
**Policy and Institutional Reforms to Improve Horticultural Markets in Pakistan
(ADP/2014/043)**

WORKING PAPER 04/18

**Consumption Patterns and Demand Elasticities of Selected
Horticulture Products in Pakistan**

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Abstract

The demand elasticities for food items at household level in Pakistan are estimated using the Quadratic Almost Demand System (QUAIDS) and changes in the consumption pattern in the food baskets over a period of fifteen years are reviewed, including a detailed analysis of demand for mango, chili and tomato. The data came from three rounds of the Household Integrated Expenditure Survey (HIES) from 2000 to 2015. We find that the share of household expenditures on mango and chili declines while it increases in the case of tomatoes. However, the size of the elasticities varies from case to case which has some interesting policy implications.

Keywords

Pakistan, QUAIDS, Domestic Demand, Household Consumption, Elasticity

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I Introduction

Household consumption is a major component of national income, and in Pakistan consumption expenditures account for around 80% of the GDP. Therefore, as Blundell (1988) points out, understanding the nature of household consumption is important to understand the impact of policies on an economy. It is particularly important for understanding the changing nature and dynamics of horticultural markets.

Pakistan is often described as an agricultural economy though the share of agriculture is no longer the major contributor to GDP. Pakistan's agricultural sector has undergone significant changes over the last several decades. For example, patterns of land utilization, input utilization, system of cropping, marketing system and the structure of the financial system closely connected with agriculture have changed in important ways. Technological changes in agriculture, such as widespread use of high yielding crop varieties, while they have contributed to higher output, have raised environmental problems such as lowering the water table and soil productivity. Similarly, rapid urbanization has shrunk the availability of land for agricultural use, increasing incentives for the use of available land for higher valued agricultural uses such as cultivation of horticulture products and crop diversification to enhance soil productivity.

There are a many studies that investigate different issues related to the production of vegetables, fruits and spices among other crops in Pakistan. Unfortunately, however, there are only a few studies that analyze the demand side of the horticulture sector in a rigorous way. The present article is an attempt to fill this gap. More specifically, we focus on estimating demand functions of selected horticultural items to derive estimates of demand elasticities to understand changes in demand patterns of horticultural products during the past fifteen years. As far as we know, our study is the first to estimate household demand functions for horticulture products in Pakistan using a rigorous system based approach, particularly one that takes into account the non-linear impact of income changes.

In this study we use a newly developed technique known as Quadratic Almost Ideal Demand System (QUAIDS) for our estimation which takes into account the non-linear impact of the income changes. Given the wide range of approaches available in formulating a demand system, it is not surprising that a large variety of functional forms demand systems have been applied in the literature. However, most of the functional forms that are theoretically consistent are also rigid in predicting consumer behavior. By rigidity we mean that the range of certain important parameters, such as own, cross price and income elasticities, is restricted by the

underlying functional form. Some examples of rigid demand systems are those based on Cobb-Douglas and CES utility functions and the linear expenditure system.

Rigidity is obviously an undesirable property that one would like to avoid in any meaningful empirical analysis. On the other hand, most of the flexible demand systems are likely to violate certain properties and hence be theoretically inconsistent. The demand systems based on translog indirect utility function, quadratic expenditure system, addilog demand system and almost ideal demand system (AIDS), for example, fall into this category. An ideal demand system would be the one that is theoretically consistent and flexible at the same time. Only AIDS comes close to this criterion. It is flexible and satisfies the adding-up, homogeneity, symmetry, and negativity criteria. However, in practical applications, AIDS can violate monotonicity and curvature. It is possible to test whether these properties hold in the neighborhood of the actual data. If it passes the two tests, AIDS would provide a rich basis for demand analysis.

However, even then AIDS has the limitation that it does not capture any non-linear impacts of income (Bank et al. 1996). It is possible that a consumer good can turn from a luxury into a necessity after a specific level of income. Despite all its other attractive properties, AIDS is unable to capture this nonlinearity. Keeping these drawbacks in view, Bank et al (1997) proposed QUAIDS for the calculation of price and income elasticities for the different basket of goods and services. Bank et al. (1997) extend the AIDS model to capture the nonlinear relationships between consumer goods and income of the consumers. There are a number of studies which utilizes QUAIDS for getting estimate of the price and income elasticities (see for Example Banks et al. (1997), Blundell and Robin (1999), Moro and Skokie (2000), Fisher et al. (2001) and Abdulai (2002)). However, QUAIDS has not been widely utilized in Pakistan.

The present study contributes to the literature in several ways. First, to the best our knowledge, this is a pioneering study, which concentrates only on the demand side analysis of selected horticultural products using a non-linear demand system. More specifically, we study the changes in demand for mangos, tomatoes and chilies over a period of fifteen years by utilizing the three rounds of PSLM data in order to relate them to the overall changes in the consumption patterns. Second, using QUAIDS we estimate the elasticities of demand of mangoes, chilies and tomatoes along with other food items for Pakistan as a whole and also at province level. The calculated elasticities are found to be consistent with a priori expectations according to microeconomic theory. It is expected that the findings of this research will help in fine tuning policies affecting the food pricing and other policies aiming at poverty alleviation.

The rest of the paper is organized as follows. Literature review is presented in section II. section III discusses the methodology. Details of the data are presented in section IV. Empirical findings are given in section V and section VI concludes the paper.

II Review of Literature

As mentioned earlier, a number of researchers have estimated demand functions for Pakistan, studying demand for food and non-food items both at individual product level and in composite commodity groups. They dissect the country level analysis into urban and rural level utilizing a variety of demand functions. Specifically, the literature on estimation of demand functions and elasticities can be divided into three main categories in the case of Pakistan. First, single equation models, second rigid system of equation and third flexible system of equations. More clearly, Ali (1981), Siddique (1982), Malik et al (1987), Malik et al (1988) and Burney and Khan (1991) estimate the Engle equation for the elasticities of various food and nonfood commodities. Almost all of them utilize the various rounds of Household Integrated Survey (HIES). Then Ali (1985), Ahmad and Ludlow (1987), Ahmad et al. (1988), Burney and Akhtar (1990) and Burney and Khan (1991) estimate the Linear expenditure system (LES) and Extended Linear Expenditure System (ELES) for the analysis of price and income elasticities.

