The Relative Price Convergence in Pakistan: Does the choice of numeraire city matter?

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Dedication

To my Parents, my sisters and my brothers

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Abstract

This thesis investigates the importance of choice of numeraire city in convergence analysis. By using CPI data of 31 Pakistani cities for period 2001 to 2011 half life is computed for different cities in case of 19 numeraire cities. Average half life by excluding Quetta is found to be less than a month in case of all numeriare cities except Quetta. Highest average half life is found to be 81 months or almost 8 years in case of Quetta as numeriare city while lowest average half life is found to be about 1.2 months in case of Lahore as numeraire. These results imply that choice of numeraire city matters in convergence analysis and there exist effective market integration and PPP holds in case of Pakistan.

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Chapter 1

Introduction

1.1 Motivation

In recent literature regional price convergence is attracting immense consideration because price convergence helps to determine the span of differences in regional inflation rates. Slow convergence implies that differences in regional inflation rates will persist for relatively long periods and vice versa. Moreover it was found that rapid price convergence occurs across regions within country than across countries because regions within country possess better integrated markets for capital, labor and products. In addition to this, factors responsible for slow price convergence includes transportation costs, presence of nontraded goods in general price index, trade barriers, presence of monopoly firms and sticky price adjustment etc. All these factors contribute towards relative price differential across regions.

Sosvilla-Rivero and Gil-Pareja (2004) studied price convergence across EU countries for the period 1975-1995 using Harmonised index of consumer prices data of both nontradable and tradable goods[1]. By applying Levin and Lin panel data unit root test they found evidence of price convergence in case of traded goods while no evidence was found in case of nontradable goods and goods subjected to special taxes or other regulations.

Das and Bhatacharia (2008) studied price convergence across Indian regions for the period January 1995 to June 2004. They decomposed each series into two components as common factor and idiosyncratic factor and then both components were subjected to stationarity test and half life of each component was estimated. Results showed that both components were stationary while idiosyncratic component was more persistent.

[1] HICP is European central bankl indicator of price stability and inflation. HICP is price index which is gathered according to harmonized methodology across EU countries. HICP of euro area is a weighted average of member states price indices who have adopted the euro.

Chmelarova and Nath (2010) using annual CPI data for period 1917-2007 for 17 US cities studied price convergence by keeping many cities as numeraire and estimated half life for USA cities showing the importance of numeraire city in convergence analysis they concluded that for relative price convergence analysis for different cities the choice of numeraire city matters. As compared to previous studies half life estimates were smaller.

Pakistan is composed of diversified regions namely Punjab, Sindh, Baluchistan, Khyber Pakhtunkhwa and Gilgit Baltistan sharing some common borders with other countries hence Mohsin and Gilbert (2011) by applying Chmelarova and Nath's (2010) study to Pakistan monthly CPI data used two numeraire cities Karachi and Lahore and studied price convergence among Pakistani regions. They showed that with both OLS and GLS Purchasing Power Parity holds in case of Pakistan. The average half life of price shock is less with GLS than with OLS.

1.2 Objectives of Study

The objectives of study are as follows

1. To analyze whether relative price convergence exists within cities of Pakistan or not?
2. To extend analysis to more numeraire cities in case of Pakistan in order to check whether relative city price convergence is numeraire specific or not?
3. To examine whether relative price convergence is faster in case of high or low inflation cities as numeraire?
4. To analyze whether rise of world food prices affect relative city prices in case of different numeraire cities or not?
5. To examine whether cointegrating or long run relationship exists between CPI series of different cities or not?

In order to study relative city price convergence in case of Pakistan CPI series of Abbotabad, Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Quetta, Rawalpindi, Sargodha, Sialkot, Sukkur, Turbat and Vehari are chosen while numeraire cities includes Abbotabad, Bahawalnagar, Bahawalpur, Bannu, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Karachi, Larkana, Lahore, Loralai&Cantt, Multan, Nawabshah, Peshawar, Quetta, Sargodha and

Turbat. The effect of world food prices on different cities relative prices is analyzed in case of all the above mentioned numeraire Cities. Moreover State bank of Pakistan ranks cities as high or low inflation cities as compared to average inflation in Pakistan. In current study numeraire cities are selected from both low and high inflation cities it will help to analyze whether speed of convergence is faster with high or low inflation cities. In addition to this cointegrating relationships are analyzed in case of all of the above mentioned CPI series.

1.3 Place in Literature

The current study will add to existing knowledge by analyzing price convergence with respect to different numeraire cities or base cities in case of Pakistan including Abbotabad, Bahawalnagar, Bahawalpur, Bannu, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Karachi, Larkana, Lahore, Loralai&Cantt, Multan, Nawabshah, Peshawar, Quetta, Sargodha and Turbat while Mohsin and Gilbert (2011) analyzed relative city price convergence with only two numeraire cities Karachi and Lahore.

1.4 Theories of Price Convergence Mechanism

Although this thesis does not deals with price convergence theories but it is important to understand price convergence mechanism described by the Law of one price and Balassa Samuelson hypothesis. In addition to this it is vital to understand these mechanisms because the studies related to price convergence would incorporate these theories in their empirical findings.

1.4.1 Law of one price

It relates exchange rates to prices of individual goods in different countries.

Identical products must sell for same price in an efficient market assuming no differential taxes among markets and no transportation costs or when exchange rates are taken into consideration then price of given commodity, security or asset will have same price.

Purchasing Power Parity

According to purchasing power parity theory purchasing power of money is same among different countries. In 16^{th} century school of Salamanca originated the idea of purchasing power

parity and was developed by Gustav Cassel in 1918 in its modern form. PPP is based upon law of one price and is applied to aggregate economy.

There are two versions of purchasing power parity theory.

- Absolute purchasing power parity theory
- Relative purchasing power parity theory

Absolute purchasing power parity theory

Absolute PPP relates exchange rates to overall price levels as compared to law of one price.

It assumes that purchasing power of currencies is forced to be equalized because of equilibrium exchange rate between two currencies or absolute PPP is law of one price applied to basket of goods instead of to a single product.

If P and P^* denote home and foreign price of basket of goods then absolute PPP states

$$P = E \times P^*$$

It relates absolute price level across home and foreign country to level of exchange rate.

Relative purchasing power parity theory

It is dynamic version of absolute PPP. It relates inflation rates of two countries to exchange rates of two currencies over the same period.

To derive relative PPP consider absolute PPP in time t and divide it by absolute PPP of time t-1 to get expression of relative PPP as

$$\frac{p_t}{p_{t-1}} = \frac{p_t^* E_t}{p_{t-1}^* E_{t-1}}$$

Now taking log on both sides

$$\pi_t = \pi_t^* + \epsilon_t$$

Where π_t= domestic inflation rate =$Log\ (\frac{p_t}{p_{t-1}})$

$$\pi_t^* = Foreign\ inflation\ rate = Log\left(\frac{p_t^*}{p_{t-1}^*}\right)$$

$$\epsilon_t = rate\ of\ depreciation = Log\left(\frac{E_t}{E_{t-1}}\right)$$

Implying depreciation is equal to difference in inflation rates

1.4.2 Balassa Samuelson Hypothesis

According to Balassa Samuelson hypothesis productive countries or advance economies suffer from higher price levels. Difference in inflation among countries results from productivity differential between non traded and traded goods sector. The basic idea behind Balassa Samuelson proposition is that wages and price levels are higher among developed countries. Spillover effects from trade when less developed countries start trade with developed countries causes wage and productivity of less developed countries to rise in tradable goods sector due to stronger convergence of productivity levels among the traded goods sector. While labor mobility between sectors leads to rise in wages of non tradable good sector of catching up economies to avoid worker flight from nontraded product sector hence slower productivity growth and higher wages in this sector leads to increase in overall price level causing overall inflation to rise. Thus as less develop country start trade with developed country then after trade less developed economy experiences higher inflation rate.

The next chapter provides an overview of literature. Chapter 3 gives data description and methodology used for analysis. Chapter 4 presents the estimation and empirical results while last Chapter 5 concludes the findings found in the analysis.

Chapter 2

Literature Review

According to Rogoff (1996) Purchasing Power Parity Puzzle can be described as a question of how to reconcile volatility of high short term real exchange rates with extremely slow convergence to PPP. He found a remarkable consensus of 3-5 year half lives of PPP deviations.

Paula De Masi and Vincent Koen (1996) studied relative price convergence in Russia for period 1980-1994 and found that relative price structure changed significantly and domestic prices moved closer to market levels after liberalization. For two to three years after liberalization large gap remained between domestic and international price levels implying convergence to be accompanied by real exchange rate appreciation which could strengthen nominal exchange rate. If due to foreign competition and other tight financial policies prices of tradable goods sector remained high then the process of real exchange rate appreciation would translate into high measured inflation in Russia.

O'Connell (1998) using quarterly data of CPI real exchange rate for period 1973q2-1995q4 and panel unit root tests analyzed the importance of controlling cross sectional dependence in data for unit root testing in panels of real exchange rate and showed that the choice of numeraire currency becomes irrelevant by inclusion of common time effects for controlling for cross section dependence in panel test of PPP.

Sarah E. Culver and David H. Papell (1999) using quarterly CPI data for period 1978-1997 and univariate analysis and panel unit root tests examined whether ppp holds among US and canadian cities rather than among european countries after estimating half-life of PPP deviations they found that price convergence is slower among US cities as compared to canadian cities and european countries. While speed of convergence is high in case of Canadian citiesas compared to European countries.

According to Patrick Conway (1999) kyiv was a planned economy then during its transition towards market economy due to privatization and integration it progressed greatly. Then afterwards convergence in case of prices was achieved due to arbitrage between state shops and

private shops while both kinds of market were segregated by each other. In addition to this there was demand side transmission with respect to price differential and supply side reallocation with respect to supplies that lead to convergence of prices in Kyiv.

Across Euro area in case of traded goods price level is convergent according to John.H.Rogers (2001). Moreover price dispersion of traded goods across cities of US is close across euro area. US regions are more deviant from law of one price as compared to euro area. In addition to this cross country variations in case of inflation are explained by other factors as compared to price convergence which explain difference in inflation across euro area.

Cecchetti et al (2002) examined price indices dynamics for 19 cities of USA using CPI data for period 1918-1995. They utilized panel unit root tests to investigate whether different city prices converge to steady state value or follow a random walk. In case of First uni-variate test when series are examined individually there was no evidence of rejecting the unit root hypothesis. Then Cecchetti et al performed panel unit root test the first one was Levin and Lin test and the other one derived by Im, Pesaran and Shin, in case of both of these test null hypothesis of no convergence was rejected. Moreover they found slow convergence or half life of 9 years in case of USA. Although long run adjustment towards PPP was found in case of traded goods or commodities and non traded goods or services but the speed of convergence was slow because of following factors such as nonlinearities, transportation costs and slower adjustment of prices in case of non traded goods that are included in the database.

Lutz (2004) by utilizing four different data set of good prices which included “Big Mac” price in EU countries, prices of cars, price of magazine “The Economist” and prices of goods and services from a publication from Swiss Bank UBS for period 1970 -2001 examined whether EMU experiences diminishing price dispersion as compared to its other members. His study showed that after introduction of common currency in euro area there is little impact on price level convergence.

Chen, L.L, Devereux, J, (2003) studied dispersion of absolute price level for 19 US cities using annual CPI data from period 1918 onwards and compared their results to Engel and Rogers (1996) study which they conducted for OECD countries concluded that as compared to international cities US price converge faster. After 1920 because of improvements in

transportation and communication a 40% decline in price level differences was found. In addition to this they analyzed the speed of convergence of tradable and non tradable goods. Investigating two sub indices food and rent they found stronger evidence of convergence in case of food prices. While in case of rent prices no such evidence was found or rent prices supported Balassa Samuelson Hypothesis implying that faster price convergence exist in case of tradable goods and no or slower price convergence exist in case of non traded goods. They also examined bilateral exchange rate of cities. They defined bilateral exchange rate as log of price level of ith city minus the log of US CPI price data. 11 out of 19 non-stationary exchange rates were rejected. Low speed of adjustment of overall price level was found with a mean of half-life deviations of 5 years from PPP.

Sosvilla-Rivero and Gil-Pareja (2004) using HICP data for period 1975-1995 researched price convergence among European Union. They used Levin and Lin panel data unit root test. Evidence of price convergence was shown by 17 cases out of 25 and overall half-life of about 10 years was found. While in case of non traded goods and goods subjected to special taxes or regulations no evidence of price convergence was found. Moreover they divided countries in to two groups on basis of participation in Exchange Rate Mechanism. They found that countries whose currency continuously participated in ERM for instance Belgium, France, Netherlands and Luxembourg for these countries the estimated speed of convergence was higher as compared to whole sample while the countries whose currency participated later or suspended its participation in ERM for instance Italy, Portugal, Spain, Greece and United Kingdom for these countries estimated speed of convergence was lower as compared to whole sample.

Danijel (2005) using International Comparison Project data for European countries studied variations in real income and price levels among European countries. He found that as compared to other transition economies except Slovenia Croatia experiences higher national price level. Due to lower Pressure for corrections of both the inflation and exchange rate this relatively higher price level in Croatia would add towards European integration process. While converging to EU economies Croatia would experience small changes in aggregate price level because of similarity of its structure of prices relative to that of EU economies implying relatively painless convergence of price level and inflation rates in case of Croatia. This would add to effectiveness of monetary policy in case of Croatia while monetary policy would be ineffective in case of non

traded goods for instance services which could be the outcome of Balassa Samuelson effect because in case of Balassa Samuelson effect which is a real and not monetary phenomenon wage policy can perform better to offset inflationary pressure. In addition to this, differences in price levels across countries were due to Balassa Samuelson effect.

Morshed et al (2005) investigated price convergence among Indian cities by using monthly CPI data of 25 cities for period 1988-2001 and found that shock's half life is very small in case of Indian cities. Furthermore they estimated half life from both panel unit root test and cointegration analysis and found that speed of convergence of half-life is faster in case of cointegration analysis. While analyzing transmission mechanism of shocks from one city to another they found no systematic transmission mechanism.

Na Li and Jianhu Huang (2006) using panel econometric method examined the dynamics of price indices of 42 provinces, unemployment rate and real wage across Canadian economy. They found that majority of cases rejected null hypothesis of unit root in favor of mean reverting process. Moreover it was found that among CPI subgroups only 7 out of 100 cases failed in rejecting null hypothesis of unit root. Average speed of convergence for 34 CPI subgroups was substantially smaller than that of Euro areas and the U.S and these results were evident due to CPI monthly data which proved Canadian economy as highly integrated one. They also found that there is absence of market segmentation and product, labor and capital markets are better integrated across Canada. They also concluded that price converges and law of one price holds in case of Canadian economy.

Fan and Wei (2006) by using monthly CPI data and nonlinear mean reversion model developed by Granger and Terasvirta and panel unit root tests of Levin, Lin and Chu and Im, Pesaran and Shin examined price convergence in china for 36 major cities over a period of seven years. They found that law of one price holds in case of china. Moreover empirical evidence support the success of economic reform implemented in china which transformed Chinese economy into market economy. In addition to this they found half-life of price convergence to be about 3 to 4 months which implied effective market integration in china. Their estimated half-life tends to be quite smaller as compared to previous studies involving half-life estimation of about 2 to 5 years because of the utilization of high frequency data.

Christian Dreger and Reinhold Kosfeld (2007) using panel econometric technique and regional price index data which included overall price index and index without housing prices for 439 German districts examined price convergence among German districts. Empirical results of panel unit root test indicated that there is lack of convergence among German districts. Panel unit root technique suggested that idiosyncratic component were stationary while common factors were nonstationary in case of German districts. Moreover same results were obtained for overall price index and index without housing prices.

In case of Colombia Ana Maria and Jesus Otero (2008) analyzed market integration by utilizing dataset of 13 cities and 54 food products and by using stationary tests. In case of KPSS test not enough evidence was found for market integration or in long run food prices does not maintain equilibrium relationship while using Hadri test enough evidence was found that market for food products was integrated implying law of one price holds in case of these products.

According to Lee Chin and Muzafar Shah Habibullah(2008) due to increased market integration among Peninsular Malaysia Sarawak and Sabah evidence of price convergence was found using aggregate and disaggregate data of various commodity prices for period 1990-2005. Estimation was carried out through panel unit root tests. Convergence found among tradable goods includes beverages, clothing, Tobacco, gross rent, power and fuel etc. weak convergence was found among non tradable goods like medical care, education recreation etc. Moreover for Malaysia half-life of about 6.75 years was found for Deviations from PPP. Half life in case of non tradable good was about 10 years and for tradable good it was about 1-2 years. So PPP or price convergence holds in case of tradable goods as compared to non trabable goods.

Das and Bhatacharia (2008) studied price convergence across Indian regions by using panel unit root test and concluded that price across various regions were mean reverting in India. They decompose each series into two components as common factor and idiosyncratic factor after which both components were subject to stationarity test and then half life of each component was estimated. Results showed that both components were stationary while idiosyncratic component was more persistent.

According to Konstantin Gluschenko (2010) studied price convergence and market integration across by Russia Using time series analysis and found that Russian markets in 1994 -2000

moved towards market integration despite of anti integration forces. Moreover Russian regions were characterize into three states as integrated with benchmark region, not integrated and not tending towards integration and not integrated but tending towards integration and hence it was found that 54% or one half of Russian regions were integrated while 24% or about quarter of regions were moving towards integration and about 22% or one fifth regions were nonintegrated in case of Russia

Chmelarova and Nath (2010) using annual CPI data for 17 cities for period 1918-2007 found that selected numeraire city explain the dynamic behavior of relative prices which consists of a common factor and idiosyncratic factor. By using Augmented Dickey Fuller test and half life estimation technique in case of Atlanta, Chicago and Los Angeles both common factor and idiosyncratic factors were I(0) depicting convergence of relative prices while in case of Boston, San Francisco, Houston Cincinnati, Seattle and St.Louis common factor is I(1) that is nonstationary depicting non converging relative prices. In case of Philadelphia, New York and Portland common factors were I(0) while idiosyncratic factor were non stationary. In case of other cities idiosyncratic factors were stationary with mixed common factors. As compared to previous studies half life estimates were smaller however the speed of convergence is still very slow.