It is interesting to mention here that price and income elasticities can be calculated through LES and ELES without using the price data. This estimation is based on the assumption that the marginal utility of one good is independent of the consumption of the other good. Deaton (1975) notes that this assumption is not plausible for food commodities because these commodities can never move independently. Then Deaton and Muellbauer (1980) specify consumer demand model in which the budget share of the i th good is a function of real total expenditure and relative prices. This overcomes the flaws of LES and ELES. This specification is known as Almost Ideal Demand System (AIDS). AIDS is a more flexible model than LES and ELES (Deaton and Mullebauer 1980). AIDS postulates that budget shares remain constant in the absence of changes in relative prices and real expenditure.

In Pakistan, Alderman (1988) is the pioneer of using the market prices data to estimate the consumer price response in a system approach. This was followed by a number of studies utilizing AIDS and Linear Approximation of AIDS (LA/AIDS) to estimate the consumption patterns of rural and urban consumers of Pakistan both for the food and non-food commodities. Surprisingly, time series data is never used except Burki (1997) for the analysis of income and price elasticities in case of Pakistan. Burki (1997) analyses consumer preferences for eight food

commodities by using the time series over the period of 1972 to 1991. The study applies generalized axiom of revealed preference (GARP) and LA/AIDS to test the existence and changes in the pattern food consumption. The study finds that there is structural shift from gram to chickens in 1982-1983. However, the sources of this shift was not discussed in the study. Furthermore, the study finds the price and income elasticities are in line with general economic theory of demand.

With the exception of the Burki (1997), almost all other studies based on AIDS and LA/AIDS are based on the cross sectional data. For example, Alderman (1988) calculates income and price elasticities using AIDS. The data come from the 1979 HIES as well as a similar urban survey conducted in 1982 using a virtually identical questionnaire. A few surprising relationships can be visualized in the rural results. The relative magnitudes of the estimated price and income elasticities were within a plausible range. Ali and Abedullah (1998) estimate demand elasticities for pulses by applying the AIDS. Their findings reveals that in general pulses have high income and price elasticities. This result was contrary to a priori expectation.

More recently, Yousaf and Khalil (2011) analyzes the demand for milk in Karachi-the biggest metropolitan city of Pakistan- by using AIDS for the year 2005-2006. The study mainly discusses the determinants of the demand for milk and finds that household expenditures and age are major determinants of the demand of milk in the case of Karachi. Similarly, Zahoor et al. (2011) use LA/AIDS to estimate the price elasticity for eight food commodity groups for Punjab province. The study finds that all food groups are price inelastic. Yousaf and Khalil (2012) explore changes in consumption patterns in the case of Baluchistan by utilizing the LA/AIDS specifications. The study finds that expenditures of the households on different food items are increasing at a decreasing rate. However, the reasons behind the change in the patterns of the consumptions are not discussed in the study. Aziz et al. (2011) also estimate LA/AIDS and find income and price elasticities for food items in line with economic theory in the case of Pakistan. However, mutton and fish are the exceptional cases in this analysis. More recently, Hayat et al. (2016) estimate LA/AIDS for the demand analysis of selected food commodities in case of Pakistan. The innovation of the study is that it uses Pakistan Panel House hold Survey (PPHS) instead of HIES¹. This study finds, based on estimated values of elasticities, that vegetables, sugar, pulses, grains ghee and food grains are necessities while meat and milk are the luxuries.

¹ PPHS is prepared by Pakistan institute of Development economics.

As mentioned earlier, Bank et al. (1997) note that AIDS and LA/AIDS, despite having the property of flexibility, do not capture the non-linear impact of income. The discussion of necessities and luxuries may be questioned on the ground of specification of AIDS. Therefore, they proposed to utilize QUAIDS for this purpose. Unfortunately, QUAIDS is not well discussed in the case of Pakistan. We find only two studies in this regards. First, Iqbal and Anwar (2014) use QUAIDS for the calculations of income and price elasticities using HIES 2010-2011. The interesting outcome of the study in our context is that the elasticities of fruits are highest in both urban and rural areas. Second, Haider and Ziadi (2017) calculate the consumption patterns. QUAIDS is quite famous in estimating the consumption patterns across the world. For example, Abdulai (2002) uses QUAIDS to analyze the food consumption behavior of Swiss families and Kumar et al. (2011) uses it for the food items in India. Uregia et al. (2012) analyses welfare impact of rising food prices on rural households in Ethiopia and Mittal (2010) estimated price and expenditure elasticities for different food items in India.

Our detailed review of literature shows that there is scope for using QUAIDS in Pakistan to estimate elasticities with a flexible approach. The present study is the first attempt to fill this gap.

III Theory and Methodology

There are many models and demand systems that have been used to estimate demand patterns of households [for example (Gorman 1981), Howe et al. (1979), Deaton and Muellbauer (1980), Lewbel 1987, 1988, 1989, 1990, 1991), Diewert and Wales (1987, 1988), Blundell (1988), Banks et al. (1997), LaFrance et al. (2002), LaFrance (2004); and LaFrance et al. (2005, 2006) and LaFrance (2008)]. However, keeping the context of our study in view, we shall focus here only on the AIDS family.

As mentioned earlier that Bank et al. (1997) extend AIDS model for the analysis of non-linear relationship and income. The new extended model is known as QUAIDS. Deaton and Muellbauer (1980) introduce an expenditure function to derive the budget share equations by exploiting the envelop theorems. Furthermore, using duality theory, the expenditure function can be converted into indirect utility function (IUF). The IUF in the case of QUAIDS is as follows:

$$\ln u = \left(\left[\frac{\ln I - \ln a(p)}{b(p)} \right]^{-1} + \lambda(p) \right)^{-1} \quad 1$$

where I is total income of household and $a(p)$, $b(p)$ and $\lambda(p)$ are vectors of prices. Bank et al. (1997) further explain these vector in following way:

$$\ln a(p) = \alpha_0 + \sum_{i=1}^n \alpha_i \ln p_i + \frac{1}{2} \sum_{i=1}^n \sum_{j=1}^n \gamma_{ij} \ln p_i \ln p_j,$$

$$b(p) = \prod_{i=1}^n p_i^{\beta_i} \quad \text{and}$$

$$\lambda(p) = \sum_i \lambda_i \ln p_i$$

Then there are few theoretical restrictions on the parameters to ensure that the demand function will be a well behaved function:

$$\sum_{i=1}^n \alpha_i = 1, \quad \sum_{i=1}^n \beta_i = 0, \quad \sum_{i=1}^n \gamma_{ij} = 0 \quad \text{and} \quad \sum_{i=1}^n \lambda_i = 0$$

The symmetry condition of the Slutsky matrix requires $\gamma_{ij} = \gamma_{ji}$

The share equation for QUAIDS model can be obtained by applying Roy's identity:

$$w_i(p) = \alpha_i + \sum_j \gamma_{ij} \ln p_j + \beta_i \left[\ln \frac{I}{a(p)} \right] + \frac{\lambda_i}{b(p)} \left[\ln \frac{I}{a(p)} \right]^2 \quad 2$$

where p_i and p_j represent vectors of prices of i^{th} and j^{th} commodities, and α_0 , α_j and γ_{ij} are the vectors of parameters.

The restrictions on the parameters ensure that the demand function is a well-behaved function. However, the cost of these restrictions is that the direct parameters are no more interpretable (Lewbel 1991). Therefore, we estimate price and income elasticities for better understanding of consumption patterns. To accomplish the task, the share equation 2 is differentiated with respect to price and income to get the expressions, which can be used for the calculation of price elasticities and income elasticities.

$$v_i = \frac{\partial w_i}{\partial \ln I} = \beta_i + \frac{2\lambda_i}{b(p)} \ln \frac{I}{a(p)} \quad 3$$

$$v_{ij} = \frac{\partial w}{\partial p_j} = \gamma_{ij} - u_i \left(\alpha_j + \sum_k \gamma_{jk} \ln p_k \right) - \frac{\lambda_i \beta_j}{b(p)} \ln^2 \frac{I}{a(p)} \quad 4$$

then the expression for income, uncompensated price elasticity and compensated price elasticities will be, respectively, as follows:

$$e_i = \frac{u_i}{w_i} + 1 \quad 5$$

$$e_{ij}^v = \frac{v_{ij}}{w_i} + \delta_{ij} \quad 6$$

Where δ_{ij} is the Keonecker delta.

and

$$e_{ij}^c = e_{ij}^u + e_i w_i \quad 7$$

IV Data Preparation

The data is taken from various issues of Household Integrated Expenditure Survey (HIES). As mentioned earlier, we are going to conduct a Pakistan level and province wise analyses. The number of households in the surveys varies across the regions. Table 1 shows the number of households which are used in three different rounds of surveys (see table).

The data preparation for estimation of QUAIDS model is the most important part, which comprises of several steps. First, we compute total monthly food expenditure of each household. The data on monthly expenditure is collected at various frequencies, for example, fortnightly and monthly. The food expenditure which is asked fortnightly, for example milk, is multiplied by 2.17 to make it monthly. By adding expenditure on all food items, we have total monthly food expenditure of each household in one data file.

Then, we have to identify the food groups, for which we want to compute the elasticities. For example, in our case we divided the monthly food expenditure into 17 food groups - cereals, pulses, mango, chili and tomatoes etc (see Table A1 in appendix). In the third step, we compute food expenditure for each food item separately for each household. Then, we compute consumption share of each food item as we have total food expenditure and separate expenditure on each food item². We compute consumption shares by dividing the food expenditure on each food item with total food expenditure. the shares must add up to 1.

The second item which we need is the price of each food item to determine the elasticity. In computing the demand system, we use unit values as proxy for prices. The unit value for each food item is simply the expenditure divided by quantity. Compute the monthly food expenditure for each food item, then the total quantity of each food item. Now divide the value (expenditure) by quantity for getting the unit value.

² Note that before computing shares, we replaced the missing values with zero for each food item.

Table 1: No. of Households in the three rounds of HIES

	2001-02	2010-11	2015-16
Pakistan	16, 057	16341	24238
Rural	5, 872	9752	8083
Urban	10, 185	6589	16155
KP	6, 310	2954	5209
Sindh	2, 666	4098	6176
Baluchistan	2, 025	2335	2345
Punjab	3, 706	6954	10508

Source: HIES

V Empirical Findings

i. Changes in the Consumption Patterns/Some Stylized Facts

Table 2 shows the dynamics of change in the consumption patterns by different regions of Pakistan. It is important to note that these changes are caused by a combination of factors which shift the demand or supply curves or changes in prices. It is evident from the table that cereals, Milk and Milk products dominated in total food expenditure throughout the last fifteen years, with the exception of Balochistan. Overall around 40 to 45% of the expenditures are allocated to Cereal, Milk and Milk products, whereas, in Balochistan, household spent around 1/3rd of their budget on these products. As opposed to other provinces, households in Balochistan spent more (around 15.9% in 2001-02 and 12.9% in 2015-16 of the total budget) Meat and Poultry. The general trend is that the proportion of income spend on Milk and Milk product increased over time and household ended up spending the highest on Milk and Milk products in 2015-16. This is followed by Cereal which was the highest contributor in 2001-02. The share of Cereals has declined by 23.07% and that of Milk has increased by 23.79%. This shows the diversification of households towards high value products from staple food. It is interesting to see that food expenditures on cereals in urban area dropped significantly while it increased by 6.78 percent in rural areas of Pakistan. Expenditures on Milk and Milk products have however increased in rural as well as in urban areas.

In 2015-16, after Milk and Milk Products, Cereals have the highest share at regional level (20.80% for rural and 16.36% for urban households), followed by Tea (7.65%), Meat

(7.55%) and Sugar (6.53%) for rural households, and by Meat (9.94%), Tea (6.97%), and Sugar (5.33%) in case of urban household.

At provincial level, the share of expenditure spent on Cereals has declined in all four Provinces with maximum decline observed (33.15%) in Punjab. In contrast, the budgetary allocation for Milk & its Products has increased in four Provinces, with the maximum increase in Punjab (57.45%). Overall, expenditures have moved away from Cereals towards Milk and Milk products, Other Fruits, Other Vegetables, Beverages and Readymade food, Other Spices (in rural areas only), Meat (Poultry) (in rural areas only) and Tomatoes. The share of food expenditures on fruits has increased in Pakistan - from 3.09 percent in 2001-02 to 4.11 percent in 2015-16. The increase is more pronounced in rural areas than in urban areas. It is also interesting to note that the share of food expenditure on fruits has increased in all provinces except in Balochistan.

The case of mango is much more interesting. The expenditure shares on mango declined significantly in all cases. Our price elasticities estimates shows that there is a marked increase in the price elasticities of Mango making it the most price elastic commodity among those included in our estimation. Mango seems to have changed from a necessity into a luxury good. The expenditure share on Potato and Chilies has declined in both rural and urban households. However, the share of expenditure on Tomato has increased for both rural (by 10.8%) and urban (by 25.7%) households. The share of Pulses has declined by 7.85% and 4.15% for rural and urban households respectively.