Mohsin and Gilbert (2010) using monthly CPI data of 35 Pakistani cities for period 2001-2008 and Karachi and Lahore as numeraire cities concluded that purchasing power parity theory holds in case of Pakistan both with OLS and GLS techniques. They found that price shock average half life is 5 months with GLS and with OLS it's less than 6 months while Price shock dies out more quickly in Lahore as compared to Karachi.

M.Ege.Yazgan, Hakan.Yilmazkuday (2011) using quarterly data of 48 final goods and services and pesaran (2007a) technique that allows heterogeneity across city pairs in presence of cross sectional dependence, analyzed price convergence among 52 US cities for period 1990q1-2007q4 and found half life that is below the previous corresponding US studies.

Chapter 3

Data and Methodology

3.1 Data Description

In order to investigate relative price convergence and importance of choice of numeraire city in convergence analysis monthly CPI data of 31 Pakistani cities is used spanning from July 2001 to September 2011. While the data is collected from Monthly Statistical Bulletin published by Government of Pakistan Statistics division, Federal Bureau of Statistics.

CPI also sometime referred to as "headline inflation" measure by how much the prices of a basket of consumer goods has changed over a given time period or in other words it is a measure of level of inflation. Moreover in order to distinguish between periods of inflation or deflation CPI is one of the most frequently used statistics. This is because during a short period of time large increases in CPI indicate periods of inflation. While during a short period of time large decreases in CPI indicate periods of deflation.

3.2 Econometric Methodology

The current study involves ADF test for testing unit root in CPI data of 31 Pakistani cities while for cointegration analysis Engle Granger test is applied to cities CPI data.

3.2.1 DF and ADF Unit Root Tests

Dickey fuller test

Dickey fuller test is used to test the hypothesis of unit root in univariate time series.

The basic assumption of DF test is that error term is white noise that is there is no problem of serial correlation.

Dickey fuller discussed following three types of models.

- Y_t is random walk without constant and trend $\boldsymbol{\Delta Yt = \rho Yt - 1 + \varepsilon t}$
- Y_t is random walk with drift $\boldsymbol{\Delta Yt = \alpha + \rho Yt - 1 + \varepsilon t}$

- Y_t is random walk with drift around a stochastic term $\boldsymbol{\Delta Yt = \alpha + \beta t + \rho Yt - 1 + \varepsilon t}$

We are interested in the size of ρ. If$|\rho| > 1$ the ΔYt will be explosive, or nonstationary. On the other hand, If$|\rho| < 1$, the series will be mean reverting, that is stationary (I(0)). The special case is if $|\rho| = 1$, in which case we have a random walk.

On basis of these DGP Dickey fuller formulated and discussed different forms of null hypothesis of unit root against the alternative of stationarity. They proposed following test statistics for these models.

Model	Hypothesis	Test statistic
$\boldsymbol{\Delta Yt = \alpha + \beta t + \rho Yt - 1 + \varepsilon t}$	$\boldsymbol{\rho = 0}$	$\boldsymbol{\tau_\tau}$
	$\boldsymbol{\beta = \rho = 0}$	$\boldsymbol{\Phi_3}$
	$\boldsymbol{\alpha = \beta = \rho = 0}$	$\boldsymbol{\Phi_2}$
$\boldsymbol{\Delta Yt = \alpha + \rho Yt - 1 + \varepsilon t}$	$\boldsymbol{\rho = 0}$	$\boldsymbol{\tau_\mu}$
	$\boldsymbol{\alpha = \rho = 0}$	$\boldsymbol{\Phi_1}$
$\boldsymbol{\Delta Yt = \rho Yt - 1 + \varepsilon t}$	$\boldsymbol{\rho = 0}$	$\boldsymbol{\tau}$

Augmented Dickey Fuller Test

ADF suggest that lags of dependent variables must be included as additional regressors in model in order to deal with problem of serial correlation in residual term.

Procedure

$$\boldsymbol{\Delta Yt = \alpha + \beta t + \rho Yt - 1 + \sum_{i=1}^{l} \beta i\ \Delta Yt - 1 + \varepsilon t}$$

- Start with the general model.
- Estimate ADF equation with added lags until error term becomes white noise.
- Use $\boldsymbol{\tau_\tau}$ statistic to test hypothesis $\boldsymbol{\rho = 0}$**.** If null hypothesis of unit root is rejected there is no need to proceed further. Conclude that Yt series does not contain a unit root.
- If null hypothesis is not rejected it is necessary to test the significance of trend term by testing the hypothesis $\boldsymbol{\beta = \rho = 0}$ using the $\boldsymbol{\Phi_3}$ Statistic. If trend is not significant proceed to next step. Otherwise if trend is significant retest for the presence of a unit root using standardized normal distribution. If the null of a unit root is rejected precede no further

conclude that series does not contain a unit root. Otherwise conclude that the series contains a unit root.

- Estimate the model without trend. Test for the presence of a unit root using the $\boldsymbol{\tau_{\mu}}$ statistic. If the null is rejected conclude the model does not contain a unit root.
  If the null is not rejected test for the significance of the constant by testing the hypothesis $\boldsymbol{\alpha = \rho = 0}$ using the $\boldsymbol{\Phi_1}$ statistic. If the drift is not significant proceed to next step. Otherwise if the drift is significant retest for the presence of unit root using standardized normal distribution. If the null of a unit root is rejected proceed no further conclude that Yt series does not contain a unit root. Otherwise conclude that the series contains a unit root.
- Estimate the model without drift and trend. Use $\boldsymbol{\tau}$ to test the presence of unit root. If the null of unit root is rejected conclude that Yt does not contain a unit root. Otherwise conclude that the series contains a unit root.

3.2.2 Engle Granger Cointegration Test

Engle Granger approach implicitly assumes that there is only one cointegrating relationship among two variables so it is optimal only in case of two variables.

Procedure:

Step:1

Estimate cointegrating regression between P_{c1} (price of city 1) and P_{c2} (price of city 2) both of which are integrated of same order, let both be I(1).

$$\boldsymbol{P_{c1} = \alpha + \beta P_{c2} + \mathcal{E}_t}$$

Then test for cointegrating relationship through the residuals of the fitted model.

$$\boldsymbol{\widehat{\mathcal{E}_t} = P_{c1} - \widehat{\alpha} - \widehat{\beta} P_{c2}}$$

Step:2

Specify and estimate error correction model.

$$\boldsymbol{\Delta P_{c1} = a_0 + b_1 \Delta P_{c2} - \pi \widehat{\mathcal{E}}_{t-1} + \mu_t}$$

This equation has both long run and short run information. In this model

$\mathbf{b_1}$= measures short run immediate impact of change in P_{c2} on a change inP_{c1}.

$\boldsymbol{\pi} =$ Feedback effect or the adjustment effect that shows how much disequilibrium is corrected.

In above equation everything is stationary the change in P_{C1} and P_{C2} is stationary because both are assumed to be I(1).So it fulfills the assumptions of CLRM and OLS can be applied to it.

Decision Rule:

When the value of test statistic exceeds the critical value then null hypothesis of no cointegration may be accepted.

Residual Based Test:

It involves the following steps

Step:1 Test the variable for their order of integration

For this purpose Dickey Fuller test can be used to infer about the no of unit roots if any. Three cases can be analyze as follows

- If both variables are stationary then there is no need to proceed to next and OLS can be applied.
- If both variables are integrated of different order then it is concluded that they are not cointegrated.
- If both variables are integrated of same order then proceed to next step.

Step:2 Estimate the long run relationship

$$\boldsymbol{P_{c1} = \alpha + \beta P_{c2} + \varepsilon_t}$$

- If there is no cointegration then the results obtained would be spurious.
- If the variables are cointegrated then OLS yields super consistent estimate for cointegrating parameter$(\widehat{\beta})$.

Step:3 Check for the order of integration of residuals

Apply ADF test to estimated residuals $\widehat{\varepsilon_t}$ under the following hypothesis

H_0: Unit root in the residuals, $\widehat{\varepsilon_t} \sim I(1)$ implying the variables are not cointegrated.

H_1: Residuals are stationary, $\widehat{\varepsilon_t} \sim I(0)$ implying the variables are cointegrated.

Estimate the following ADF equation

$$\Delta\widehat{\varepsilon_t} = a_1 \varepsilon_{t-1} + \sum_{i=1}^{n} \delta i \, \Delta\widehat{\varepsilon}_{t-1} + v_t$$

Because $\widehat{\varepsilon_t}$ is residual so we do not include constant and trend terms. Compare the calculated values to critical values computed by Engle and Granger in their seminal paper.

Step:4 Estimate the Error Correction Model

Estimate the error correction model to analyze the short run and long run effects of variables and to analyze the adjustment coefficient.

Chapter 4

Estimation and Empirical Results

Estimation of Relative prices of Cities

The real exchange rates or relative prices are calculated as follows

$$rp = log\ of\ CPI\ of\ city\ i - log\ of\ CPI\ of\ city\ n$$

Where *n = numeraire city or base city and n=1, 2… 19*

i = current city and i=1, 2… 30

Estimation of the value of Rho

For estimating the value of ρ the following general DF test regression is used

$$\Delta Yt = \alpha + \beta t + \rho Yt - 1 + \sum_{i=1}^{s-1} \delta i\ Si + \varepsilon t \qquad (1)$$

Where Yt= relative price of city

ΔYt =First difference of Yt

$\sum_{i=1}^{s-1} \delta i\ Si$=Seasonal dummies, i=1, 2... S-1

Estimation of Half life

Half life measures the speed of mean reversion process. Moreover for analyzing the behavior of relative price with respect to choice of base or numeraire city speed of convergence which is estimated by half life is compared.

The Half life is calculated by using the following formula

$$H(P) = \frac{\log(0.5)}{\log(\hat{\rho})}$$

Estimation of the value of rho and half life

Now for estimating the value of rho and half life the cities that will be taken as base cities are as follows Abbotabad, Bahawalnagar, Bahawalpur, Bannu, D.I.Khan, Faisalabad, Gujranwala,

Hyderabad, Islamabad, Karachi, Larkana, Lahore, Loralai&cantt, Multan, Nawabshah, Peshawar, Quetta, Sargodha and Turbat.

Table:4.1 Relative Price convergence in case of 19 numeraire cities

Numeraire Cities	Average half life	Average half life Excluding Quetta
Abbotabad	1.727	0.317
Bahawalnagar	2.125	0.332
Bahawalpur	3.411	0.329
Bannu	4.794	0.432
D.I.Khan	6.041	0.557
Faisalabad	2.166	0.412
Gujranwala	3.768	0.326
Hyderabad	1.399	0.288
Islamabad	5.927	0.230
Karachi	1.805	0.601
Lahore	**1.198**	0.460
Larkana	1.399	0.288
Loralai	3.092	0.485
Multan	3.740	0.430
Nawabshah	3.700	0.198
Peshawar	1.712	0.468
Quetta	**81.138**	-
Sargodha	4.711	0.400
Turbat	4.295	0.544

The table 4.1 shows that with Abbotabad as numeraire average half life is 1.7 months and by excluding Quetta average half life is less than a month. With Bahawalnagar and Faislabad as numeraire average half life is about 2.1 months and 2.2 months in case of Faisalabad and if Quetta is excluded than average half life is less than a month in case of these numeraire cities. While with Hyderabad, Karachi, Lahore, Larkana and Peshawar as numeraire average half life is 1.4 months, 1.8 months, 1.2 months, 1.4 months and 1.7 months while with exclusion of Quetta average half life is less than a month in case of these numeraire cities. Average half life with

Bahawalpur, Gujranwala, Loralai , Multan and Nawabshah as base city is about 3.4 months, 3.8 months, 3.1 months and 3.7 months with both Multan and Nawabshah and excluding Quetta average half life turns out to be less than a month in case of these base cities. In case of Bannu, Sargodha and Turbat as numeraire average half life is about 4.8 months, 4.7 months and 4.3 months and with the exclusion of Quetta average half life turns out to be less than a month in case of these numeraire cities. While average half life with D.I.Khan as base city is about 6 months and excluding Quetta again half life turns out to be less than a month. With Islamabad as numeraire city average half life is estimated to be about 5.9 months and with exclusion of Quetta average half life turns out to be less than a month. Highest average half life is 81 months or almost 8 years in case of Quetta as numeraire while lowest average half life is 1.2 months in case of Lahore as numeraire.

Now the effect of changes in world food prices on the relative prices of different cities with the help of regression involving slope dummy variable are analyzed. The regression is as follows

$$\Delta Yt = \alpha + \rho_1 Yt-1 + \rho_2 Yt-1 * D_t + \varepsilon t \qquad (2)$$

The world food prices picked up pace once in 2007 and again in 2010 and reached a peak once in 2008 and again in 2011 implying that world food prices generally followed an upward trend from 2007 and onwards for this reason the above slope dummy variable assumes the following values,

$$D_t = 1 \quad \text{for 2007-2011}$$

$$\text{and} \quad D_t = 0 \quad \text{for 2001-2006}$$

The following Null and Alternative hypothesis are tested by using Wald test

$$H_0: \rho_1 = \rho_2$$

$$H_1: \rho_1 \neq \rho_2$$

This analysis is performed in case of all the 19 numeraire cities including Abbotabad, Bahawalnagar, Bahawalpur, Bannu, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Karachi, Larkana, Lahore, Loralai&cantt, Multan, Nawabshah, Peshawar, Quetta, Sargodha and Turbat.

Explanation of table 4.2: The final column in table 4.2 given in appendix report the Wald test results it is found that with Abbotabad as numeraire none of the cities rejects the null hypothesis of equality of two rhos as all p-values associated with Wald test are greater than 0.05 implying

that there is no affect of increase of world prices on relative prices of different cities with Abbotabad as numeraire.

Explanation of table 4.3: The final column in table 4.3 given in appendix shows that with Bahawalnagar as numeraire null hypothesis of equality of two rhos is rejected (because p-values<0.05) only in case of Bahawalpur, D.G.Khan, Islamabad, Loralai, Sargodha and vehari implying relative price of these cities are affected by the rise of world food prices. While in case of rest of cities null hypothesis cannot be rejected.

Explanation of table 4.4: The final column in table 4.4 given in appendix shows that with Bahawalpur as numeraire null hypothesis of equality of two rhos is rejected only in case of Bahawalnagar, Islamabad, Loralai, Nawabshah and Sargodha (because p-value≤0.05) with Wald test. Hence relative prices of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.5: The final column in table 4.5 given in appendix shows that with Bannu as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Faisalabad, Karachi, Lahore, Multan and Sialkot (because p-value<0.05) implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.6: The final column in table 4.6 given in appendix shows that with D.I.Khan as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Khuzdar while in case of rest of cities null hypothesis of rhos equality cannot be rejected (because p-value>0.05) implying that relative price of these cities are not affected by the rise of world food prices.

Explanation of table 4.7: The final column in table 4.7 given in appendix shows that with Faisalabad as numeraire null hypothesis is rejected only in case of Bannu, D.G.khan, Jhang, Khuzdar, Loralai, Mianwali, Peshawar and Turbat implying that relative price of only these cities are affected by the rise of world food prices while in case of other cities null hypothesis of rhos equality cannot be rejected.

Explanation of table 4.8: The final column in table 4.8 given in appendix shows that with Gujranwala as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Attock, Mardan and turbat (because p-value<0.05) implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.9: The final column in table 4.9 given in appendix shows that with Hyderabad as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Nawabshah.While in case of rest of cities null hypothesis of rhos equality cannot be

rejected (because p-value>0.05) implying that relative price of these cities are not affected by the rise of world food prices.

Explanation of table 4.10: The final column in table 4.10 given in appendix shows that with Islamabad as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Bahawalnagar, Bahawalpur, Sargodha, turbat and Vehari (because p-value<0.05) implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.11: The final column in table 4.11 given in appendix shows that with Karachi as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Bahawalpur, Bannu and turbat (because p-value<0.05) implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.12: The final column in table 4.12 given in appendix shows that with Lahore as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Bannu, Jhelum, Loralai, Mianwali, and turbat (because p-value<0.05) implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.13: The final column in table 4.13 report the Wald test results, it is found that with Larkana as numeraire none of the cities rejects the null hypothesis of equality of two rhos as all p-values associated with Wald test are greater than 0.05 implying that there is no affect of increase of world prices on relative prices of different cities with Larkana as numeraire.

Explanation of table 4.14: The final column in table 4.14 given in appendix shows that with Loralai as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Bahawalnagar, Bahawalpur, D.G. Khan, Faisalabad, Jhelum, Lahore, Sargodha and Sialkot implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.15: The final column in table 4.15 given in appendix shows that with Multan as numeraire null hypothesis of equality of two rhos with Wald test is rejected only in case of Bannu, Jhang, Khuzdar, Mianwali and turbat (because p-value<0.05) implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected.

Explanation of table 4.16: The final column in table 4.16 given in appendix shows that with Nawabshah as numeraire null hypothesis is rejected only in case of Bahawalpur and Hyderabad implying relative price of only these cities are affected by the rise of world food prices. While in

case of other cities H_0 cannot be rejected implying that relative Prices are not affected by rise in world food prices.

Explanation of table 4.17: The final column in table 4.17 given in appendix shows that with Peshawar as numeraire H_0 with Wald test is rejected only in case of Faisalabad, Khuzdar, Mianwali and Turbat implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities H_0 cannot be rejected implying that relative Prices are not affected by rise in world food prices.

Explanation of table 4.18: The final column in table 4.18 report the Wald test results it is found that with Quetta as numeraire none of the cities rejects the null hypothesis of equality of two rhos as all p-values associated with Wald test are greater than 0.05 implying that there is no affect of increase of world prices on relative prices of different cities with Quetta as numeraire.