The expenditure share for Other Fruits has also increased for Punjab (more than doubled), and it has also significantly increased for KP (90%). The increase in expenditure share of Fruits in Sindh (19.7%) is lower as compared with Punjab and KP and higher as compared to Baluchistan (7.88%). This may be due to the poor economic condition of the households in KP and Baluchistan. On the other hand, within a period of 15 years the share of expenditure spent on Pulses has declined for Provinces other than Punjab and Baluchistan. However, the expenditure share of Meat has declined for Punjab (25.47%) and Baluchistan (18.73%) but increased for Sindh (15.88%) and KP (28.75%). This indicate a clear change in the taste and preferences of households in the four provinces.

Similarly, the share of expenditure on other vegetables has increased for four Provinces. The share of Potato has however declined in all the provinces. Like potato, the expenditure share of Sugar has also declined in the four Provinces, with the maximum decline in the case of Sindh (52.39%). Tea has a significant share in the budgetary allocation of households in Pakistan. Its share has declined in all the Provinces, with the maximum decline in KP (33.70%).

An interesting trend is observed in the consumption of Beverages and Readymade food in Pakistan, where a remarkable increase can be seen in its consumption from 2001-02 to 2015-16. The increase is maximum for Baluchistan (more than 4 times).

The budgetary allocation of households at overall, regional, and provincial level reveals that the consumption pattern has moved towards a more diversified basket. The expenditure share of Cereals has declined substantially within a period of 15 years and consumption has been diverted towards more nutritive food items like Milk, Fruits, and Vegetables. This indicates a healthy sign for people in Pakistan that they are moving their consumption basket from traditional Cereal-based food towards more nutritious food. However, the rural households are not as better off as their urban counterparts.

ii. Elasticities

As mentioned earlier, we estimate QUAIDS for food group with a special attention to horticultural products for three different rounds of HIES. We estimate equation 2 using Log likelihood function by imposing various restrictions, like adding up, Symmetry, homogeneity and convexity on the parameters of the model. Bank et al (1997) postulate that QUAIDS is a well behaved model. Empirically, the well behavior of the function is ensured when the curvature condition satisfies. Therefore, the natural start of an analysis of any flexible demand function is to test its curvature condition. To accomplish this task, we find Eigen values for 17 commodities. All Eigen values are negative which will produce a semi-negative indefinite Slutsky matrix.

The literature on the estimation of demand function uses the phrase that the demand function should be well behaved for workable purposes. The workability implies that the demand function may be used for policy implications. The literature postulates that a well-behaved demand function must fulfill the properties of monotonicity, convexity, symmetry and homogeneity. Empirically, we need non-positive Eigen values to fulfill the curvature condition. It is also important to mention here that the curvature condition is automatically met if the properties of convexity and monotonicity are satisfied. Interestingly, the curvature condition is imposed in QUAIDS type flexible demand system (Chang and Serletis 2012). According to this statement the flexible demand system is inevitable for appropriate empirical findings. We find non-positive Eigen values, which ensures that the curvature condition is satisfied in our case³.

³ However, we are not presenting the results of curvature condition keeping brevity in view.

The primary objective of the paper is to estimate the demand elasticities in the case of horticultural products in the case of Pakistan. Therefore, the discussion on the estimated parameter is beyond the scope of study. However, one thing which is important to mention here is that significant estimates of lambda parameters (λ) imply that the QUAIDS is a valid model in the case of Pakistani household data. According to the best of our knowledge, there is no study which estimates the QUAIDS for the composite commodity group in the case of Pakistan.

The income, compensated and uncompensated elasticities are shown in Table 3.

iii. **Income Elasticities:**

All food groups are characterized as normal goods as all income elasticities are positive at national, regional, and provincial level for the respective three years (Except for Mango in case of Baluchistan for the year 2015-16). The demand for Cereals, Tea, Milk and Milk Products, Sugar, Beverages & Readymade food was elastic in 2001-02. These elasticities however declined over time. Whereas the demand for Cereal and Sugar is still income elastic, Milk and Milk products are unitary elastic. The elasticity for Milk & its Products and Cereals declined from 1.08 to 1.01 and 1.20 to 1.14 from 2001-02 to 2015-16 respectively. The income elasticity for Sugar & its Products declined from 2.11 in 2001-02 to 1.48 in 2015-16. Tea and Beverages & Readymade food have however become relatively less elastic with respect to income. This implies that household spends relatively less on these commodities when their income increases and vice versa. These trends are however not consistent across rural and urban areas and across provinces. Cereal for example has become relatively more elastic in rural areas and relatively less elastic in urban areas. Similarly, it has become relatively more elastic in Sindh and KP and less elastic in Balochistan and Punjab.

It is interesting to note that the demand for Cereals in income-elastic, at regional and provincial level as Cereals is normally found to be income inelastic relative to the demand for high value food (Milk, Meat etc.). It is already shown in **Table-2** that the share of expenditure on Cereals has declined substantially over the period of 15 years (this reduction is due to reduced demand for Cereals in urban areas). This trend of reduction in the consumption of staple food is also observed elsewhere in the world. Some studies attributed this decline to the dramatic increase in the world food prices between 2006 and 2008. This increase was particularly stark for rice, corn, and wheat. Further large increase took place in 2010 and 2011.

Whereas the income elasticity of Pulses, Edible oil, Baked items, Tomato, Vegetable Oil and Chilies is relatively stable when we compare the 2001-02 values with 2015-16 magnitudes, the demand for Meat, Other Fruits, Potato, and Other Spices has increased but still income inelastic and the income elasticity of demand for Mangoes has decreased from 0.75 to

0.41. Again these patterns are different across the rural and urban areas and across provinces. For example, the decline in Mangoes' income elasticity is observed in urban area only. Similarly, the income elasticity of Mangoes has declined in Sindh, KP and Balochistan and increased in Punjab.

With the exception of Meat and other Spices, the income elasticities across rural and urban areas are not too far from each other. There are however wide disparities in income elasticities at provincial level due to changes in the taste and preferences of consumers as pointed out above.

iv. Price Elasticities:

Compensated price elasticity shows a change in quantity demanded because of a change in prices by capturing only the Substitution Effect. Uncompensated elasticity, on the other hand, captures both the Substitution Effect as well as the Income Effect. These own price elasticities are found to be negative for all food items, overall, at regional and at Provincial level.

With the exception of Mango and Chili, all other products have own price elasticities less than 1 implying that these goods are necessities in the household basket. This is true across provinces and rural urban divide. Within a period of 15 years the responsiveness of households to curtail the demand as a result of the increase in prices have declined in Pakistan for food groups Tea, Baked items, Chilies, Other Spices, and Tobacco. It means consumers are unable to decrease the demand for these food items considerably whenever there is an increase in prices and vice-versa. The compensated elasticity for Cereals has increased from 2001-02 to 2015-16, indicating that consumers are shifting their demand towards other food items. In 2015-16, the magnitude of compensated elasticities is lower for Pulses, Potato, Other Vegetables, and Tobacco than that of Milk, Meat, Chilies, Other Spices and Beverages and Readymade food. It implies that the price elasticity of high value food is higher than that of other food items. With the inflation in food prices consumers will shift their demand towards commodities with lower own price elasticities.

In 2015-16, the magnitude of compensated elasticities for rural household is much lower for most of the food items than that of urban households. It implies that with inflation in food prices, rural households will be affected more than the urban households. However, if we look at the magnitude of compensated elasticities for 2010-11 and 2001-02 for most of the food items the elasticity estimates are higher for urban households. It means that with the passage

of time, rural households are worse off in terms of consumption of food items assuming price hikes.

At Provincial level, in 2015-16 the compensated elasticity for Milk is highest and equal for Punjab and Baluchistan, followed by Sindh and KP. The compensated elasticity for Meat is also the highest for Punjab in 2015-16 followed by Baluchistan, Sindh and KP. For the food groups Other Fruits and Beverages and Readymade food, the own price elasticity increased for all the province from 2001-02 to 2015-16 except for Balochistan, however a lower increase is observed in case of Beverages category. Similarly, the compensated elasticity for Potato and Tomato increased for all the Provinces within a period of 15 years. In case of Chilies, the Hicksian elasticity has declined for Sindh and Punjab, however, increased for KP and Baluchistan from 2001-02 to 2015-16. It can be observed that the compensated elasticity for Pulses declined considerably for Baluchistan (from - 0.52 to -0.38) from 2001-02 to 2015-16), however it increased for other Provinces.

Across the food items, the elasticity estimates for Mango is surprising as it is against a-priori expectations as they are highly elastic in most of the cases. It used to be a necessity in 2001-02 and has become a luxury product in 2015-16. Looking at the share of Mango, it can be seen from Table 2, that it has declined overall, at regional and provincial level. On the other hand, the expenditure elasticity for Mango also declined from 2001-02 to 2015-16 overall, at regional and Provincial level except for Punjab indicating a lesser response from consumers in their purchasing habit in response to change in their real income. The income elasticity decreased substantially for Baluchistan so that Mango turned to be an inferior good for the province in 2015-16, as its income elasticity is negative. The magnitude of uncompensated and compensated elasticity of demand in case of mango coincide, since its share in consumer's expenditure is very low which together with the low income elasticities make the income effect negligible

While introducing the QUAIDS model, we put several restrictions to ensure the workability of the model to be consistent with microeconomic theory. We apply likelihood ratio, following the literature, to test validity of the restrictions. We use the likelihood ratio test to test for $\lambda = 0$ which relies on the and the unrestricted model, which is the most important test as far as validity of the QUAIDS model is concerned. We reject the null hypothesis of $\lambda = 0$ which implies that QUAIDS is a valid model in our case.

VI Conclusion

This paper presents estimates using QUAIDS for selected horticultural products in Pakistan. The advantage of estimating QUAIDS over the other flexible and non-flexible demand model is that it captures the nonlinearity in Engel curve, which is a particularly desirable property to have in the case of a developing country. We do this exercise for the food groups in general and for selected horticulture products, Mango, Chilies and Tomatoes.

We find that the consumption patterns have changed significantly over the last fifteen years. Household expenditure shares have changed with shifts from cereal food items to dairy products, milk products and fruits and vegetables. In the case of our selected horticultural products, there is a notable decrease in the share of expenditures on mangoes and chili, and an increase in tomatoes. We also see that there are wide disparities in income elasticities at provincial level due to changes in the tastes and preferences of consumers. With the exception of mango and chili, all other products have own price elasticities less than 1 implying that these goods are ‘necessities’ in the household basket. This is true across provinces and the rural urban divide. Mango used to be a necessity in 2001-02 but is no longer so in 2015-16. These provide the basis for understanding the likely changes in future demand for these products and to formulate policies to benefit both producers and consumers of these products.

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Appendix

Table 2: Changes in Food Consumption Pattern in Pakistan

Food Commodity		2001-02	2010-11	2015-16	Change% 2001-02- 2015-16	
Cereals	Overall	23.19	20.92	17.84	-23.07	
	Rural	19.48	19.01	20.80	6.78	
	Urban	25.32	22.20	16.36	-35.39	
	Punjab	25.61	20.61	17.12	-33.15	
	Sindh	22.84	23.32	17.81	-22.02	
	Baluchistan	24.23	23.68	20.35	-16.01	
	KP	21.30	19.15	18.20	-14.55	
	Pulses	Overall	2.70	2.76	2.55	-5.56
Pulses	Rural	2.80	2.75	2.58	-7.86	
	Urban	2.65	2.76	2.54	-4.15	
	Punjab	2.08	2.46	2.52	21.15	
	Sindh	2.12	2.93	2.01	-5.19	
	Baluchistan	3.06	3.36	3.44	12.42	
	KP	3.12	2.66	2.85	-8.65	
	Edible Oils	Overall	1.91	1.89	1.50	-21.47
	Edible Oils	Rural	2.43	2.37	1.09	-55.14
Urban		1.60	1.57	1.71	6.87	
Punjab		1.94	2.31	1.47	-24.23	
Sindh		2.06	1.86	1.94	-5.83	
Baluchistan		0.88	1.06	1.10	25.00	
KP		2.37	1.94	1.22	-48.52	
Tea		Overall	9.32	10.48	7.20	-22.75
Tea		Rural	9.19	10.06	7.65	-16.76
	Urban	9.40	10.76	6.97	-25.85	
	Punjab	8.51	9.64	7.68	-9.75	
	Sindh	8.93	11.11	6.71	-24.86	
	Baluchistan	9.23	9.90	7.49	-18.85	
	KP	10.06	10.91	6.67	-33.70	
	Baked Items	Overall	3.66	2.49	2.77	-24.32
	Baked Items	Rural	3.39	2.36	3.09	-8.85
Urban		3.81	2.58	2.61	-31.50	
Punjab		4.11	3.51	2.24	-45.50	
Sindh		4.89	2.83	3.38	-30.88	
Baluchistan		4.20	2.80	3.26	-22.38	
KP		2.40	1.64	2.89	20.42	
Milk & Milk Products		Overall	19.63	20.59	24.30	23.79
Milk & Milk Products		Rural	19.88	20.81	25.43	27.92
	Urban	19.49	20.44	23.74	21.81	
	Punjab	17.93	21.40	28.23	57.45	
	Sindh	18.84	18.85	22.31	18.42	
	Baluchistan	12.54	10.09	16.04	27.91	
	KP	22.94	24.38	22.48	-2.01	
	Meat/Poultry	Overall	9.71	9.86	9.14	-5.87
	Meat/Poultry	Rural	11.86	11.34	7.55	-36.34
Urban		8.47	8.86	9.94	17.36	
Punjab		10.56	10.57	7.87	-25.47	
Sindh		7.87	8.21	9.12	15.88	
Baluchistan		15.91	15.14	12.93	-18.73	