Explanation of table 4.19: The final column in table 4.19 given in appendix shows that with Sargodha as numeraire H_0 is rejected only in case of Bahawalnagar, Bahawalpur, D.G.khan, Islamabad, Jhelum, Loralai, Rawalpindi and Vehari implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities relative Prices are not affected by rise in world food prices.

Explanation of table 4.20: The final column in table 4.20 given in appendix shows that with Turbat as numeraire null hypothesis of equality of two rhos with Wald test is rejected in case of Attock, D.G.khan, Faisalabad, Gujranwala, Islamabad, Jhelum, Karachi, Lahore, Mianwali, Multan, Peshawar, Rawalpindi and Sialkot (because p-value$\leq$0.05) implying relative price of only these cities are affected by the rise of world food prices. While in case of other cities relative Prices are not affected by rise in world food prices. In addition to this maximum rejection of null hypothesis occurs in case of Turbat as numeraire.

In next analysis cointegration test of Engle Granger will be applied to CPI data of 31 Pakistani cities. Furthermore Engle Granger method involves the estimation of following long run regression

$$\boldsymbol{P_{c1} = \alpha + \beta P_{c2} + \varepsilon_t}$$

In case of above regression following Null and Alternative hypothesis are tested with Wald test

$$\mathbf{H_0: \beta = 1}$$

$$\mathbf{H_1: \beta < 1}$$

Note:

Wald test is used to check the significance of slope. Moreover for checking the significance of single parameter Wald test can be applied because Wald statistic is the square of t-statistic and hence will produce exactly equivalent results.

Before the application of Engle Granger test ADF test is applied to CPI data of 31 Pakistani cities to check whether CPI series of different cities are stationary at level or at difference.

In ADF test analysis τ_τ –statistic, τ_μ–statistic and τ–statistic are given by t-ratios of rho while Φ_1–statistic and Φ_3–statistic are given by F-values of Wald test. Moreover in ADF analysis all critical values are selected at 5% significance level.

The critical values of Dickey Fuller test are given in following table

Critical values for the DF test				
Model	**Test statistics**	**1%**	**5%**	**10%**
$Y_t = \rho Y_{t-1} + \varepsilon_t$	τ	-2.56	-1.94	-1.62
$Y_t = \mu + \rho Y_{t-1} + \varepsilon_t$	τ_μ	-3.43	-2.86	-2.57
$Y_t = \mu + \beta T + \rho Y_{t-1} + \varepsilon_t$	τ_τ	-3.96	-3.41	-3.13
Standard critical values		-2.33	-1.65	-1.28
Φ3			6.34	
Φ1			4.63	

The Augmented Dickey Fuller results are given below in table 4.21

Table: 4.21 shows the ADF results of 31 cities

CPI of 31 Cities	At Level					Null hypothesis	At First Difference	Null Hypothesis
	t-statistic			f-statistic			t-statistic	
Abbotabad	-2.492	-1.26	-0.549	3.179	0.788	Accepted	-4.128	Rejected
Attock	-2.268	-1.52	-0.723	2.588	1.163	Accepted	-3.857	Rejected
Bahawalnagar	-2.237	-1.55	-0.702	2.535	1.203	Accepted	-3.843	Rejected
Bahawalpur	-2.178	-1.56	-0.887	2.392	1.234	Accepted	-3.716	Rejected
Bannu	-2.561	-1.68	-0.763	3.306	1.417	Accepted	-4.149	Rejected
D.G.Khan	-2.299	-1.51	-0.948	2.661	1.1818	Accepted	-3.897	Rejected
D.I.Khan	-2.47	-1.55	-0.537	3.088	1.221	Accepted	-3.921	Rejected
Faisalabad	-2.353	-1.57	-1.046	2.778	1.32	Accepted	-3.996	Rejected
Gujranwala	-2.331	-1.7	-1.159	2.723	1.52	Accepted	-3.989	Rejected
Hyderabad	-2.594	-1.39	-0.646	3.439	0.964	Accepted	-4.426	Rejected
Islamabad	-2.089	-1.7	-0.679	2.183	1.45	Accepted	-3.516	Rejected
Jhelum	-2.377	-1.62	-0.926	2.846	1.321	Accepted	-3.948	Rejected
Jhang	-2.439	-1.64	-0.916	2.993	1.351	Accepted	-4.057	Rejected
Karachi	-2.441	-1.65	-0.719	3.026	1.366	Accepted	-3.913	Rejected
Khuzdar	-2.445	-1.36	-0.336	3.043	1.002	Accepted	-3.941	Rejected
Lahore	-2.415	-1.73	-0.947	2.921	1.525	Accepted	-3.906	Rejected
Larkana	-2.366	-1.6	-0.977	2.828	1.336	Accepted	-3.958	Rejected
Loralai&cantt	-2.533	-1.69	-0.5	3.234	1.477	Accepted	-4.235	Rejected
Mardan	-2.502	-1.44	-0.63	3.168	1.039	Accepted	-4.032	Rejected
Mianwali	-2.534	-1.58	-0.707	3.227	1.251	Accepted	-4.263	Rejected
Mirpurkhas	-2.535	-1.17	-0.788	3.327	0.734	Accepted	-4.138	Rejected
Multan	-2.289	-1.5	-1.041	2.636	1.212	Accepted	-3.889	Rejected
Nawabshah	-2.78	-0.84	-0.583	4.044	0.376	Accepted	-4.769	Rejected
Peshawar	-2.469	-1.58	-0.586	3.062	1.251	Accepted	-3.988	Rejected
Quetta	-10.507	-	-	-	-	Rejected	-	-
Rawalpindi	-2.1799	-1.48	-0.711	2.396	1.097	Accepted	-3.739	Rejected
Sargodha	-2.418	-1.61	-0.961	2.936	1.316	Accepted	-4.035	Rejected
Sialkot	-2.412	-1.7	-1.231	2.913	1.615	Accepted	-3.883	Rejected
Sukkur	-2.531	-1.33	-0.832	3.269	0.919	Accepted	-4.344	Rejected
Turbat	-2.46	-1.53	-0.587	3.042	1.172	Accepted	-3.908	Rejected
Vehari	-2.207	1.677	-0.8	2.439	1.407	Accepted	-3.78	Rejected

Explanation of table 4.21: Above table shows that at level by starting with general model null hypothesis of unit root by using τ_τ statistic cannot be rejected because t-ratio of Rho is less negative than DF-critical value of -3.4246 in case of all cities CPI except quetta. As null of unit root cannot be rejected hence significance of trend term is tested by using Φ_3-statistic. In this case F-value is less than DF-critical value 6.3 implying null hypothesis of unit root and insignificant trend cannot be rejected in case of all cities CPI except Quetta. Next step is carried out by dropping trend term and null hypothesis of unit root is tested by using τ_μ statistic. In this case null of unit root cannot be rejected because t-ratio of Rho is less negative than DF-critical value of -2.88. As null hypothesis of unit root cannot be rejected hence significance of drift is tested by using $\Phi_1$statistic. F-value in this case is less than DF-critical value of 4.63 hence null of unit root and insignificant drift cannot be rejected. Next step is carried out by dropping both trend and drift terms from model and null hypothesis of unit root is tested by using τ statistic. In this case null of unit root cannot be rejected because t-ratio of Rho in case of all cities excluding Quetta is greater or less negative than DF-critical value of -1.95.Now again starting with general model at first difference null hypothesis of unit root is tested by using τ_τ statistic. In this case null of unit root is rejected because t-ratio of Rho is less than or more negative than DF-critical value of -3.42.

Conclusion: From analysis it is concluded that CPI series of all cities except Quetta are I(1) or are stationary at first difference while CPI of Quetta is stationary at level or is I(0). Hence Engle Granger test will be applied to CPI series of all cities that are I(1) except Quetta CPI series which is I(0).

Table: 4.22 Engle Granger test results with Abbotabad CPI as regressor and other cities CPI as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Attock	-0.021	-0.741	-3.37	Accepted	-	-	15.245	0.000
Bahawalnagar	-0.034	-1.113	-3.37	Accepted	-	-	54.135	0.000
Bahawalpur	-0.026	-0.971	-3.37	Accepted	-	-	17.992	0.000
Bannu	-0.121	-2.639	-3.37	Accepted	-	-	35.131	0.000
D G Khan	-0.033	-0.980	-3.37	Accepted	-	-	20.018	0.000
D I Khan	-0.125	-1.905	-3.37	Accepted	-	-	20.110	0.000
Faisalabad	-0.042	-1.281	-3.37	Accepted	-	-	2.289	0.133
Gujranwala	-0.037	-1.204	-3.37	Accepted	-	-	25.774	0.000
Hyderabad	-0.264	-4.327	-3.37	Rejected	0.977	0.246	41.940	0.000
Islamabad	-0.007	-0.344	-3.37	Accepted	-	-	1.823	0.179
Jhelum	-0.043	-1.169	-3.37	Accepted	-	-	14.181	0.000
Jhang	-0.097	-1.875	-3.37	Accepted	-	-	57.724	0.000
Karachi	-0.095	-1.969	-3.37	Accepted	-	-	20.045	0.000
Khuzdar	-0.274	-4.266	-3.37	Rejected	1.157	0.272	148.783	0.000
Lahore	-0.036	-0.928	-3.37	Accepted	-	-	13.524	0.000
Larkana	-0.074	-1.982	-3.37	Accepted	-	-	0.713	0.400
Loralai&Cantt	-0.107	-1.841	-3.37	Accepted	-	-	49.769	0.000
Mardan	-0.211	-3.554	-3.37	Rejected	1.237	0.195	385.149	0.000
Mianwali	-0.121	-2.191	-3.37	Accepted	-	-	-2.191	0.000
Mirpurkhas	-0.403	-5.405	-3.37	Rejected	1.008	0.407	12.289	0.001
Multan	-0.035	-0.942	-3.37	Accepted	-	-	9.266	0.003
Nawabshah	-0.037	-1.374	-3.37	Accepted	-	-	27.899	0.000
Peshawar	-0.049	-1.286	-3.37	Accepted	-	-	17.403	0.000
Rawalpindi	-0.021	-0.844	-3.37	Accepted	-	-	15.103	0.000
Sargodha	-0.055	-1.355	-3.37	Accepted	-	-	82.568	0.000
Sialkot	-0.039	-1.006	-3.37	Accepted	-	-	9.095	0.003
Sukkur	-0.266	-4.315	-3.37	Rejected	1.022	0.266	6.182	0.014
Turbat	-0.175	-3.124	-3.37	Accepted	-	-	65.393	0.000
Vehari	-0.005	-0.187	-3.37	Accepted	-	-	28.907	0.000

4.22 Explanation:

Table 4.22 shows Engle Granger test results with CPI of Abbotabad as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.22 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Islamabad, Jhelum, Jhang, Karachi, Lahore, Larkana, Loralai, Mianwali, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Abbotabad.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Abbotabad shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Gujranwala, Jhelum, Jhang, Karachi, Lahore, Loralai, Mianwali, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari (because $p<0.05$) implying that change in price of Abbotabad is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Faisalabad, Islamabad and Larkana (because $p>0.05$) implying that prices are same among these cities and Abbotabad.

In addition to this, table 4.22 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Hyderabad, Khuzdar, Mardan, Mirpurkhas and Sukkur because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying these cities CPI are cointegrated with CPI of Abbotabad.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Abbotabad shows that null hypothesis of $\beta=1$ is rejected in case of Hyderabad, Khuzdar, Mardan, Mirpurkhas and Sukkur (because $p<0.05$) implying that change in price of Abbotabad is greater than change in prices of these cities.

Table: 4.23 Engle Granger test results with Attock CPI as regressor and other cities CPI as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.021	-0.771	-3.37	Accepted	-	-	42.142	0.000
Bahawalnagar	-0.183	-3.475	-3.37	Rejected	1.146	0.181	82.857	0.000
Bahawalpur	-0.103	-2.544	-3.37	Accepted	-	-	8.638	0.004
Bannu	-0.200	-3.056	-3.37	Accepted	-	-	1.975	0.162
D G Khan	-0.236	-3.994	-3.37	Rejected	1.010	0.238	0.083	0.774
D I Khan	-0.240	-3.381	-3.37	Rejected	0.992	0.291	3.436	0.066
Faisalabad	-0.186	-3.517	-3.37	Rejected	0.902	0.186	166.822	0.000
Gujranwala	-0.160	-3.143	-3.37	Accepted	-	-	39.352	0.000
Hyderabad	-0.014	-0.402	-3.37	Accepted	-	-	94.253	0.000
Islamabad	-0.019	-0.763	-3.37	Accepted	-	-	0.214	0.644
Jhelum	-0.585	-7.050	-3.37	Rejected	1.029	0.558	0.048	0.826
Jhang	-0.174	-2.381	-3.37	Accepted	-	-	33.603	0.000
Karachi	-0.555	-6.793	-3.37	Rejected	0.874	0.541	328.798	0.000
Khuzdar	-0.148	-3.027	-3.37	Accepted	-	-	8.745	0.004
Lahore	-0.347	-3.880	-3.37	Rejected	0.891	0.493	423.100	0.000
Larkana	-0.142	-2.827	-3.37	Accepted	-	-	48.969	0.000
Loralai&Cantt	-0.331	-4.657	-3.37	Rejected	1.127	0.256	16.023	0.000
Mardan	-0.113	-2.592	-3.37	Accepted	-	-	47.387	0.000
Mianwali	-0.131	-2.572	-3.37	Accepted	-	-	7.048	0.009
Mirpurkhas	-0.019	-0.646	-3.37	Accepted	-	-	20.382	0.000
Multan	-0.281	-4.439	-3.37	Rejected	0.952	0.270	18.552	0.000
Nawabshah	0.003	0.180	-3.37	Accepted	-	-	0.283	0.595
Peshawar	-0.199	-3.676	-3.37	Rejected	0.987	0.193	12.136	0.001
Rawalpindi	-0.215	-3.837	-3.37	Rejected	0.993	0.207	2.029	0.157
Sargodha	-0.138	-3.010	-3.37	Accepted	-	-	30.860	0.000
Sialkot	-0.248	-4.101	-3.37	Rejected	0.909	0.219	298.433	0.000
Sukkur	-0.027	-0.988	-3.37	Accepted	-	-	21.872	0.000
Turbat	-0.235	-4.018	-3.37	Rejected	0.978	0.245	0.575	0.450
Vehari	-0.073	-1.640	-3.37	Accepted	-	-	66.237	0.000

4.23 Explanation:

Table 4.23 reports Engle Granger test results with CPI of Attock as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.23 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalpur, Bannu, Gujranwala, Hyderabad, Islamabad, Jhang, Khuzdar, Larkana, Mardan, Mianwali, Mirpurkhas, Nawabshah, Sargodha, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Attock.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Attock shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalpur, Gujranwala, Hyderabad, Jhang, Khuzdar, Larkana, Mardan, Mianwali, Mirpurkhas, Sargodha, Sukkur and Vehari (because $p<0.05$) implying that change in price of Attock is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bannu, Islamabad and Nawabshah (because $p>0.05$) implying that prices are same among these cities and Attock.

In addition to this, table 4.23 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bahawalnagar, D.G.Khan, D.I.Khan, Faisalabad, Jhelum, Karachi, Lahore, Loralai, Multan, Peshawar, Rawalpindi, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Attock. Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Attock shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalnagar, Faisalabad, Karachi, Lahore, Loralai, Multan, Peshawar and Sialkot (because $p<0.05$) implying that change in price of Attock is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of D.G.Khan, D.I.Khan, Jhelum, Rawalpindi and Turbat (because $p>0.05$) implying that prices are same among these cities and Attock.

Table: 4.24 Engle Granger test results with Bahawalnagar as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.018	-0.644	-3.37	Accepted	-	-	137.987	0.000
Attock	-0.179	-3.440	-3.37	Rejected	0.840	0.168	130.759	0.000
Bahawalpur	-0.301	-4.674	-3.37	Rejected	0.905	0.300	103.750	0.000
Bannu	-0.145	-2.551	-3.37	Accepted	-	-	60.929	0.000
D G Khan	-0.200	-3.105	-3.37	Accepted	-	-	211.501	0.000
D I Khan	0.176	-2.337	-3.37	Accepted	-	-	112.745	0.000
Faisalabad	-0.153	-3.001	-3.37	Accepted	-	-	440.585	0.000
Gujranwala	-0.157	-0.157	-3.37	Accepted	-	-	19.292	0.000
Hyderabad	-0.046	-1.514	-3.37	Accepted	-	-	239.629	0.000
Islamabad	-0.039	-1.170	-3.37	Accepted	-	-	38.617	0.000
Jhelum	-0.331	-4.898	-3.37	Rejected	0.880	0.334	145.475	0.000
Jhang	-0.253	-3.443	-3.37	Rejected	0.938	0.357	28.922	0.000
Karachi	-0.519	-6.516	-3.37	Rejected	0.750	0.750	957.515	0.000
Khuzdar	-0.108	-2.606	-3.37	Accepted	-	-	15.229	0.000
Lahore	-0.184	-2.815	-3.37	Accepted	-	-	524.065	0.000
Larkana	-0.173	-2.869	-3.37	Accepted	-	-	374.841	0.000
Loralai&Cantt	-0.291	-4.552	-3.37	Rejected	0.974	0.233	17.881	0.000
Mardan	-0.079	-2.200	-3.37	Accepted	-	-	1.615	0.206
Mianwali	-0.085	-2.343	-3.37	Accepted	-	-	32.157	0.000
Mirpurkhas	-0.013	-0.474	-3.37	Accepted	-	-	90.468	0.000
Multan	-0.176	-3.421	-3.37	Rejected	0.810	0.145	212.865	0.000
Nawabshah	0.000	-0.026	-3.37	Accepted	-	-	11.874	0.001
Peshawar	-0.108	-2.639	-3.37	Accepted	-	-	139.663	0.000
Rawalpindi	-0.180	-3.439	-3.37	Rejected	0.840	0.157	124.064	0.000
Sargodha	-0.138	-2.724	-3.37	Accepted	-	-	21.952	0.000
Sialkot	-0.211	-3.723	-3.37	Rejected	0.770	0.220	590.780	0.000
Sukkur	-0.033	-1.220	-3.37	Accepted	-	-	100.357	0.000
Turbat	-0.149	-3.139	-3.37	Accepted	-	-	38.567	0.000
Vehari	-0.053	-0.971	-3.37	Accepted	-	-	1.165	0.283

4.24 Explanation:

Table 4.24 shows Engle Granger test results with CPI of Bahawalnagar as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.24 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Khuzdar, Lahore, Larkana, Mardan, Mianwali, Mirpurkhas, Nawabshah, Peshawar, Sargodha, Sukkur, Turbat and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Bahawalnagar.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Bahawalnagar shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Khuzdar, Lahore, Larkana, Mianwali, Mirpurkhas, Nawabshah, Peshawar, Sargodha, Sukkur and Turbat (because $p<0.05$) implying that change in price of Bahawalnagar is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Mardan and Vehari (because $p>0.05$) implying that prices are same among these cities and Bahawalnagar.

In addition to this, table 4.24 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bahawalpur, Jhelum, Jhang, Karachi, Loralai, Multan, Rawalpindi and Sialkot because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Bahawalnagar.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Bahawalnagar shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalpur, Jhelum, Jhang, Karachi, Loralai, Multan, Rawalpindi and Sialkot (because $p<0.05$) implying that change in price of Bahawalnagar is greater than change in prices of these cities.

Table: 4.25 Engle Granger test results with Bahawalpur as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.014	-0.550	-3.37	Accepted	-	-	59.089	0.000
Attock	-0.100	-2.510	-3.37	Accepted	-	-	19.277	0.000
Bahawalnagar	-0.302	-4.679	-3.37	Rejected	1.076	0.304	75.921	0.000
Bannu	-0.095	-1.903	-3.37	Accepted	-	-	3.273	0.073
D G Khan	-0.149	-3.151	-3.37	Accepted	-	-	16.951	0.000
D I Khan	-0.284	-4.441	-3.37	Rejected	0.929	0.285	23.951	0.000
Faisalabad	-0.066	-1.988	-3.37	Accepted	-	-	165.326	0.000
Gujranwala	-0.080	-2.092	-3.37	Accepted	-	-	1.993	0.161
Hyderabad	-0.013	-0.529	-3.37	Accepted	-	-	113.056	0.000
Islamabad	0.013	0.394	-3.37	Accepted	-	-	3.831	0.053
Jhelum	-0.151	-2.412	-3.37	Accepted	-	-	19.070	0.000
Jhang	-0.143	-2.309	-3.37	Accepted	-	-	1.951	0.165
Karachi	-0.186	-2.152	-3.37	Accepted	-	-	467.227	0.000
Khuzdar	-0.103	-2.532	-3.37	Accepted	-	-	0.017	0.898
Lahore	-0.109	-2.026	-3.37	Accepted	-	-	266.020	0.000
Larkana	-0.177	-3.256	-3.37	Accepted	-	-	140.169	0.000
Loralai&Cantt	-0.137	-1.892	-3.37	Accepted	-	-	0.876	0.351
Mardan	-0.064	-1.971	-3.37	Accepted	-	-	5.609	0.019
Mianwali	-0.054	-1.635	-3.37	Accepted	-	-	1.251	0.265
Mirpurkhas	-0.001	-0.057	-3.37	Accepted	-	-	36.071	0.000
Multan	-0.085	-2.060	-3.37	Accepted	-	-	48.336	0.000
Nawabshah	0.004	0.302	-3.37	Accepted	-	-	3.533	0.063
Peshawar	-0.086	-2.317	-3.37	Accepted	-	-	30.870	0.000
Rawalpindi	-0.098	-2.122	-3.37	Accepted	-	-	17.057	0.000
Sargodha	-0.153	-3.165	-3.37	Accepted	-	-	1.906	0.170
Sialkot	-0.131	-2.803	-3.37	Accepted	-	-	307.882	0.000
Sukkur	-0.021	-0.917	-3.37	Accepted	-	-	39.863	0.000
Turbat	-0.125	-2.841	-3.37	Accepted	-	-	2.742	0.100
Vehari	-0.082	-1.781	-3.37	Accepted	-	-	34.409	0.000

4.25 Explanation:

Table 4.25 shows Engle Granger test results with CPI of Bahawalpur as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.25 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bannu, D.G.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Bahawalpur.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Bahawalpur shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, D.G.Khan, Faisalabad, Hyderabad, Islamabad, Jhelum, Karachi, Lahore, Larkana, Mardan, Mirpurkhas, Multan, Peshawar, Rawalpindi, Sialkot, Sukkur and Vehari (because $p\leq0.05$) implying that change in price of Bahawalpur is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bannu, Gujranwala, Jhang, Khuzdar, Loralai&Cantt, Mianwali, Nawabshah, Sargodha and Turbat (because $p>0.05$) implying that prices are same among these cities and Bahawalpur.

In addition to this, table 4.25 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bahawalnagar and D.I.Khan because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Bahawalpur.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Bahawalpur shows that null hypothesis of $\beta=1$ is rejected in case of both Bahawalnagar and D.I.Khan (because $p<0.05$) implying that change in price of Bahawalpur is greater than change in prices of these cities.

Table: 4.26 Engle Granger test results with Bannu as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.100	-2.301	-3.37	Accepted	-	-	75.969	0.000
Attock	-0.138	-2.305	-3.37	Accepted	-	-	8.562	0.004
Bahawalnagar	-0.138	-2.488	-3.37	Accepted	-	-	34.205	0.000
Bahawalpur	-0.091	-1.875	-3.37	Accepted	-	-	0.000	0.985
D G Khan	-0.281	-4.451	-3.37	Rejected	0.882	0.195	5.886	0.017
D I Khan	-0.263	-3.427	-3.37	Rejected	0.892	0.344	18.306	0.000
Faisalabad	-0.191	-3.153	-3.37	Accepted	-	-	125.801	0.000
Gujranwala	-0.218	-3.925	-3.37	Rejected	0.953	0.155	4.060	0.046
Hyderabad	-0.119	-2.141	-3.37	Accepted	-	-	192.985	0.000
Islamabad	-0.030	-1.150	-3.37	Accepted	-	-	2.285	0.133
Jhelum	-0.261	-4.262	-3.37	Rejected	0.905	0.233	6.825	0.010
Jhang	-0.363	-5.177	-3.37	Rejected	0.966	0.331	5.306	0.023
Karachi	-0.370	-5.239	-3.37	Rejected	0.792	0.359	313.613	0.000
Khuzdar	-0.250	-4.112	-3.37	Rejected	0.917	0.197	4.408	0.038
Lahore	-0.193	-3.546	-3.37	Rejected	0.780	0.174	159.928	0.000
Larkana	-0.205	-3.568	-3.37	Rejected	0.848	0.200	100.309	0.000
Loralai&Cantt	-0.269	-4.333	-3.37	Rejected	1.009	0.273	6.499	0.012
Mardan	-0.179	-3.412	-3.37	Rejected	0.965	0.132	31.953	0.000
Mianwali	-0.254	-4.192	-3.37	Rejected	0.922	0.201	0.237	0.627
Mirpurkhas	-0.046	-1.030	-3.37	Accepted	-	-	42.951	0.000
Multan	-0.275	-4.393	-3.37	Rejected	0.824	0.147	31.433	0.000
Nawabshah	0.005	0.193	-3.37	Accepted	-	-	0.704	0.403
Peshawar	-0.199	-3.627	-3.37	Rejected	0.867	0.140	35.211	0.000
Rawalpindi	-0.122	-2.452	-3.37	Accepted	-	-	4.607	0.034
Sargodha	-0.173	-3.396	-3.37	Rejected	0.940	0.125	4.503	0.036
Sialkot	-0.254	-4.213	-3.37	Rejected	0.789	0.197	178.284	0.000
Sukkur	-0.123	-2.817	-3.37	Accepted	-	-	46.375	0.000
Turbat	-0.301	-4.637	-3.37	Rejected	0.876	0.259	0.190	0.664
Vehari	-0.043	-0.937	-3.37	Accepted	-	-	15.688	0.000

4.26 Explanation:

Table 4.26 shows Engle Granger test results with CPI of Bannu as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.26 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, Faisalabad, Hyderabad, Islamabad, Mirpurkhas, Nawabshah, Rawalpindi, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Bannu.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Bannu shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalnagar, Faisalabad, Hyderabad, Mirpurkhas, Rawalpindi, Sukkur and Vehari (because $p<0.05$) implying that change in price of Bannu is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bahawalpur, Islamabad and Nawabshah (because $p>0.05$) implying that prices are same among these cities and Bannu.

In addition to this, table 4.26 shows that null hypothesis of unit root in residuals is rejected in case of CPI of D.G.Khan, D.I.Khan, Gujranwala, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Multan, Peshawar, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Bannu.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Bannu shows that null hypothesis of $\beta=1$ is rejected in case of D.G.Khan, D.I.Khan, Gujranwala, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mardan, Multan, Peshawar, Sargodha and Sialkot (because $p<0.05$) implying that change in price of Bannu is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Mianwali and Turbat (because $p>0.05$) implying that prices are same among these cities and Bannu.

Table: 4.27 Engle Granger test results with D.G.Khan as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.021	-0.664	-3.37	Accepted	-	-	50.175	0.000
Attock	-0.236	-4.002	-3.37	Rejected	0.956	0.235	1.744	0.189
Bahawalnagar	-0.205	-3.163	-3.37	Accepted	-	-	151.931	0.000
Bahawalpur	-0.152	-3.194	-3.37	Accepted	-	-	8.239	0.005
Bannu	-0.293	-4.576	-3.37	Rejected	1.065	0.258	1.088	0.299
D I Khan	-0.448	-5.904	-3.37	Rejected	0.955	0.453	6.391	0.013
Faisalabad	-0.273	-4.310	-3.37	Rejected	0.875	0.281	246.633	0.000
Gujranwala	-0.150	-2.924	-3.37	Accepted	-	-	24.028	0.000
Hyderabad	-0.032	-0.854	-3.37	Accepted	-	-	114.680	0.000
Islamabad	-0.042	-1.294	-3.37	Accepted	-	-	0.075	0.785
Jhelum	-0.241	-2.928	-3.37	Accepted	-	-	0.876	0.351
Jhang	-0.656	-7.701	-3.37	Rejected	1.055	0.655	50.401	0.000
Karachi	-0.715	-8.219	-3.37	Rejected	0.835	0.731	425.540	0.000
Khuzdar	-0.217	-3.834	-3.37	Rejected	0.992	0.221	7.139	0.009
Lahore	-0.184	-2.771	-3.37	Accepted	-	-	225.089	0.000
Larkana	-0.238	-3.450	-3.37	Rejected	0.931	0.255	90.393	0.000
Loralai&Cantt	-0.462	-5.799	-3.37	Rejected	1.076	0.373	15.197	0.000
Mardan	-0.166	-3.298	-3.37	Accepted	-	-	42.654	0.000
Mianwali	-0.141	-2.655	-3.37	Accepted	-	-	3.622	0.059
Mirpurkhas	-0.017	-0.522	-3.37	Accepted	-	-	24.816	0.000
Multan	-0.280	-4.429	-3.37	Rejected	0.927	0.261	27.396	0.000
Nawabshah	-0.001	-0.077	-3.37	Accepted	-	-	0.334	0.564
Peshawar	-0.246	-4.126	-3.37	Rejected	0.952	0.251	15.935	0.000
Rawalpindi	-0.205	-3.677	-3.37	Rejected	0.955	0.198	0.151	0.698
Sargodha	-0.298	-4.669	-3.37	Rejected	1.045	0.299	38.630	0.000
Sialkot	-0.338	-4.846	-3.37	Rejected	0.869	0.341	288.765	0.000
Sukkur	-0.036	-1.276	-3.37	Accepted	-	-	27.939	0.000
Turbat	-0.261	-4.289	-3.37	Rejected	0.948	0.280	1.100	0.296
Vehari	-0.057	-1.148	-3.37	Accepted	-	-	63.778	0.000

4.27 Explanation:

Table 4.27 shows Engle Granger test results with CPI of D.G.Khan as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.27 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalnagar, Bahawalpur, Gujranwala, Hyderabad, Islamabad, Jhelum, Lahore, Mardan, Mianwali, Mirpurkhas, Nawabshah, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of D.G.Khan.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and D.G.Khan shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalnagar, Bahawalpur, Gujranwala, Hyderabad, Lahore, Mardan, Mirpurkhas, Sukkur and Vehari (because $p<0.05$) implying that change in price of D.G.Khan is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Islamabad, Jhelum, Mianwali, Nawabshah (because $p>0.05$) implying that prices are same among these cities and D.G.Khan.

In addition to this, table 4.27 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bannu, D.I.Khan, Faisalabad, Jhang, Karachi, Khuzdar, Larkana, Loralai&Cantt, Multan, Peshawar, Rawalpindi, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of D.G.Khan.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and D.G.Khan shows that null hypothesis of $\beta=1$ is rejected in case of D.I.Khan, Faisalabad, Jhang, Karachi, Khuzdar, Larkana, Loralai&Cantt, Multan, Peshawar, Sargodha and Sialkot (because $p<0.05$) implying that change in price of D.G.Khan is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Attock, Bannu, Rawalpindi and Turbat (because $p>0.05$) implying that prices are same among these cities and D.G.Khan.

Table: 4.28 Engle Granger test results with D.I.Khan as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Tes for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.106	-1.663	-3.37	Accepted	-	-	43.370	0.000
Attock	-0.287	-4.445	-3.37	Rejected	0.912	0.245	0.050	0.823
Bahawalnagar	-0.181	-2.417	-3.37	Accepted	-	-	63.120	0.000
Bahawalpur	-0.280	-4.416	-3.37	Rejected	0.977	0.258	9.313	0.003
Bannu	-0.275	-3.559	-3.37	Rejected	1.036	0.371	7.626	0.007
D G Khan	-0.441	-5.845	-3.37	Rejected	0.946	0.394	1.247	0.266
Faisalabad	-0.301	-4.542	-3.37	Rejected	0.831	0.269	54.790	0.000
Gujranwala	-0.193	-3.473	-3.37	Rejected	0.999	0.185	10.533	0.002
Hyderabad	-0.143	-2.195	-3.37	Accepted	-	-	98.443	0.000
Islamabad	-0.027	-0.701	-3.37	Accepted	-	-	0.001	0.977
Jhelum	-0.290	-3.757	-3.37	Rejected	0.958	0.351	0.224	0.637
Jhang	-0.338	-3.817	-3.37	Rejected	1.040	0.376	30.433	0.000
Karachi	-0.316	-3.420	-3.37	Rejected	0.838	0.439	161.944	0.000
Khuzdar	-0.442	-5.857	-3.37	Rejected	0.969	0.409	26.063	0.000
Lahore	-0.184	-2.797	-3.37	Accepted	-	-	77.234	0.000
Larkana	-0.298	-3.474	-3.37	Rejected	0.886	0.378	38.450	0.000
Loralai&Cantt	-0.534	-6.629	-3.37	Rejected	1.036	0.542	29.142	0.000
Mardan	-0.228	-2.855	-3.37	Accepted	-	-	90.548	0.000
Mianwali	-0.252	-3.389	-3.37	Rejected	0.971	0.327	9.909	0.002
Mirpurkhas	-0.085	-1.417	-3.37	Accepted	-	-	16.667	0.000
Multan	-0.377	-5.255	-3.37	Rejected	0.882	0.307	3.681	0.057
Nawabshah	-0.002	-0.080	-3.37	Accepted	-	-	0.147	0.702
Peshawar	-0.239	-2.685	-3.37	Accepted	-	-	2.513	0.116
Rawalpindi	-0.217	-3.175	-3.37	Accepted	-	-	0.713	0.400
Sargodha	-0.632	-7.390	-3.37	Rejected	1.026	0.592	56.414	0.000
Sialkot	-0.317	-4.643	-3.37	Rejected	0.834	0.309	88.290	0.000
Sukkur	-0.185	-2.870	-3.37	Accepted	-	-	19.528	0.000
Turbat	-0.395	-4.387	-3.37	Rejected	0.916	0.468	7.858	0.006
Vehari	-0.099	-1.843	-3.37	Accepted	-	-	27.638	0.000

4.28 Explanation:

Table 4.28 shows Engle Granger test results with CPI of D.I.Khan as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.28 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalnagar, Hyderabad, Islamabad, Lahore, Mardan, Mirpurkhas, Nawabshah Peshawar, Rawalpindi, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of D.I.Khan.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and D.I.Khan shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalnagar Hyderabad, Lahore, Mardan, Mirpurkhas, Sukkur and Vehari (because $p<0.05$) implying that change in price of D.I.Khan is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Islamabad, Nawabshah, Peshawar and Rawalpindi (because $p>0.05$) implying that prices are same among these cities and D.I.Khan.

In addition to this, table 4.28 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bahawalpur, Bannu, D.G.Khan, Faisalabad, Gujranwala, Jhelum, Jhang Karachi, Khuzdar, Larkana, Loralai&Cantt, Mianwali, Multan, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of D.I.Khan

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and D.I.Khan shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalpur, Bannu, Faisalabad Gujranwala, Jhang, Karachi, Khuzdar, Larkana, Loralai&Cantt, Mianwali, Sargodha, Sialkot and Turbat (because $p<0.05$) implying that change in price of D.I.Khan is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Attock, D.G.Khan, Jhelum and Multan (because $p>0.05$) implying that prices are same among these cities and D.I.Khan.