Food Commodity		2001-02	2010-11	2015-16	Change% 2001-02- 2015-16
	KP	7.79	8.37	10.03	28.75
Mango	Overall	0.69	0.21	0.08	-88.41
	Rural	0.92	0.25	0.05	-94.57
	Urban	0.56	0.17	0.10	-82.14
	Punjab	1.20	0.08	0.02	-98.33
	Sindh	0.40	0.19	0.14	-65.00
	Baluchistan	0.23	0.17	0.22	-4.35
	KP	0.77	0.29	0.07	-90.91
Other Fruits	Overall	2.40	2.80	4.03	67.92
	Rural	3.09	3.38	3.33	7.77
	Urban	2.01	2.41	4.37	117.41
	Punjab	1.86	2.28	4.43	138.17
	Sindh	2.58	2.97	3.09	19.77
	Baluchistan	2.92	1.91	2.69	-7.88
	KP	2.60	3.34	4.94	90.00
Potato	Overall	2.38	2.36	1.56	-34.45
	Rural	3.09	2.15	1.84	-40.45
	Urban	2.43	2.50	1.42	-41.56
	Punjab	2.43	2.52	1.58	-34.98
	Sindh	2.27	2.36	1.62	-28.63
	Baluchistan	2.13	2.69	1.45	-31.92
	KP	2.49	2.15	1.50	-39.76
Tomato	Overall	1.08	1.41	1.29	19.44
	Rural	1.20	1.43	1.33	10.83
	Urban	1.01	1.40	1.27	25.74
	Punjab	0.89	1.04	0.92	3.37
	Sindh	2.02	2.42	1.16	-42.57
	Baluchistan	1.44	2.42	1.92	33.33
	KP	0.59	0.86	1.91	223.73
Other Vegetables	Overall	5.05	5.71	6.90	36.63
	Rural	4.97	5.61	7.16	44.06
	Urban	5.10	5.78	6.77	32.75
	Punjab	4.68	4.97	7.09	51.50
	Sindh	4.62	5.19	6.49	40.48
	Baluchistan	5.69	7.08	7.94	39.54
	KP	5.45	5.92	6.63	21.65
Chilies	Overall	1.38	1.06	0.87	-36.96
	Rural	1.21	1.03	0.99	-18.18
	Urban	1.47	1.08	0.81	-44.90
	Punjab	1.45	1.24	1.05	-27.59
	Sindh	0.62	0.39	1.07	72.58
	Baluchistan	1.70	0.90	0.42	-75.29
	KP	1.70	1.29	0.48	-71.76
Other Spices	Overall	2.28	2.51	2.73	19.74
	Rural	2.63	2.75	2.47	-6.08
	Urban	2.09	2.35	2.87	37.32
	Punjab	2.15	1.97	2.45	13.95
	Sindh	2.32	2.51	3.22	38.79
	Baluchistan	2.60	2.49	2.98	14.62
	KP	2.21	2.83	2.62	18.55
Sugar and its Products	Overall	8.68	9.64	5.73	-33.99
	Rural	7.52	8.68	6.53	-13.16

Food Commodity		2001-02	2010-11	2015-16	Change% 2001-02- 2015-16
	Urban	9.35	10.29	5.33	-42.99
	Punjab	7.36	9.23	5.09	-30.84
	Sindh	12.56	11.22	5.98	-52.39
	Baluchistan	8.82	12.63	7.31	-17.12
	KP	8.25	8.20	5.98	-27.52
Beverages and Readymade food	Overall	2.79	3.19	8.92	219.71
	Rural	4.25	4.10	5.14	20.94
	Urban	1.96	2.57	10.81	451.53
	Punjab	3.23	3.11	7.65	136.84
	Sindh	3.39	2.57	10.64	213.86
	Baluchistan	1.48	1.88	7.47	404.73
	KP	2.60	3.94	10.10	288.46
Tobacco	Overall	3.14	2.12	2.58	-17.83
	Rural	2.91	1.90	2.96	1.72
	Urban	3.28	2.27	2.38	-27.44
	Punjab	4.08	3.07	2.59	-36.52
	Sindh	1.67	1.07	3.40	103.59
	Baluchistan	2.94	1.81	3.01	2.38
	KP	3.34	2.12	1.38	-58.68