Table: 4.29 Engle Granger test results with Faisalabad as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.031	-0.972	-3.37	Accepted	-	-	0.289	0.592
Attock	-0.184	-3.490	-3.37	Rejected	1.079	0.179	115.469	0.000
Bahawalnagar	-0.155	-2.997	-3.37	Accepted	-	-	252.599	0.000
Bahawalpur	-0.043	-1.239	-3.37	Accepted	-	-	96.399	0.000
Bannu	-0.199	-3.173	-3.37	Accepted	-	-	71.458	0.000
D G Khan	-0.272	-4.280	-3.37	Rejected	1.110	0.273	176.951	0.000
D I Khan	-0.307	-4.574	-3.37	Rejected	1.083	0.306	27.466	0.000
Gujranwala	-0.084	-1.709	-3.37	Accepted	-	-	222.730	0.000
Hyderabad	-0.013	-0.349	-3.37	Accepted	-	-	14.669	0.000
Islamabad	-0.015	-0.523	-3.37	Accepted	-	-	22.880	0.000
Jhelum	-0.338	-4.926	-3.37	Rejected	1.133	0.332	127.723	0.000
Jhang	-0.273	-2.960	-3.37	Accepted	-	-	272.484	0.000
Karachi	-0.584	-7.009	-3.37	Rejected	0.959	0.576	41.176	0.000
Khuzdar	-0.192	-3.471	-3.37	Rejected	1.119	0.192	87.380	0.000
Lahore	-0.196	-2.807	-3.37	Accepted	-	-	25.788	0.000
Larkana	-0.177	-3.108	-3.37	Accepted	-	-	0.214	0.644
Loralai&Cantt	-0.413	-5.171	-3.37	Rejected	1.226	0.331	159.101	0.000
Mardan	-0.145	-2.916	-3.37	Accepted	-	-	221.584	0.000
Mianwali	-0.154	-3.163	-3.37	Accepted	-	-	130.103	0.000
Mirpurkhas	-0.011	-0.365	-3.37	Accepted	-	-	0.388	0.534
Multan	-0.205	-3.701	-3.37	Rejected	1.037	0.188	48.411	0.000
Nawabshah	0.003	0.169	-3.37	Accepted	-	-	4.357	0.039
Peshawar	-0.309	-4.708	-3.37	Rejected	1.074	0.309	88.084	0.000
Rawalpindi	-0.100	-2.185	-3.37	Accepted	-	-	109.952	0.000
Sargodha	-0.195	-3.592	-3.37	Rejected	1.176	0.195	236.526	0.000
Sialkot	-0.259	-3.066	-3.37	Accepted	-	-	17.047	0.000
Sukkur	-0.011	-0.351	-3.37	Accepted	-	-	0.580	0.448
Turbat	-0.281	-4.435	-3.37	Rejected	1.067	0.294	98.738	0.000
Vehari	-0.079	-2.074	-3.37	Accepted	-	-	214.593	0.000

4.29 Explanation:

Table 4.29 shows Engle Granger test results with CPI of Faisalabad as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.29 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalnagar, Bahawalpur, Bannu, Gujranwala, Hyderabad, Islamabad, Jhang, Lahore, Larkana, Mardan, Mianwali, Mirpurkhas, Nawabshah, Rawalpindi, Sialkot, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Faisalabad.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Faisalabad shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalnagar, Bahawalpur, Bannu, Gujranwala, Hyderabad, Islamabad, Jhang, Lahore, Mardan, Mianwali, Nawabshah, Rawalpindi, Sialkot, Sukkur and Vehari (because $p<0.05$) implying that change in price of Faisalabad is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Abbotabad, Larkana, Mirpurkhas and Sukkur (because $p>0.05$) implying that prices are same among these cities and Faisalabad.

In addition to this, table 4.29 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, D.G.Khan, D.I.Khan, Jhelum, Karachi, Khuzdar, Loralai&Cantt, Multan, Peshawar, Sargodha and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Faisalabad.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Faisalabad shows that null hypothesis of $\beta=1$ is rejected in case of Attock, D.G.Khan, D.I.Khan, Jhelum, Karachi, Khuzdar, Loralai&Cantt, Multan, Peshawar, Sargodha and Turbat (because $p<0.05$) implying that change in price of Faisalabad is greater than change in prices of these cities.

Table: 4.30 Engle Granger test results with Gujranwala as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.020	-0.715	-3.37	Accepted	-	-	79.595	0.000
Attock	-0.154	-3.049	-3.37	Accepted	-	-	62.020	0.000
Bahawalnagar	-0.155	-2.996	-3.37	Accepted	-	-	8.657	0.004
Bahawalpur	-0.076	-2.003	-3.37	Accepted	-	-	8.733	0.004
Bannu	-0.227	-3.979	-3.37	Rejected	0.984	0.179	14.482	0.000
D G Khan	-0.143	-2.815	-3.37	Accepted	-	-	42.288	0.000
D I Khan	-0.194	-3.444	-3.37	Rejected	0.882	0.193	33.327	0.000
Faisalabad	-0.078	-1.622	-3.37	Accepted	-	-	356.518	0.000
Hyderabad	-0.037	-1.126	-3.37	Accepted	-	-	153.273	0.000
Islamabad	-0.071	-1.997	-3.37	Accepted	-	-	14.523	0.000
Jhelum	-0.269	-4.152	-3.37	Rejected	0.930	0.268	55.892	0.000
Jhang	-0.106	-1.698	-3.37	Accepted	-	-	1.399	0.239
Karachi	-0.403	-4.371	-3.37	Rejected	0.793	0.470	550.376	0.000
Khuzdar	-0.121	-2.624	-3.37	Accepted	-	-	2.474	0.118
Lahore	-0.309	-3.704	-3.37	Rejected	0.810	0.466	868.495	0.000
Larkana	-0.141	-2.581	-3.37	Accepted	-	-	151.089	0.000
Loralai&Cantt	-0.152	-1.869	-3.37	Accepted	-	-	1.215	0.272
Mardan	-0.076	-1.972	-3.37	Accepted	-	-	0.875	0.352
Mianwali	-0.102	-2.477	-3.37	Accepted	-	-	8.105	0.005
Mirpurkhas	0.004	0.131	-3.37	Accepted	-	-	52.768	0.000
Multan	-0.049	-0.793	-3.37	Accepted	-	-	93.675	0.000
Nawabshah	0.006	0.332	-3.37	Accepted	-	-	6.226	0.014
Peshawar	-0.134	-2.909	-3.37	Accepted	-	-	70.572	0.000
Rawalpindi	-0.137	-2.892	-3.37	Accepted	-	-	40.401	0.000
Sargodha	-0.086	-2.244	-3.37	Accepted	-	-	1.448	0.231
Sialkot	-0.161	-2.786	-3.37	Accepted	-	-	452.982	0.000
Sukkur	-0.017	-0.625	-3.37	Accepted	-	-	56.016	0.000
Turbat	-0.165	-3.249	-3.37	Accepted	-	-	11.421	0.001
Vehari	-0.201	-3.640	-3.37	Rejected	1.004	0.192	10.671	0.001

4.30 Explanation:

Table 4.30 shows Engle Granger test results with CPI of Gujranwala as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.30 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, D.G.Khan, Faisalabad, Hyderabad, Islamabad, Jhang, Khuzdar, Larkana, Loralai&Cantt, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur and Turbat because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Gujranwala.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Gujranwala shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock Bahawalnagar, Bahawalpur, D.G.Khan, Faisalabad, Hyderabad, Islamabad, Larkana, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sialkot, Sukkur and Turbat (because $p<0.05$) implying that change in price of Gujranwala is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Jhang, Khuzdar, Loralai&Cantt, Mardan and Sargodha (because $p>0.05$) implying that prices are same among these cities and Gujranwala.

In addition to this, table 4.30 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bannu, D.I.Khan, Jhelum, Karachi, Lahore and Vehari because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Gujranwala.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Gujranwala shows that null hypothesis of $\beta=1$ is rejected in case of Bannu, D.I.Khan, Jhelum, Karachi, Lahore and Vehari (because $p<0.05$) implying that change in price of Gujranwala is greater than change in prices of these cities.

Table: 4.31 Engle Granger test results with Hyderabad as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.258	-4.273	-3.37	Rejected	0.975	0.207	24.727	0.000
Attock	-0.054	-1.644	-3.37	Accepted	-	-	39.774	0.000
Bahawalnagar	-0.052	-1.704	-3.37	Accepted	-	-	97.106	0.000
Bahawalpur	-0.035	-1.412	-3.37	Accepted	-	-	40.560	0.000
Bannu	-0.135	-2.377	-3.37	Accepted	-	-	101.594	0.000
D G Khan	-0.039	-1.055	-3.37	Accepted	-	-	52.648	0.000
D I Khan	-0.150	-2.301	-3.37	Accepted	-	-	47.489	0.000
Faisalabad	-0.028	-0.746	-3.37	Accepted	-	-	2.338	0.129
Gujranwala	-0.046	-1.407	-3.37	Accepted	-	-	58.484	0.000
Islamabad	-0.003	-0.193	-3.37	Accepted	-	-	7.979	0.006
Jhelum	-0.031	-0.847	-3.37	Accepted	-	-	37.934	0.000
Jhang	-0.071	-1.450	-3.37	Accepted	-	-	105.755	0.000
Karachi	-0.026	-0.740	-3.37	Accepted	-	-	1.652	0.201
Khuzdar	-0.259	-4.206	-3.37	Rejected	1.157	0.250	223.731	0.000
Lahore	-0.025	-0.741	-3.37	Accepted	-	-	1.110	0.294
Larkana	-0.074	-2.283	-3.37	Accepted	-	-	4.441	0.037
Loralai&Cantt	-0.099	-1.972	-3.37	Accepted	-	-	96.935	0.000
Mardan	-0.178	-3.353	-3.37	Accepted	-	-	363.180	0.000
Mianwali	-0.190	-3.330	-3.37	Accepted	-	-	170.263	0.000
Mirpurkhas	-0.264	-4.126	-3.37	Rejected	1.015	0.220	94.397	0.000
Multan	-0.037	-0.892	-3.37	Accepted	-	-	39.523	0.000
Nawabshah	-0.035	-1.307	-3.37	Accepted	-	-	53.577	0.000
Peshawar	-0.043	-0.984	-3.37	Accepted	-	-	48.910	0.000
Rawalpindi	-0.036	-1.296	-3.37	Accepted	-	-	34.046	0.000
Sargodha	-0.043	-1.089	-3.37	Accepted	-	-	107.242	0.000
Sialkot	-0.048	-1.469	-3.37	Accepted	-	-	0.008	0.928
Sukkur	-0.255	-4.236	-3.37	Rejected	1.029	0.244	97.740	0.000
Turbat	-0.164	-3.123	-3.37	Accepted	-	-	108.070	0.000
Vehari	-0.018	-0.707	-3.37	Accepted	-	-	54.311	0.000

4.31 Explanation:

Table 4.31 shows Engle Granger test results with CPI of Hyderabad as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.31 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan , Faisalabad, Gujranwala, Islamabad, Jhelum, Jhang, Karachi, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Hyderabad.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Hyderabad shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Gujranwala, Islamabad, Jhelum, Jhang, Larkana, Loralai&Cantt, Mardan, Mianwali, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Turbat and Vehari (because $p<0.05$) implying that change in price of Hyderabad is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Faisalabad, Karachi, Lahore and Sialkot (because $p>0.05$) implying that prices are same among these cities and Hyderabad.

In addition to this, table 4.31 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Abbotabad, Khuzdar, Mirpurkhas and Sukkur because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Hyderabad.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Hyderabad shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Khuzdar, Mirpurkhas and Sukkur (because $p<0.05$) implying that change in price of Hyderabad is greater than change in prices of these cities.

Table: 4.32 Engle Granger test results with Islamabad as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	0.010	0.590	-3.37	Accepted	-	-	33.264	0.000
Attock	0.000	-0.018	-3.37	Accepted	-	-	6.143	0.015
Bahawalnagar	-0.036	-1.066	-3.37	Accepted	-	-	14.568	0.000
Bahawalpur	0.021	0.622	-3.37	Accepted	-	-	0.006	0.938
Bannu	-0.037	-1.241	-3.37	Accepted	-	-	1.740	0.190
D G Khan	-0.035	-1.086	-3.37	Accepted	-	-	4.277	0.041
D I Khan	-0.014	-0.341	-3.37	Accepted	-	-	9.469	0.003
Faisalabad	-0.011	-0.395	-3.37	Accepted	-	-	62.691	0.000
Gujranwala	-0.071	-1.977	-3.37	Accepted	-	-	3.545	0.062
Hyderabad	0.006	0.346	-3.37	Accepted	-	-	60.130	0.000
Jhelum	-0.017	-0.382	-3.37	Accepted	-	-	5.203	0.024
Jhang	-0.001	-0.036	-3.37	Accepted	-	-	0.250	0.618
Karachi	0.009	0.225	-3.37	Accepted	-	-	140.012	0.000
Khuzdar	-0.016	-0.656	-3.37	Accepted	-	-	0.248	0.620
Lahore	-0.057	-1.285	-3.37	Accepted	-	-	182.050	0.000
Larkana	-0.030	-0.818	-3.37	Accepted	-	-	44.502	0.000
Loralai&Cantt	-0.038	-0.987	-3.37	Accepted	-	-	0.251	0.617
Mardan	-0.007	-0.340	-3.37	Accepted	-	-	1.201	0.275
Mianwali	-0.010	-0.420	-3.37	Accepted	-	-	1.022	0.314
Mirpurkhas	0.022	1.245	-3.37	Accepted	-	-	23.139	0.000
Multan	-0.014	-0.495	-3.37	Accepted	-	-	15.069	0.000
Nawabshah	0.016	1.391	-3.37	Accepted	-	-	6.089	0.015
Peshawar	-0.018	-0.832	-3.37	Accepted	-	-	12.882	0.000
Rawalpindi	0.007	0.360	-3.37	Accepted	-	-	3.857	0.052
Sargodha	-0.018	-0.755	-3.37	Accepted	-	-	0.160	0.690
Sialkot	-0.042	-1.448	-3.37	Accepted	-	-	104.523	0.000
Sukkur	0.012	0.756	-3.37	Accepted	-	-	23.869	0.000
Turbat	-0.030	-1.143	-3.37	Accepted	-	-	1.711	0.193
Vehari	-0.072	-1.810	-3.37	Accepted	-	-	35.695	0.000

4.32 Explanation:

Table 4.32 shows Engle Granger test results with CPI of Islamabad as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.32 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot Sukkur, Turbat and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Islamabad.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Islamabad shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalnagar, D.G.Khan, D.I.Khan, Faisalabad, Hyderabad, Jhelum, Karachi, Lahore, Larkana, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sialkot, Sukkur, and Vehari (because $p<0.05$) implying that change in price of Islamabad is greater than change in prices of these cities.

While null hypothesis of $\beta=1$ cannot be rejected in case of Bahawalpur, Bannu, Gujranwala, Jhang, Khuzdar, Loralai&Cantt, Mardan, Mianwali, Sargodha and Turbat (because $p>0.05$) implying that prices are same among these cities and Islamabad.

Table: 4.33 Engle Granger test results with Jhelum as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.026	-0.753	-3.37	Accepted	-	-	41.911	0.000
Attock	-0.578	-6.998	-3.37	Rejected	0.943	0.500	0.828	0.365
Bahawalnagar	-0.329	-4.880	-3.37	Rejected	1.077	0.319	96.163	0.000
Bahawalpur	-0.180	-2.980	-3.37	Accepted	-	-	9.281	0.003
Bannu	-0.268	-4.330	-3.37	Rejected	1.028	0.265	1.108	0.295
D G Khan	-0.235	-2.884	-3.37	Accepted	-	-	0.000	0.991
D I Khan	-0.291	-3.745	-3.37	Rejected	0.932	0.363	4.418	0.038
Faisalabad	-0.333	-4.897	-3.37	Rejected	0.848	0.305	183.687	0.000
Gujranwala	-0.269	-4.172	-3.37	Rejected	1.027	0.267	34.981	0.000
Hyderabad	-0.019	-0.533	-3.37	Accepted	-	-	93.161	0.000
Islamabad	-0.025	-0.586	-3.37	Accepted	-	-	0.094	0.760
Jhang	-0.319	-3.920	-3.37	Rejected	1.038	0.421	30.453	0.000
Karachi	-0.725	-8.296	-3.37	Rejected	0.830	0.731	385.153	0.000
Khuzdar	-0.214	-3.774	-3.37	Rejected	0.958	0.203	6.463	0.012
Lahore	-0.322	-4.656	-3.37	Rejected	0.857	0.321	457.540	0.000
Larkana	-0.202	-3.083	-3.37	Accepted	-	-	64.082	0.000
Loralai&Cantt	-0.464	-4.830	-3.37	Rejected	1.042	0.427	16.693	0.000
Mardan	-0.134	-2.518	-3.37	Accepted	-	-	35.667	0.000
Mianwali	-0.136	-2.239	-3.37	Accepted	-	-	4.214	0.042
Mirpurkhas	-0.023	-0.640	-3.37	Accepted	-	-	20.922	0.000
Multan	-0.373	-5.265	-3.37	Rejected	0.895	0.300	17.047	0.000
Nawabshah	-0.008	-0.401	-3.37	Accepted	-	-	0.521	0.472
Peshawar	-0.317	-4.786	-3.37	Rejected	0.922	0.306	12.717	0.001
Rawalpindi	-0.532	-6.598	-3.37	Rejected	0.937	0.444	0.107	0.744
Sargodha	-0.153	-2.293	-3.37	Accepted	-	-	28.454	0.000
Sialkot	-0.418	-5.572	-3.37	Rejected	0.847	0.424	303.554	0.000
Sukkur	-0.034	-1.013	-3.37	Accepted	-	-	23.055	0.000
Turbat	-0.307	-4.701	-3.37	Rejected	0.913	0.302	1.237	0.268
Vehari	-0.206	-3.431	-3.37	Rejected	1.048	0.196	69.290	0.000

4.33 Explanation:

Table 4.33 shows Engle Granger test results with CPI of Jhelum as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.33 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalpur, D.G.Khan, Hyderabad, Islamabad, Larkana, Mardan, Mianwali, Mirpurkhas, Nawabshah, Sargodha and Sukkur because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Jhelum.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Jhelum shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalpur, Hyderabad, Larkana, Mardan, Mianwali, Mirpurkhas, Sargodha and Sukkur (because $p<0.05$) implying that change in price of Jhelum is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of D.G.Khan, Islamabad and Nawabshah (because $p>0.05$) implying that prices are same among these cities and Jhelum.