Table 3: Income Elasticities

Area	Year	Cereals	Pulses	Edible Oils	Tea	Baked	Milk and Products	Meat	Mango	Other Fruits	Potato	Tomato	Other Vegetables	Chilies	Other Spices	Sugar	Beverages & Ready-made food	Tobacco
Pakistan	2001-02	1.20	0.80	0.86	1.10	0.83	1.08	0.65	0.75	0.64	0.83	0.85	0.75	0.79	0.58	2.11	1.01	1.00
	2010-11	1.15	0.79	0.98	0.98	1.03	1.02	0.85	0.52	0.83	1.10	1.03	0.82	0.87	0.67	1.73	0.97	0.57
	2015-16	1.14	0.84	0.91	0.94	0.84	1.01	0.96	0.41	0.90	0.94	0.91	0.77	0.78	0.70	1.48	0.94	0.47
Rural	2001-02	1.16	0.91	0.90	1.09	0.85	0.97	0.68	0.74	0.67	0.84	0.92	0.81	0.76	0.57	2.70	1.00	1.04
	2010-11	1.18	0.79	1.03	0.97	0.92	0.90	0.93	0.75	0.95	1.09	1.13	0.83	0.85	0.63	1.46	1.05	0.76
	2015-16	1.20	0.82	0.95	1.00	0.90	1.07	0.92	0.72	0.86	0.97	0.91	0.75	0.80	0.65	1.19	0.92	0.52
Urban	2001-02	1.17	0.74	0.82	1.06	0.99	1.16	0.72	0.90	0.71	0.83	0.80	0.69	0.73	0.65	1.79	0.97	1.02
	2010-11	1.13	0.81	0.94	0.98	1.22	0.99	0.93	0.52	0.81	1.12	0.98	0.82	0.83	0.71	1.62	0.91	1.02
	2015-16	1.07	0.85	0.88	0.89	0.86	0.98	0.99	0.33	0.95	0.90	0.90	0.77	0.75	0.73	1.67	0.93	0.48
Sindh	2001-02	1.13	0.79	0.84	1.06	0.62	0.97	0.90	0.79	0.69	0.95	0.85	0.77	0.90	0.68	1.79	1.30	0.83
	2010-11	1.21	0.75	1.02	1.10	0.29	0.92	0.92	0.71	0.75	0.92	0.65	0.74	1.02	0.79	1.46	1.17	1.00
	2015-16	1.24	0.75	0.95	0.83	1.04	1.07	0.59	0.57	0.77	1.13	0.93	0.77	0.87	0.53	1.66	0.68	0.64
KP	2001-02	1.01	0.79	0.81	1.01	0.99	1.27	0.95	0.98	0.76	0.77	0.78	0.68	0.62	0.62	1.68	0.90	1.08
	2010-11	1.00	0.87	0.88	0.95	1.03	1.18	0.96	0.47	0.81	0.92	0.81	0.80	0.71	0.65	2.06	0.91	0.78
	2015-16	1.11	0.80	1.01	1.06	0.76	1.00	0.72	0.61	0.83	0.93	0.64	0.91	0.93	0.74	1.43	0.96	1.10
Baluchistan	2001-02	1.25	0.62	0.80	0.93	1.23	1.16	0.57	0.97	0.75	0.97	0.59	0.73	0.82	0.59	1.79	0.92	1.04
	2010-11	1.12	0.65	1.08	1.15	1.25	1.16	0.55	0.78	0.88	1.15	1.16	0.90	0.97	0.70	1.17	0.80	1.14
	2015-16	1.22	0.71	0.97	0.90	0.87	0.90	0.74	-0.07	0.90	1.07	0.77	0.64	0.87	0.66	1.62	1.24	0.83
Punjab	2001-02	1.36	0.78	0.93	0.97	0.93	1.04	0.44	0.40	0.49	0.67	0.71	0.77	0.90	0.49	2.22	0.94	1.06
	2010-11	1.24	0.70	1.07	0.79	1.30	1.10	0.41	0.67	0.81	1.25	0.91	0.83	0.92	0.70	1.71	0.89	0.85
	2015-16	1.05	0.87	0.86	0.99	0.84	1.06	1.02	0.70	0.91	0.79	0.81	0.75	0.75	0.76	1.42	0.88	0.88

Uncompensated Elasticities																		
Area	Year	Cereals	Pulses	Edible Oils	Tea	Baked	Milk and Products	Meat	Mango	Other Fruits	Potato	Tomato	Other Vegetables	Chilies	Other Spices	Sugar	Beverages & Readymade	Tobacco
Pakistan	2001-02	-0.87	-0.62	-0.67	-1.34	-0.99	-0.79	-0.51	-0.62	-0.57	-0.56	-0.60	-0.53	-1.45	-0.84	-0.69	-1.01	-1.03
	2010-11	-0.87	-0.64	-0.74	-0.91	-0.86	-0.85	-0.76	-1.71	-0.69	-0.43	-0.73	-0.49	-1.45	-0.72	-0.58	-1.01	-0.37
	2015-16	-0.92	-0.67	-0.78	-0.80	-0.80	-0.86	-0.78	-4.98	-0.74	-0.50	-0.72	-0.64	-1.31	-0.77	-1.05	-1.01	-0.39
Rural	2001-02	-0.83	-0.58	-0.71	-1.31	-0.84	-0.84	-0.43	-0.61	-0.51	-0.57	-0.60	-0.55	-1.38	-0.82	-0.40	-1.01	-0.86
	2010-11	-0.87	-0.62	-0.78	-0.91	-0.80	-0.87	-0.74	-1.73	-0.66	-0.47	-0.71	-0.50	-1.33	-0.72	-0.47	-1.01	-0.40
	2015-16	-0.95	-0.66	-0.74	-0.81	-0.84	-0.83	-0.82	-4.91	-0.76	-0.42	-0.73	-0.60	-1.37	-0.77	-0.99	-1.00	-0.35
Urban	2001-02	-0.90	-0.63	-0.65	-1.36	-1.14	-0.78	-0.57	-0.62	-0.61	-0.56	-0.60	-0.52	-1.51	-0.86	-0.81	-0.99	-1.09
	2010-11	-0.88	-0.65	-0.73	-0.90	-1.02	-0.74	-0.79	-1.70	-0.71	-0.40	-0.74	-0.49	-1.57	-0.72	-0.39	-1.00	-0.62
	2015-16	-0.90	-0.67	-0.80	-0.79	-0.78	-0.88	-0.76	-4.98	-0.73	-0.54	-0.71	-0.66	-1.27	-0.78	-1.00	-1.01	-0.39
Sindh	2001-02	-0.89	-0.72	-0.68	-1.08	-0.86	-0.75	-0.76	-0.08	-0.56	-0.60	-0.30	-0.60	-1.43	-0.93	-0.44	-0.99	-1.12
	2010-11	-0.86	-0.69	-0.77	-0.64	-0.77	-0.87	-0.81	-1.48	-0.70	-0.52	-0.36	-0.54	-1.53	-0.89	-0.54	-1.00	-1.04
	2015-16	-0.90	-0.72	-0.83	-0.68	-0.76	-0.87	-0.44	-5.46	-0.80	-0.47	-0.66	-0.61	-0.82	-0.71	-1.05	-0.99	-0.29
KP	2001-02	-0.82	-0.58	-0.64	-1.30	-0.99	-0.79	-0.75	-0.69	-0.55	-0.55	-0.70	-0.46	-0.79	-0.80	-0.39	-1.00	-1.01
	2010-11	-0.81	-0.65	-0.70	-0.95	-0.87	-0.88	-0.79	-2.11	-0.65	-0.46	-0.81	-0.54	-0.63	-0.81	-0.31	-1.01	-0.24
	2015-16	-0.89	-0.59	-0.77	-0.69	-0.81	-0.82	-0.45	-4.57	-0.72	-0.44	-0.49	-0.58	-1.36	-0.85	-1.00	-1.01	-0.82
Baluchistan	2001-02	-0.85	-0.54	-0.71	-1.11	-1.07	-0.83	-0.42	-0.04	-0.56	-0.53	-0.46	-0.52	-1.88	-0.76	-1.05	-1.00	-1.00
	2010-11	-0.96	-0.36	-0.80	-0.88	-0.94	-0.92	-0.41	-0.91	-0.75	-0.43	-0.50	-0.36	-1.97	-0.64	-0.95	-1.04	-0.22
	2015-16	-0.99	-0.40	-0.79	-0.79	-0.85	-0.84	-0.71	-5.37	-0.80	-0.47	-0.50	-0.47	-1.90	-0.87	-1.09	-1.02	-0.36
Punjab	2001-02	-0.86	-0.72	-0.78	-1.15	-0.99	-0.78	-0.52	-1.00	-0.61	-0.54	-0.67	-0.60	-1.12	-0.85	-1.11	-1.02	-0.88
	2010-11	-0.96	-0.36	-0.80	-0.88	-0.94	-0.92	-0.41	-0.91	-0.75	-0.43	-0.50	-0.36	-1.97	-0.64	-0.95	-1.04	-0.22
	2015-16	-0.90	-0.73	-0.75	-0.72	-0.81	-0.88	-0.80	-3.60	-0.71	-0.54	-0.79	-0.63	-0.73	-0.77	-0.91	-1.00	-0.19

Compensated Elasticities

Area	Year	Cereals	Pulses	Edible Oils	Tea	Baked	Milk and Products	Meat	Mango	Other Fruits	Potato	Tomato	Other Vegetables	Chilies	Other Spices	Sugar	Beverages & Medicinal	Tobacco
Pakistan	2001-02	-0.59	-0.59	-0.59	-1.30	-0.97	-0.58	-0.45	-0.63	-0.55	-0.54	-0.59	-0.49	-1.44	-0.83	-0.64	-0.92	-1.00
	2010-11	-0.63	-0.62	-0.64	-0.88	-0.84	-0.64	-0.68	-1.71	-0.67	-0.40	-0.71	-0.45	-1.45	-0.70	-0.52	-0.92	-0.36
	2015-16	-0.72	-0.65	-0.71	-0.77	-0.78	-0.61	-0.70	-4.98	-0.70	-0.49	-0.71	-0.59	-1.30	-0.75	-0.92	-0.95	-0.38
Rural	2001-02	-0.56	-0.55	-0.62	-1.27	-0.82	-0.65	-0.36	-0.61	-0.50	-0.55	-0.59	-0.50	-1.37	-0.81	-0.32	-0.92	-0.83
	2010-11	-0.62	-0.60	-0.67	-0.89	-0.78	-0.69	-0.65	-1.73	-0.63	-0.44	-0.70	-0.45	-1.32	-0.71	-0.42	-0.91	-0.39
	2015-16	-0.73	-0.64	-0.67	-0.78	-0.82	-0.57	-0.73	-4.91	-0.73	-0.40	-0.72	-0.55	-1.37	-0.76	-0.88	-0.95	-0.34
Urban	2001-02	-0.63	-0.61	-0.57	-1.32	-1.12	-0.55	-0.50	-0.62	-0.59	-0.54	-0.59	-0.49	-1.50	-0.85	-0.76	-0.91	-1.06
	2010-11	-0.65	-0.63	-0.63	-0.88	-0.99	-0.53	-0.70	-1.70	-0.68	-0.38	-0.72	-0.44	-1.56	-0.70	-0.34	-0.92	-0.60
	2015-16	-0.71	-0.65	-0.74	-0.77	-0.77	-0.64	-0.67	-4.98	-0.69	-0.52	-0.70	-0.61	-1.26	-0.76	-0.85	-0.95	-0.37
Sindh	2001-02	-0.62	-0.70	-0.60	-1.05	-0.85	-0.56	-0.68	-0.09	-0.54	-0.58	-0.29	-0.56	-1.42	-0.92	-0.39	-0.88	-1.10
	2010-11	-0.61	-0.67	-0.66	-0.61	-0.77	-0.68	-0.71	-1.49	-0.68	-0.50	-0.35	-0.50	-1.52	-0.87	-0.49	-0.89	-1.02
	2015-16	-0.68	-0.70	-0.76	-0.66	-0.75	-0.61	-0.39	-5.46	-0.77	-0.45	-0.65	-0.56	-0.82	-0.69	-0.90	-0.95	-0.28
KP	2001-02	-0.59	-0.56	-0.57	-1.26	-0.97	-0.54	-0.66	-0.70	-0.53	-0.54	-0.69	-0.42	-0.78	-0.79	-0.35	-0.92	-0.97
	2010-11	-0.60	-0.63	-0.60	-0.93	-0.86	-0.64	-0.70	-2.11	-0.63	-0.44	-0.80	-0.50	-0.62	-0.80	-0.24	-0.93	-0.22
	2015-16	-0.70	-0.57	-0.70	-0.66	-0.80	-0.58	-0.38	-4.57	-0.69	-0.43	-0.48	-0.51	-1.35	-0.83	-0.88	-0.96	-0.79
Baluchistan	2001-02	-0.56	-0.52	-0.64	-1.07	-1.04	-0.61	-0.37	-0.04	-0.55	-0.51	-0.45	-0.48	-1.87	-0.75	-1.00	-0.92	-0.97
	2010-11	-0.73	-0.34	-0.68	-0.85	-0.92	-0.68	-0.35	-0.91	-0.72	-0.40	-0.48	-0.31	-1.96	-0.62	-0.91	-0.96	-0.19
	2015-16	-0.77	-0.38	-0.72	-0.77	-0.84	-0.62	-0.64	-5.37	-0.77	-0.46	-0.49	-0.43	-1.89	-0.85	-0.94	-0.95	-0.34
Punjab	2001-02	-0.54	-0.70	-0.69	-1.12	-0.97	-0.57	-0.48	-1.00	-0.60	-0.52	-0.66	-0.56	-1.11	-0.84	-1.05	-0.94	-0.85
	2010-11	-0.62	-0.60	-0.66	-0.64	-0.82	-0.50	-0.43	-1.32	-0.72	-0.31	-0.76	-0.44	-0.66	-0.76	-0.94	-0.88	-0.07
	2015-16	-0.71	-0.70	-0.68	-0.70	-0.80	-0.62	-0.70	-3.60	-0.67	-0.53	-0.78	-0.58	-0.72	-0.74	-0.78	-0.95	-0.17