In addition to this, table 4.33 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bahawalnagar, Bannu, D.I.Khan, Faisalabad, Gujranwala, Jhang, Karachi, Khuzdar, Lahore, Loralai&Cantt, Multan, Peshawar, Rawalpindi, Sialkot, Turbat and Vehari because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Jhelum.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Jhelum shows that null hypothesis of $\beta=1$ is rejected in case of of Bahawalnagar, D.I.Khan, Faisalabad, Gujranwala, Jhang, Karachi, Khuzdar, Lahore, Loralai&Cantt, Multan, Peshawar, Sialkot, and Vehari (because $p<0.05$) implying that change in price of Jhelum is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Attock, Bannu, Rawalpindi and Turbat (because $p>0.05$) implying that prices are same among these cities and Jhelum.

Table: 4.34 Engle Granger test results with Jhang as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.080	-1.589	-3.37	Accepted	-	-	120.634	0.000
Attock	-0.168	-2.356	-3.37	Accepted	-	-	53.561	0.000
Bahawalnagar	-0.253	-3.444	-3.37	Rejected	1.007	0.340	16.068	0.000
Bahawalpur	-0.142	-2.319	-3.37	Accepted	-	-	7.295	0.008
Bannu	-0.369	-5.232	-3.37	Rejected	0.956	0.369	14.360	0.000
D G Khan	-0.650	-7.639	-3.37	Rejected	0.903	0.599	69.907	0.000
D I Khan	-0.337	-3.780	-3.37	Rejected	0.879	0.391	54.764	0.000
Faisalabad	-0.273	-3.004	-3.37	Accepted	-	-	419.761	0.000
Gujranwala	-0.115	-1.848	-3.37	Accepted	-	-	0.083	0.774
Hyderabad	-0.060	-1.231	-3.37	Accepted	-	-	221.783	0.000
Islamabad	-0.010	-0.300	-3.37	Accepted	-	-	9.519	0.003
Jhelum	-0.319	-3.925	-3.37	Rejected	0.907	0.420	48.910	0.000
Karachi	-0.652	-7.647	-3.37	Rejected	0.772	0.660	617.692	0.000
Khuzdar	-0.270	-4.314	-3.37	Rejected	0.900	0.253	1.025	0.313
Lahore	-0.173	-2.640	-3.37	Accepted	-	-	345.218	0.000
Larkana	-0.242	-3.523	-3.37	Rejected	0.834	0.284	159.635	0.000
Loralai&Cantt	-0.388	-3.312	-3.37	Accepted	-	-	0.313	0.577
Mardan	-0.276	-4.366	-3.37	Rejected	0.951	0.266	6.300	0.013
Mianwali	-0.230	-2.831	-3.37	Accepted	-	-	8.077	0.005
Mirpurkhas	-0.022	-0.496	-3.37	Accepted	-	-	69.793	0.000
Multan	-0.523	-6.540	-3.37	Rejected	0.843	0.437	133.917	0.000
Nawabshah	-0.006	-0.250	-3.37	Accepted	-	-	3.787	0.054
Peshawar	-0.399	-5.481	-3.37	Rejected	0.856	0.383	90.525	0.000
Rawalpindi	-0.184	-2.471	-3.37	Accepted	-	-	39.049	0.000
Sargodha	-0.458	-4.925	-3.37	Rejected	0.951	0.523	0.135	0.714
Sialkot	-0.422	-5.570	-3.37	Rejected	0.791	0.434	665.790	0.000
Sukkur	-0.083	-1.721	-3.37	Accepted	-	-	77.880	0.000
Turbat	-0.378	-5.321	-3.37	Rejected	0.851	0.374	11.243	0.001
Vehari	-0.040	-0.757	-3.37	Accepted	-	-	5.740	0.018

4.34 Explanation:

Table 4.34 shows Engle Granger test results with CPI of Jhang as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.34 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalpur, Faisalabad, Gujranwala, Hyderabad, Islamabad, Lahore, Loralai&Cantt, Mianwali, Mirpurkhas, Nawabshah, Rawalpindi, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Jhang.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Jhang shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalpur, Faisalabad, Hyderabad, Islamabad, Lahore, Mianwali, Mirpurkhas, Nawabshah, Rawalpindi, Sukkur and Vehari (because $p<0.05$) implying that change in price of Jhang is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Gujranwala and Loralai&Cantt (because $p>0.05$) implying that prices are same among these cities and Jhang.

In addition to this, table 4.34 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Jhelum, Karachi, Khuzdar, Larkana, Mardan, Multan, Peshawar, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Jhang.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Jhang shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Jhelum, Karachi, Larkana, Mardan, Multan, Peshawar, Sialkot and Turbat (because $p<0.05$) implying that change in price of Jhang is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Khuzdar and Sargodha (because $p>0.05$) implying that prices are same among these cities and Jhang.

Table: 4.35 Engle Granger test results with Karachi as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.076	-1.637	-3.37	Accepted	-	-	4.157	0.044
Attock	-0.544	-6.708	-3.37	Rejected	1.058	0.444	212.326	0.000
Bahawalnagar	-0.513	-6.465	-3.37	Rejected	1.232	0.473	526.170	0.000
Bahawalpur	-0.184	-2.147	-3.37	Accepted	-	-	281.851	0.000
Bannu	-0.373	-5.269	-3.37	Rejected	1.169	0.372	184.698	0.000
D G Khan	-0.706	-8.129	-3.37	Rejected	1.106	0.630	278.534	0.000
D I Khan	-0.310	-3.357	-3.37	Rejected	1.072	0.419	94.543	0.000
Faisalabad	-0.574	-6.941	-3.37	Rejected	0.967	0.493	25.281	0.000
Gujranwala	-0.464	-5.900	-3.37	Rejected	1.157	0.431	314.908	0.000
Hyderabad	-0.013	-0.372	-3.37	Accepted	-	-	0.691	0.407
Islamabad	-0.017	-0.440	-3.37	Accepted	-	-	63.406	0.000
Jhelum	-0.721	-8.259	-3.37	Rejected	1.118	0.690	251.687	0.000
Jhang	-0.649	-7.622	-3.37	Rejected	1.186	0.622	363.826	0.000
Khuzdar	-0.234	-3.972	-3.37	Rejected	1.099	0.201	157.713	0.000
Lahore	-0.308	-3.641	-3.37	Rejected	0.960	0.411	0.105	0.747
Larkana	-0.307	-3.851	-3.37	Rejected	1.020	0.365	27.824	0.000
Loralai&Cantt	-0.437	-5.817	-3.37	Rejected	1.217	0.440	381.288	0.000
Mardan	-0.137	-2.216	-3.37	Accepted	-	-	264.873	0.000
Mianwali	-0.244	-3.431	-3.37	Rejected	1.097	0.288	153.770	0.000
Mirpurkhas	-0.015	-0.376	-3.37	Accepted	-	-	8.630	0.004
Multan	-0.520	-6.511	-3.37	Rejected	1.022	0.393	131.245	0.000
Nawabshah	-0.004	-0.173	-3.37	Accepted	-	-	9.006	0.003
Peshawar	-0.365	-4.281	-3.37	Rejected	1.050	0.392	141.443	0.000
Rawalpindi	-0.416	-5.619	-3.37	Rejected	1.052	0.294	226.334	0.000
Sargodha	-0.381	-5.354	-3.37	Rejected	1.148	0.326	336.789	0.000
Sialkot	-0.520	-6.412	-3.37	Rejected	0.966	0.494	5.416	0.022
Sukkur	-0.007	-0.188	-3.37	Accepted	-	-	11.162	0.001
Turbat	-0.344	-5.022	-3.37	Rejected	1.053	0.312	172.142	0.000
Vehari	-0.176	-2.061	-3.37	Accepted	-	-	368.804	0.000

4.35 Explanation:

Table 4.35 shows Engle Granger test results with CPI of Karachi as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.35 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalpur, Hyderabad, Islamabad, Mardan, Mirpurkhas, Nawabshah, Sukkur and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Karachi.Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Karachi shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalpur, Islamabad, Mardan, Mirpurkhas, Nawabshah, Sukkur and Vehari (because $p<0.05$) implying that change in price of Karachi is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected only in case of Hyderabad (because $p>0.05$) implying that prices are same among these cities and Karachi.

In addition to this, table 4.35 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Faisalabad Gujranwala, Jhelum, Jhang, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mianwali, Multan, Peshawar, Rawalpindi, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Karachi.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Karachi shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Jhelum, Jhang, Khuzdar, Larkana, Loralai&Cantt, Mianwali, Multan, Peshawar, Rawalpindi, Sargodha, Sialkot and Turbat (because $p<0.05$) implying that change in price of Karachi is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of only Lahore (because $p>0.05$) implying that prices are same among these cities and Karachi.

Table: 4.36 Engle Granger test results with Khuzdar as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.267	-4.175	-3.37	Rejected	0.807	0.235	242.092	0.000
Attock	-0.148	-3.050	-3.37	Accepted	-	-	24.830	0.000
Bahawalnagar	-0.113	-2.677	-3.37	Accepted	-	-	2.985	0.087
Bahawalpur	-0.106	-2.597	-3.37	Accepted	-	-	4.704	0.032
Bannu	-0.263	-4.249	-3.37	Rejected	1.031	0.241	12.789	0.001
D G Khan	-0.218	-3.841	-3.37	Rejected	0.918	0.213	21.076	0.000
D I Khan	-0.449	-5.916	-3.37	Rejected	0.924	0.449	48.919	0.000
Faisalabad	-0.193	-3.516	-3.37	Rejected	0.819	0.189	164.077	0.000
Gujranwala	-0.128	-2.754	-3.37	Accepted	-	-	0.593	0.443
Hyderabad	-0.259	-4.169	-3.37	Rejected	0.803	0.259	397.766	0.000
Islamabad	-0.024	-0.967	-3.37	Accepted	-	-	8.925	0.003
Jhelum	-0.220	-3.846	-3.37	Rejected	0.941	0.220	21.348	0.000
Jhang	-0.277	-4.388	-3.37	Rejected	1.003	0.277	0.472	0.493
Karachi	-0.243	-4.078	-3.37	Rejected	0.834	0.237	301.729	0.000
Lahore	-0.158	-2.827	-3.37	Accepted	-	-	160.964	0.000
Larkana	-0.166	-3.289	-3.37	Accepted	-	-	104.319	0.000
Loralai&Cantt	-0.221	-3.862	-3.37	Rejected	1.075	0.180	0.161	0.689
Mardan	-0.443	-5.943	-3.37	Rejected	1.022	0.350	18.673	0.000
Mianwali	-0.292	-4.481	-3.37	Rejected	0.966	0.291	6.804	0.010
Mirpurkhas	-0.191	-3.271	-3.37	Accepted	-	-	124.827	0.000
Multan	-0.204	-3.663	-3.37	Rejected	0.866	0.187	56.011	0.000
Nawabshah	-0.030	-1.105	-3.37	Accepted	-	-	1.787	0.184
Peshawar	-0.238	-3.903	-3.37	Rejected	0.912	0.237	79.953	0.000
Rawalpindi	-0.102	-2.493	-3.37	Accepted	-	-	17.300	0.000
Sargodha	-0.202	-3.651	-3.37	Rejected	0.989	0.202	0.309	0.580
Sialkot	-0.158	-3.103	-3.37	Accepted	-	-	192.391	0.000
Sukkur	-0.233	-3.871	-3.37	Rejected	0.840	0.229	146.744	0.000
Turbat	-0.456	-5.880	-3.37	Rejected	0.917	0.464	16.148	0.000
Vehari	-0.060	-1.721	-3.37	Accepted	-	-	0.570	0.452

4.36 Explanation:

Table 4.36 shows Engle Granger test results with CPI of Khuzdar as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.36 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Attock, Bahawalnagar, Bahawalpur, Gujranwala, Islamabad, Lahore, Larkana, Mirpurkhas, Nawabshah, Rawalpindi, Sialkot and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Khuzdar.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Khuzdar shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalpur, Islamabad, Lahore, Larkana, Mirpurkhas, Rawalpindi and Sialkot (because $p<0.05$) implying that change in price of Khuzdar is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bahawalnagar, Gujranwala, Nawabshah and Vehari (because $p>0.05$) implying that prices are same among these cities and Khuzdar.

In addition to this, table 4.36 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Abbotabad, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Hyderabad, Jhelum, Jhang, Karachi, Loralai&Cantt, Mardan, Mianwali, Multan, Peshawar, Sargodha, Sukkur and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Khuzdar.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Khuzdar shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Hyderabad, Jhelum, Karachi, Mardan, Mianwali, Multan, Peshawar, Sukkur and Turbat (because $p<0.05$) implying that change in price of Khuzdar is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Jhang, Loralai&Cantt and Sargodha (because $p>0.05$) implying that prices are same among these cities and Khuzdar.

Table: 4.37 Engle Granger test results with Lahore as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.013	-0.349	-3.37	Accepted	-	-	0.841	0.361
Attock	-0.335	-3.774	-3.37	Rejected	1.071	0.436	290.556	0.000
Bahawalnagar	-0.180	-2.746	-3.37	Accepted	-	-	274.088	0.000
Bahawalpur	-0.101	-1.898	-3.37	Accepted	-	-	149.540	0.000
Bannu	-0.198	-3.575	-3.37	Rejected	1.176	0.196	80.690	0.000
D G Khan	-0.173	-2.638	-3.37	Accepted	-	-	137.237	0.000
D I Khan	-0.180	-2.711	-3.37	Accepted	-	-	33.138	0.000
Faisalabad	-0.189	-2.733	-3.37	Accepted	-	-	14.142	0.000
Gujranwala	-0.308	-3.702	-3.37	Rejected	1.177	0.461	534.753	0.000
Hyderabad	-0.009	-0.265	-3.37	Accepted	-	-	2.662	0.105
Islamabad	-0.058	-1.327	-3.37	Accepted	-	-	97.538	0.000
Jhelum	-0.320	-4.620	-3.37	Rejected	1.131	0.318	313.805	0.000
Jhang	-0.169	-2.565	-3.37	Accepted	-	-	191.327	0.000
Karachi	-0.310	-3.623	-3.37	Rejected	0.960	0.443	2.611	0.109
Khuzdar	-0.121	-2.271	-3.37	Accepted	-	-	68.752	0.000
Larkana	-0.118	-1.947	-3.37	Accepted	-	-	7.743	0.006
Loralai&Cantt	-0.276	-2.784	-3.37	Accepted	-	-	142.020	0.000
Mardan	-0.080	-1.681	-3.37	Accepted	-	-	138.216	0.000
Mianwali	-0.115	-2.084	-3.37	Accepted	-	-	101.616	0.000
Mirpurkhas	0.015	0.480	-3.37	Accepted	-	-	2.821	0.096
Multan	-0.180	-2.745	-3.37	Accepted	-	-	78.711	0.000
Nawabshah	0.011	0.567	-3.37	Accepted	-	-	4.484	0.036
Peshawar	-0.160	-2.611	-3.37	Accepted	-	-	79.209	0.000
Rawalpindi	-0.248	-3.127	-3.37	Accepted	-	-	264.576	0.000
Sargodha	-0.094	-1.881	-3.37	Accepted	-	-	169.447	0.000
Sialkot	-0.246	-3.365	-3.37	Rejected	0.968	-0.360	0.879	0.350
Sukkur	0.004	0.136	-3.37	Accepted	-	-	3.069	0.082
Turbat	-0.175	-2.817	-3.37	Accepted	-	-	82.087	0.000
Vehari	-0.178	-2.679	-3.37	Accepted	-	-	393.026	0.000

4.37 Explanation:

Table 4.37 shows Engle Granger test results with CPI of Lahore as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.37 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalnagar, Bahawalpur, D.G.Khan, D.I.Khan, Faisalabad, Hyderabad, Islamabad, Jhang, Khuzdar, Larkana, Loralai&Cantt, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sukkur, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Lahore.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Lahore shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalnagar, Bahawalpur, D.G.Khan, D.I.Khan, Faisalabad, Islamabad, Jhang, Khuzdar, Larkana, Loralai&Cantt, Mardan, Mianwali, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Turbat and Vehari (because $p<0.05$) implying that change in price of Lahore is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Abbotabad, Hyderabad, Mirpurkhas and Sukkur (because $p>0.05$) implying that prices are same among these cities and Lahore.

In addition to this, table 4.37 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bannu, Gujranwala, Jhelum, Karachi and Sialkot because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Lahore.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Lahore shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bannu, Gujranwala and Jhelum (because $p<0.05$) implying that change in price of Lahore is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Karachi and Sialkot (because $p>0.05$) implying that prices are same among these cities and Lahore.

Table: 4.38 Engle Granger test results with Larkana as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.057	-1.666	-3.37	Accepted	-	-	2.570	0.112
Attock	-0.133	-2.749	-3.37	Accepted	-	-	23.111	0.000
Bahawalnagar	-0.169	-2.848	-3.37	Accepted	-	-	219.416	0.000
Bahawalpur	-0.171	-3.215	-3.37	Accepted	-	-	83.643	0.000
Bannu	-0.209	-3.634	-3.37	Rejected	1.044	0.050	57.100	0.000
D G Khan	-0.226	-3.363	-3.37	Accepted	-	-	55.806	0.000
D I Khan	-0.276	-3.261	-3.37	Accepted	-	-	17.974	0.000
Faisalabad	-0.169	-3.058	-3.37	Accepted	-	-	4.093	0.045
Gujranwala	-0.139	-2.598	-3.37	Accepted	-	-	81.122	0.000
Hyderabad	-0.065	-2.086	-3.37	Accepted	-	-	21.397	0.000
Islamabad	-0.029	-0.851	-3.37	Accepted	-	-	12.781	0.001
Jhelum	-0.198	-3.062	-3.37	Accepted	-	-	34.920	0.000
Jhang	-0.237	-3.491	-3.37	Rejected	1.100	0.260	89.736	0.000
Karachi	-0.305	-3.852	-3.37	Rejected	0.911	0.363	49.274	0.000
Khuzdar	-0.157	-3.201	-3.37	Accepted	-	-	48.968	0.000
Lahore	-0.119	-2.007	-3.37	Accepted	-	-	23.311	0.000
Loralai&Cantt	-0.384	-5.246	-3.37	Rejected	1.146	0.384	146.497	0.000
Mardan	-0.099	-2.102	-3.37	Accepted	-	-	88.577	0.000
Mianwali	-0.077	-1.666	-3.37	Accepted	-	-	39.343	0.000
Mirpurkhas	-0.034	-1.177	-3.37	Accepted	-	-	0.171	0.680
Multan	-0.113	-2.269	-3.37	Accepted	-	-	8.893	0.003
Nawabshah	-0.010	-0.606	-3.37	Accepted	-	-	1.795	0.183
Peshawar	-0.131	-2.242	-3.37	Accepted	-	-	12.922	0.000
Rawalpindi	-0.119	-2.589	-3.37	Accepted	-	-	26.174	0.000
Sargodha	-0.161	-2.674	-3.37	Accepted	-	-	102.128	0.000
Sialkot	-0.129	-2.500	-3.37	Accepted	-	-	16.052	0.000
Sukkur	-0.049	-1.555	-3.37	Accepted	-	-	0.066	0.797
Turbat	-0.146	-2.602	-3.37	Accepted	-	-	36.025	0.000
Vehari	-0.036	-0.693	-3.37	Accepted	-	-	137.313	0.000

4.38 Explanation:

Table 4.38 shows Engle Granger test results with CPI of Larkana as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.38 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Khuzdar, Lahore, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Larkana.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Larkana shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Bahawalpur, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Khuzdar, Lahore, Mardan, Mianwali, Multan, Peshawar, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari (because $p<0.05$) implying that change in price of Larkana is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Abbotabad, Mirpurkhas, Nawabshah and Sukkur (because $p>0.05$) implying that prices are same among these cities and Larkana.

In addition to this, table 4.38 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bannu, Jhang, Karachi and Loralai&Cantt because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Larkana.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Larkana shows that null hypothesis of $\beta=1$ is rejected in case of Bannu, Jhang, Karachi and Loralai&Cantt (because $p<0.05$) implying that change in price of Larkana is greater than change in prices of these cities.

Table: 4.39 Engle Granger test results with Loralai as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.081	-1.522	-3.37	Accepted	-	-	110.983	0.000
Attock	-0.262	-2.994	-3.37	Accepted	-	-	34.450	0.000
Bahawalnagar	-0.275	-4.391	-3.37	Rejected	0.957	0.179	6.580	0.012
Bahawalpur	-0.129	-1.847	-3.37	Accepted	-	-	6.781	0.010
Bannu	-0.268	-4.325	-3.37	Rejected	0.937	0.259	16.291	0.000
D G Khan	-0.377	-5.315	-3.37	Rejected	0.842	0.270	31.422	0.000
D I Khan	-0.528	-6.565	-3.37	Rejected	0.856	0.480	54.099	0.000
Faisalabad	-0.390	-4.988	-3.37	Rejected	0.753	0.243	265.780	0.000
Gujranwala	-0.216	-2.862	-3.37	Accepted	-	-	0.479	0.490
Hyderabad	-0.083	-1.700	-3.37	Accepted	-	-	210.025	0.000
Islamabad	-0.024	-0.656	-3.37	Accepted	-	-	10.144	0.002
Jhelum	-0.369	-3.370	-3.37	Rejected	0.867	0.363	34.211	0.000
Jhang	-0.369	-3.314	-3.37	Accepted	-	-	0.892	0.347
Karachi	-0.432	-5.779	-3.37	Rejected	0.773	0.407	647.955	0.000
Khuzdar	-0.207	-3.708	-3.37	Rejected	0.877	0.133	1.295	0.257
Lahore	-0.241	-2.618	-3.37	Accepted	-	-	273.493	0.000
Larkana	-0.380	-5.194	-3.37	Rejected	0.814	0.354	236.925	0.000
Mardan	-0.228	-3.929	-3.37	Rejected	0.914	0.161	4.006	0.048
Mianwali	-0.199	-3.011	-3.37	Accepted	-	-	7.529	0.007
Mirpurkhas	-0.067	-1.454	-3.37	Accepted	-	-	65.740	0.000
Multan	-0.248	-4.130	-3.37	Rejected	0.779	0.126	60.696	0.000
Nawabshah	-0.020	-0.840	-3.37	Accepted	-	-	4.342	0.039
Peshawar	-0.315	-4.722	-3.37	Rejected	0.829	0.219	91.230	0.000
Rawalpindi	-0.154	-2.107	-3.37	Accepted	-	-	26.079	0.000
Sargodha	-0.261	-2.995	-3.37	Accepted	-	-	0.690	0.408
Sialkot	-0.323	-4.754	-3.37	Rejected	0.754	0.281	304.886	0.000
Sukkur	-0.058	-1.226	-3.37	Accepted	-	-	85.341	0.000
Turbat	-0.277	-4.406	-3.37	Rejected	0.840	0.211	13.965	0.000
Vehari	-0.072	-1.102	-3.37	Accepted	-	-	2.405	0.124

4.39 Explanation:

Table 4.39 shows Engle Granger test results with CPI of Loralai as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.39 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalpur, Gujranwala, Hyderabad, Islamabad, Jhang, Lahore, Mianwali, Mirpurkhas, Nawabshah, Rawalpindi, Sargodha, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Loralai.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Loralai shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalpur, Hyderabad, Islamabad, Lahore, Mianwali, Mirpurkhas, Nawabshah, Rawalpindi and Sukkur (because $p<0.05$) implying that change in price of Loralai is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Gujranwala, Jhang, Sargodha and Vehari (because $p>0.05$) implying that prices are same among these cities and Loralai.

In addition to this, table 4.39 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Jhelum, Karachi, Khuzdar, Larkana, Mardan, Multan, Peshawar, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Loralai.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Loralai shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Jhelum, Karachi, Larkana, Mardan, Multan, Peshawar, Sialkot and Turbat (because $p<0.05$) implying that change in price of Loralai is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Khuzdar (because $p>0.05$) implying that prices are same among these cities and Loralai.

Table: 4.40 Engle Granger test results with Mardan as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.204	-3.449	-3.37	Rejected	0.780	0.163	620.709	0.000
Attock	-0.113	-2.617	-3.37	Accepted	-	-	85.072	0.000
Bahawalnagar	-0.083	-2.279	-3.37	Accepted	-	-	0.505	0.479
Bahawalpur	-0.067	-2.049	-3.37	Accepted	-	-	22.193	0.000
Bannu	-0.192	-3.565	-3.37	Rejected	0.997	0.163	56.666	0.000
D G Khan	-0.166	-3.307	-3.37	Accepted	-	-	76.568	0.000
D I Khan	-0.232	-2.873	-3.37	Accepted	-	-	145.134	0.000
Faisalabad	-0.146	-2.967	-3.37	Accepted	-	-	389.302	0.000
Gujranwala	-0.083	-2.130	-3.37	Accepted	-	-	9.677	0.002
Hyderabad	-0.178	-3.307	-3.37	Accepted	-	-	672.324	0.000
Islamabad	-0.014	-0.629	-3.37	Accepted	-	-	21.577	0.000
Jhelum	-0.138	-2.578	-3.37	Accepted	-	-	69.502	0.000
Jhang	-0.282	-4.439	-3.37	Rejected	0.974	0.285	16.977	0.000
Karachi	-0.145	-2.311	-3.37	Accepted	-	-	516.238	0.000
Khuzdar	-0.442	-5.918	-3.37	Rejected	0.930	0.350	31.077	0.000
Lahore	-0.089	-1.848	-3.37	Accepted	-	-	298.393	0.000
Larkana	-0.132	-2.639	-3.37	Accepted	-	-	181.501	0.000
Loralai&Cantt	-0.242	-4.076	-3.37	Rejected	1.018	0.213	13.847	0.000
Mianwali	-0.297	-4.520	-3.37	Rejected	0.934	0.297	64.494	0.000
Mirpurkhas	-0.141	-2.593	-3.37	Accepted	-	-	278.268	0.000
Multan	-0.185	-3.449	-3.37	Rejected	0.840	0.165	169.019	0.000
Nawabshah	0.006	0.234	-3.37	Accepted	-	-	8.321	0.005
Peshawar	-0.175	-3.143	-3.37	Accepted	-	-	370.625	0.000
Rawalpindi	-0.068	-1.991	-3.37	Accepted	-	-	59.401	0.000
Sargodha	-0.138	-2.377	-3.37	Accepted	-	-	19.762	0.000
Sialkot	-0.126	-2.338	-3.37	Accepted	-	-	414.119	0.000
Sukkur	-0.165	-3.113	-3.37	Accepted	-	-	308.435	0.000
Turbat	-0.424	-5.639	-3.37	Rejected	0.876	0.431	78.961	0.000
Vehari	-0.047	-1.478	-3.37	Accepted	-	-	1.467	0.228

4.40 Explanation:

Table 4.40 shows Engle Granger test results with CPI of Mardan as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.40 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Attock, Bahawalnagar, Bahawalpur, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Karachi, Lahore, Larkana, Mirpurkhas, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Mardan.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Mardan shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalpur, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Karachi, Lahore, Larkana, Mirpurkhas, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot and Sukkur (because $p<0.05$) implying that change in price of Mardan is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bahawalnagar and Vehari (because $p>0.05$) implying that prices are same among these cities and Mardan.

In addition to this, table 4.40 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Abbotabad, Bannu, Jhang, Khuzdar, Loralai&Cantt, Mianwali, Multan and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Mardan.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Mardan shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bannu, Jhang, Khuzdar, Loralai&Cantt, Mianwali, Multan and Turbat (because $p<0.05$) implying that change in price of Mardan is greater than change in prices of these cities.

Table: 4.41 Engle Granger test results with Mianwali as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.072	-1.358	-3.37	Accepted	-	-	166.732	0.000
Attock	-0.128	-2.545	-3.37	Accepted	-	-	17.047	0.000
Bahawalnagar	-0.085	-2.327	-3.37	Accepted	-	-	12.699	0.001
Bahawalpur	-0.053	-1.609	-3.37	Accepted	-	-	0.802	0.372
Bannu	-0.263	-4.272	-3.37	Rejected	1.036	0.239	3.058	0.083
D G Khan	-0.138	-2.610	-3.37	Accepted	-	-	11.534	0.001
D I Khan	-0.256	-3.395	-3.37	Rejected	0.926	0.354	24.078	0.000
Faisalabad	-0.152	-3.145	-3.37	Accepted	-	-	208.499	0.000
Gujranwala	-0.105	-2.533	-3.37	Accepted	-	-	0.948	0.332
Hyderabad	-0.186	-3.223	-3.37	Accepted	-	-	299.409	0.000
Islamabad	-0.018	-0.762	-3.37	Accepted	-	-	4.417	0.038
Jhelum	-0.136	-2.227	-3.37	Accepted	-	-	13.127	0.000
Jhang	-0.230	-2.819	-3.37	Accepted	-	-	2.246	0.137
Karachi	-0.252	-3.485	-3.37	Rejected	0.827	0.326	278.734	0.000
Khuzdar	-0.289	-4.429	-3.37	Rejected	0.968	0.282	1.586	0.210
Lahore	-0.122	-2.193	-3.37	Accepted	-	-	196.292	0.000
Larkana	-0.080	-1.672	-3.37	Accepted	-	-	82.881	0.000
Loralai&Cantt	-0.142	-1.960	-3.37	Accepted	-	-	1.139	0.288
Mardan	-0.294	-4.469	-3.37	Rejected	1.024	0.291	42.408	0.000
Mirpurkhas	-0.081	-1.638	-3.37	Accepted	-	-	80.772	0.000
Multan	-0.202	-3.170	-3.37	Accepted	-	-	61.346	0.000
Nawabshah	0.001	0.028	-3.37	Accepted	-	-	0.599	0.441
Peshawar	-0.258	-4.227	-3.37	Rejected	0.921	0.256	67.465	0.000
Rawalpindi	-0.080	-1.916	-3.37	Accepted	-	-	9.743	0.002
Sargodha	-0.186	-3.524	-3.37	Rejected	1.003	0.183	2.446	0.120
Sialkot	-0.186	-3.490	-3.37	Rejected	0.842	0.187	233.374	0.000
Sukkur	-0.099	-2.153	-3.37	Accepted	-	-	82.948	0.000
Turbat	-0.359	-5.142	-3.37	Rejected	0.916	0.364	2.206	0.140
Vehari	-0.034	-1.101	-3.37	Accepted	-	-	5.658	0.019

4.41 Explanation:

Table 4.41 shows Engle Granger test results with CPI of Mianwali as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.41 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, D.G.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Jhang, Lahore, Larkana, Loralai&Cantt, Mirpurkhas, Multan, Nawabshah, Rawalpindi, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Mianwali.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Mianwali shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalnagar, D.G.Khan, Faisalabad, Hyderabad, Islamabad, Jhelum, Lahore, Larkana, Mirpurkhas, Multan, Rawalpindi, Sukkur and Vehari (because $p<0.05$) implying that change in price of Mianwali is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bahawalpur, Gujranwala, Jhang, Loralai&Cantt and Nawabshah (because $p>0.05$) implying that prices are same among these cities and Mianwali.

In addition to this, table 4.41 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bannu, D.I.Khan, Karachi, Khuzdar, Mardan, Peshawar, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Mianwali. Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Mianwali shows that null hypothesis of $\beta=1$ is rejected in case of D.I.Khan, Karachi, Mardan, Peshawar and Sialkot (because $p<0.05$) implying that change in price of Mianwali is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bannu, Khuzdar, Sargodha and Turbat (because $p>0.05$) implying that prices are same among these cities and Mianwali.

Table: 4.42 Engle Granger test results with Mirpurkhas as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.403	-5.437	-3.37	Rejected	0.955	0.393	19.624	0.000
Attock	-0.031	-1.020	-3.37	Accepted	-	-	3.571	0.061
Bahawalnagar	-0.033	-1.112	-3.37	Accepted	-	-	29.871	0.000
Bahawalpur	-0.025	-1.060	-3.37	Accepted	-	-	6.898	0.010
Bannu	-0.071	-1.503	-3.37	Accepted	-	-	16.112	0.000
D G Khan	-0.044	-1.386	-3.37	Accepted	-	-	5.738	0.018
D I Khan	-0.105	-1.706	-3.37	Accepted	-	-	3.690	0.057
Faisalabad	-0.025	-0.815	-3.37	Accepted	-	-	9.181	0.003
Gujranwala	-0.030	-0.980	-3.37	Accepted	-	-	13.143	0.000
Hyderabad	-0.272	-4.223	-3.37	Rejected	0.954	0.253	133.094	0.000
Islamabad	-0.006	-0.322	-3.37	Accepted	-	-	0.078	0.780
Jhelum	-0.044	-1.182	-3.37	Accepted	-	-	3.246	0.074
Jhang	-0.046	-0.988	-3.37	Accepted	-	-	27.886	0.000
Karachi	-0.039	-0.927	-3.37	Accepted	-	-	33.126	0.000
Khuzdar	-0.200	-3.424	-3.37	Rejected	1.124	0.199	71.705	0.000
Lahore	-0.015	-0.446	-3.37	Accepted	-	-	23.233	0.000
Larkana	-0.055	-1.691	-3.37	Accepted	-	-	4.920	0.028
Loralai&Cantt	-0.121	-2.618	-3.37	Accepted	-	-	24.030	0.000
Mardan	-0.151	-2.769	-3.37	Accepted	-	-	166.459	0.000
Mianwali	-0.097	-1.934	-3.37	Accepted	-	-	43.903	0.000
Multan	-0.029	-0.768	-3.37	Accepted	-	-	0.982	0.324
Nawabshah	-0.040	-1.521	-3.37	Accepted	-	-	27.844	0.000
Peshawar	-0.043	-1.116	-3.37	Accepted	-	-	2.352	0.128
Rawalpindi	-0.017	-0.669	-3.37	Accepted	-	-	3.825	0.053
Sargodha	-0.027	-0.714	-3.37	Accepted	-	-	34.276	0.000
Sialkot	-0.034	-1.036	-3.37	Accepted	-	-	18.593	0.000
Sukkur	-0.221	-3.775	-3.37	Rejected	0.997	0.220	0.508	0.477
Turbat	-0.106	-2.161	-3.37	Accepted	-	-	27.844	0.000
Vehari	-0.006	-0.270	-3.37	Accepted	-	-	15.446	0.000

4.42 Explanation:

Table 4.42 shows Engle Granger test results with CPI of Mirpurkhas as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.42 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Islamabad, Jhelum, Jhang, Karachi, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Mirpurkhas.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Mirpurkhas shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, Faisalabad, Gujranwala, Jhang, Karachi, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Nawabshah, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari (because $p<0.05$) implying that change in price of Mirpurkhas is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Attock, D.I.Khan, Islamabad, Jhelum, Multan and Peshawar (because $p>0.05$) implying that prices are same among these cities and Mirpurkhas.

In addition to this, table 4.42 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Abbotabad, Hyderabad, Khuzdar and Sukkur because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Mirpurkhas.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Mirpurkhas shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Hyderabad and Khuzdar (because $p<0.05$) implying that change in price of Mirpurkhas is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Sukkur (because $p>0.05$) implying that prices are same among these cities and Mirpurkhas.

Table: 4.43 Engle Granger test results with Multan as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.027	-0.717	-3.37	Accepted	-	-	26.432	0.000
Attock	-0.282	-4.458	-3.37	Rejected	1.017	0.285	10.902	0.001
Bahawalnagar	-0.183	-3.478	-3.37	Rejected	1.189	0.167	134.521	0.000
Bahawalpur	-0.090	-2.116	-3.37	Accepted	-	-	26.915	0.000
Bannu	-0.291	-4.530	-3.37	Rejected	1.137	0.221	15.751	0.000
D G Khan	-0.283	-4.441	-3.37	Rejected	1.045	0.279	17.362	0.000
D I Khan	-0.387	-5.327	-3.37	Rejected	1.009	0.385	0.142	0.707
Faisalabad	-0.209	-3.748	-3.37	Rejected	0.929	0.208	73.897	0.000
Gujranwala	-0.098	-1.588	-3.37	Accepted	-	-	56.775	0.000
Hyderabad	-0.033	-0.759	-3.37	Accepted	-	-	82.135	0.000
Islamabad	-0.037	-1.285	-3.37	Accepted	-	-	1.613	0.207
Jhelum	-0.381	-5.332	-3.37	Rejected	1.057	0.361	8.644	0.004
Jhang	-0.532	-6.616	-3.37	Rejected	1.112	0.518	92.395	0.000
Karachi	-0.532	-6.611	-3.37	Rejected	0.897	0.515	200.726	0.000
Khuzdar	-0.206	-3.667	-3.37	Rejected	1.060	0.210	27.853	0.000
Lahore	-0.193	-2.898	-3.37	Accepted	-	-	128.556	0.000
Larkana	-0.125	-2.378	-3.37	Accepted	-	-	23.801	0.000
Loralai&Cantt	-0.264	-4.280	-3.37	Rejected	1.173	0.207	30.377	0.000
Mardan	-0.187	-3.454	-3.37	Rejected	1.129	0.187	102.991	0.000
Mianwali	-0.209	-3.234	-3.37	Accepted	-	-	38.867	0.000
Mirpurkhas	-0.015	-0.398	-3.37	Accepted	-	-	9.854	0.002
Nawabshah	0.003	0.175	-3.37	Accepted	-	-	0.401	0.528
Peshawar	-0.284	-4.485	-3.37	Rejected	1.008	0.278	0.001	0.979
Rawalpindi	-0.213	-3.798	-3.37	Rejected	1.018	0.215	15.224	0.000
Sargodha	-0.223	-3.925	-3.37	Rejected	1.113	0.214	81.138	0.000
Sialkot	-0.254	-4.149	-3.37	Rejected	0.935	0.220	133.371	0.000
Sukkur	-0.032	-1.076	-3.37	Accepted	-	-	10.692	0.001
Turbat	-0.269	-4.349	-3.37	Rejected	1.006	0.289	16.565	0.000
Vehari	-0.065	-1.546	-3.37	Accepted	-	-	72.197	0.000

4.43 Explanation:

Table 4.43 shows Engle Granger test results with CPI of Multan as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.43 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalpur, Gujranwala, Hyderabad, Islamabad, Lahore, Larkana, Mianwali, Mirpurkhas, Nawabshah, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Multan.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Multan shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalpur, Gujranwala, Hyderabad, Lahore, Larkana, Mianwali, Mirpurkhas, Sukkur and Vehari (because $p<0.05$) implying that change in price of Multan is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Islamabad and Nawabshah (because $p>0.05$) implying that prices are same among these cities and Multan.

In addition to this, table 4.43 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Jhelum, Jhang, Karachi, Khuzdar, Loralai&Cantt, Mardan, Peshawar, Rawalpindi, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Multan.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Multan shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Bannu, D.G.Khan, Faisalabad, Jhelum, Jhang, Karachi, Khuzdar, Loralai&Cantt, Mardan, Rawalpindi, Sargodha, Sialkot and Turbat (because $p<0.05$) implying that change in price of Multan is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of D.I.Khan and Peshawar (because $p>0.05$) implying that prices are same among these cities and Multan.

Table: 4.44 Engle Granger test results with Nawabshah as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.052	-1.777	-3.37	Accepted	-	-	83.722	0.000
Attock	-0.022	-1.021	-3.37	Accepted	-	-	18.260	0.000
Bahawalnagar	-0.029	-1.267	-3.37	Accepted	-	-	2.540	0.114
Bahawalpur	-0.023	-1.157	-3.37	Accepted	-	-	11.147	0.001
Bannu	-0.043	-1.349	-3.37	Accepted	-	-	11.638	0.001
D G Khan	-0.026	-1.159	-3.37	Accepted	-	-	16.432	0.000
D I Khan	-0.044	-1.295	-3.37	Accepted	-	-	21.995	0.000
Faisalabad	-0.024	-1.045	-3.37	Accepted	-	-	54.196	0.000
Gujranwala	-0.026	-1.113	-3.37	Accepted	-	-	6.991	0.009
Hyderabad	-0.057	-1.825	-3.37	Accepted	-	-	147.378	0.000
Islamabad	-0.017	-0.844	-3.37	Accepted	-	-	18.122	0.000
Jhelum	-0.038	-1.458	-3.37	Accepted	-	-	17.640	0.000
Jhang	-0.046	-1.594	-3.37	Accepted	-	-	5.902	0.017
Karachi	-0.047	-1.641	-3.37	Accepted	-	-	80.436	0.000
Khuzdar	-0.053	-1.735	-3.37	Accepted	-	-	4.435	0.037
Lahore	-0.037	-1.381	-3.37	Accepted	-	-	69.486	0.000
Larkana	-0.041	-1.657	-3.37	Accepted	-	-	45.295	0.000
Loralai&Cantt	-0.058	-1.849	-3.37	Accepted	-	-	5.859	0.017
Mardan	-0.015	-0.558	-3.37	Accepted	-	-	0.334	0.564
Mianwali	-0.030	-0.987	-3.37	Accepted	-	-	8.510	0.004
Mirpurkhas	-0.053	-1.816	-3.37	Accepted	-	-	72.971	0.000
Multan	-0.020	-0.935	-3.37	Accepted	-	-	26.480	0.000
Peshawar	-0.030	-1.185	-3.37	Accepted	-	-	25.245	0.000
Rawalpindi	-0.023	-1.225	-3.37	Accepted	-	-	16.561	0.000
Sargodha	-0.023	-0.907	-3.37	Accepted	-	-	5.531	0.020
Sialkot	-0.028	-1.150	-3.37	Accepted	-	-	65.180	0.000
Sukkur	-0.047	-1.668	-3.37	Accepted	-	-	62.922	0.000
Turbat	-0.037	-1.352	-3.37	Accepted	-	-	10.567	0.001
Vehari	-0.018	-0.857	-3.37	Accepted	-	-	4.397	0.038

4.44 Explanation:

Table 4.44 shows Engle Granger test results with CPI of Nawabshah as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.44 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Mirpurkhas, Multan, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Nawabshah.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Nawabshah shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mianwali, Mirpurkhas, Multan, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur, Turbat and Vehari (because $p<0.05$) implying that change in price of Nawabshah is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bahawalnagar and Mardan (because $p>0.05$) implying that prices are same among these cities and Nawabshah.

Table: 4.45 Engle Granger test results with Peshawar as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.035	-0.959	-3.37	Accepted	-	-	37.034	0.000
Attock	-0.195	-3.625	-3.37	Rejected	0.987	0.177	5.957	0.016
Bahawalnagar	-0.108	-2.615	-3.37	Accepted	-	-	80.271	0.000
Bahawalpur	-0.085	-2.282	-3.37	Accepted	-	-	12.838	0.000
Bannu	-0.208	-3.707	-3.37	Rejected	1.119	0.168	20.387	0.000
D G Khan	-0.243	-4.070	-3.37	Rejected	1.009	0.234	7.811	0.006
D I Khan	-0.234	-2.599	-3.37	Accepted	-	-	0.075	0.785
Faisalabad	-0.307	-4.686	-3.37	Rejected	0.902	0.296	121.679	0.000
Gujranwala	-0.137	-2.949	-3.37	Accepted	-	-	39.055	0.000
Hyderabad	-0.032	-0.715	-3.37	Accepted	-	-	95.927	0.000
Islamabad	-0.021	-0.966	-3.37	Accepted	-	-	0.715	0.399
Jhelum	-0.320	-4.792	-3.37	Rejected	1.034	0.320	5.695	0.019
Jhang	-0.402	-5.498	-3.37	Rejected	1.092	0.403	57.646	0.000
Karachi	-0.370	-4.288	-3.37	Rejected	0.890	0.445	216.709	0.000
Khuzdar	-0.234	-3.839	-3.37	Rejected	1.040	0.232	49.489	0.000
Lahore	-0.163	-2.641	-3.37	Accepted	-	-	131.403	0.000
Larkana	-0.142	-2.338	-3.37	Accepted	-	-	29.621	0.000
Loralai&Cantt	-0.326	-4.804	-3.37	Rejected	1.139	0.285	57.389	0.000
Mardan	-0.171	-3.071	-3.37	Accepted	-	-	262.076	0.000
Mianwali	-0.259	-4.221	-3.37	Rejected	1.049	0.258	45.701	0.000
Mirpurkhas	0.008	0.192	-3.37	Accepted	-	-	12.502	0.001
Multan	-0.278	-4.420	-3.37	Rejected	0.948	0.241	1.077	0.301
Nawabshah	-0.001	-0.063	-3.37	Accepted	-	-	0.455	0.501
Rawalpindi	-0.115	-2.747	-3.37	Accepted	-	-	6.600	0.011
Sargodha	-0.192	-3.563	-3.37	Rejected	1.078	0.190	82.324	0.000
Sialkot	-0.305	-4.646	-3.37	Rejected	0.898	0.305	145.407	0.000
Sukkur	-0.040	-1.144	-3.37	Accepted	-	-	14.118	0.000
Turbat	-0.471	-6.088	-3.37	Rejected	0.981	0.485	32.850	0.000
Vehari	-0.069	-1.963	-3.37	Accepted	-	-	51.644	0.000

4.45 Explanation:

Table 4.45 shows Engle Granger test results with CPI of Peshawar as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.45 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalnagar, Bahawalpur, D.I.Khan, Gujranwala, Hyderabad, Islamabad, Lahore, Larkana, Mardan, Mirpurkhas, Nawabshah, Rawalpindi, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Peshawar.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Peshawar shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalnagar, Bahawalpur, Gujranwala, Hyderabad, Lahore, Larkana, Mardan, Mirpurkhas, Rawalpindi, Sukkur and Vehari (because $p<0.05$) implying that change in price of Peshawar is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of D.I.Khan, Islamabad and Nawabshah (because $p>0.05$) implying that prices are same among these cities and Peshawar.

In addition to this, table 4.45 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bannu, D.G.Khan, Faisalabad, Jhelum, Jhang, Karachi, Khuzdar, Loralai&Cantt, Mianwali, Multan, Sargodha, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Peshawar.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Peshawar shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bannu, D.G.Khan, Faisalabad, Jhelum, Jhang, Karachi, Khuzdar, Loralai&Cantt, Mianwali, Sargodha, Sialkot and Turbat (because $p<0.05$) implying that change in price of Peshawar is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Multan (because $p>0.05$) implying that prices are same among these cities and Peshawar.

Table: 4.46 Engle Granger test results with Rawalpindi as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.013	-0.553	-3.37	Accepted	-	-	44.686	0.000
Attock	-0.217	-3.855	-3.37	Rejected	0.996	0.214	4.078	0.046
Bahawalnagar	-0.187	-3.494	-3.37	Rejected	1.151	0.176	80.740	0.000
Bahawalpur	-0.100	-2.129	-3.37	Accepted	-	-	8.712	0.004
Bannu	-0.134	-2.524	-3.37	Accepted	-	-	0.206	0.651
D G Khan	-0.207	-3.686	-3.37	Rejected	1.010	0.207	0.501	0.480
D I Khan	-0.225	-3.207	-3.37	Accepted	-	-	6.201	0.014
Faisalabad	-0.103	-2.230	-3.37	Accepted	-	-	164.788	0.000
Gujranwala	-0.146	-3.011	-3.37	Accepted	-	-	22.765	0.000
Hyderabad	-0.036	-1.209	-3.37	Accepted	-	-	90.041	0.000
Islamabad	-0.003	-0.128	-3.37	Accepted	-	-	0.017	0.897
Jhelum	-0.541	-6.665	-3.37	Rejected	1.023	0.514	1.335	0.250
Jhang	-0.190	-2.501	-3.37	Accepted	-	-	23.111	0.000
Karachi	-0.429	-5.719	-3.37	Rejected	0.888	0.388	355.505	0.000
Khuzdar	-0.103	-2.487	-3.37	Accepted	-	-	4.094	0.045
Lahore	-0.260	-3.243	-3.37	Accepted	-	-	397.242	0.000
Larkana	-0.129	-2.692	-3.37	Accepted	-	-	55.472	0.000
Loralai&Cantt	-0.265	-4.121	-3.37	Rejected	1.149	0.173	10.803	0.001
Mardan	-0.070	-1.986	-3.37	Accepted	-	-	28.865	0.000
Mianwali	-0.083	-1.940	-3.37	Accepted	-	-	2.293	0.133
Mirpurkhas	-0.007	-0.276	-3.37	Accepted	-	-	23.030	0.000
Multan	-0.175	-2.957	-3.37	Accepted	-	-	25.525	0.000
Nawabshah	0.006	0.388	-3.37	Accepted	-	-	0.798	0.373
Peshawar	-0.121	-2.831	-3.37	Accepted	-	-	15.038	0.000
Sargodha	-0.099	-1.985	-3.37	Accepted	-	-	26.128	0.000
Sialkot	-0.222	-3.347	-3.37	Accepted	-	-	359.520	0.000
Sukkur	-0.016	-0.660	-3.37	Accepted	-	-	24.610	0.000
Turbat	-0.157	-3.226	-3.37	Accepted	-	-	0.493	0.484
Vehari	-0.066	-1.484	-3.37	Accepted	-	-	60.659	0.000

4.46 Explanation:

Table 4.46 shows Engle Granger test results with CPI of Rawalpindi as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.46 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalpur, Bannu, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Jhang, Khuzdar, Lahore, Larkana, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Sargodha, Sialkot, Sukkur, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Rawalpindi.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Rawalpindi shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalpur, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Jhang, Khuzdar, Lahore, Larkana, Mardan, Mirpurkhas, Multan, Peshawar, Sargodha, Sialkot, Sukkur, and Vehari (because $p<0.05$) implying that change in price of Rawalpindi is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bannu, Islamabad, Mianwali, Nawabshah and Turbat (because $p>0.05$) implying that prices are same among these cities and Rawalpindi.

In addition to this, table 4.46 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bahawalnagar, D.G.Khan, Jhelum, Karachi and Loralai&Cantt because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Rawalpindi. Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Rawalpindi shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Karachi and Loralai&Cantt (because $p<0.05$) implying that change in price of Rawalpindi is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of D.G.Khan and Jhelum (because $p>0.05$) implying that prices are same among these cities and Rawalpindi.

Table: 4.47 Engle Granger test results with Sargodha as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.038	-0.974	-3.37	Accepted	-	-	154.635	0.000
Attock	-0.134	-2.962	-3.37	Accepted	-	-	50.721	0.000
Bahawalnagar	-0.137	-2.693	-3.37	Accepted	-	-	9.891	0.002
Bahawalpur	-0.152	-3.149	-3.37	Accepted	-	-	7.441	0.007
Bannu	-0.183	-3.487	-3.37	Rejected	1.016	0.155	13.702	0.000
D G Khan	-0.295	-4.623	-3.37	Rejected	0.924	0.287	57.064	0.000
D I Khan	-0.637	-7.416	-3.37	Rejected	0.899	0.646	85.230	0.000
Faisalabad	-0.193	-3.575	-3.37	Rejected	0.821	0.191	371.083	0.000
Gujranwala	-0.089	-2.309	-3.37	Accepted	-	-	0.314	0.576
Hyderabad	-0.033	-0.828	-3.37	Accepted	-	-	224.549	0.000
Islamabad	-0.021	-0.908	-3.37	Accepted	-	-	9.618	0.002
Jhelum	-0.153	-2.286	-3.37	Accepted	-	-	46.919	0.000
Jhang	-0.459	-4.906	-3.37	Rejected	0.999	0.556	0.317	0.574
Karachi	-0.388	-5.399	-3.37	Rejected	0.813	0.382	577.544	0.000
Khuzdar	-0.199	-3.590	-3.37	Rejected	0.942	0.200	1.044	0.309
Lahore	-0.098	-1.951	-3.37	Accepted	-	-	313.208	0.000
Larkana	-0.164	-2.672	-3.37	Accepted	-	-	176.583	0.000
Loralai&Cantt	-0.279	-3.064	-3.37	Accepted	-	-	0.293	0.589
Mardan	-0.132	-2.291	-3.37	Accepted	-	-	9.063	0.003
Mianwali	-0.186	-3.525	-3.37	Rejected	0.954	0.188	8.480	0.004
Mirpurkhas	-0.008	-0.205	-3.37	Accepted	-	-	78.280	0.000
Multan	-0.218	-3.863	-3.37	Rejected	0.866	0.191	120.832	0.000
Nawabshah	0.007	0.381	-3.37	Accepted	-	-	3.610	0.060
Peshawar	-0.192	-3.572	-3.37	Rejected	0.901	0.194	120.106	0.000
Rawalpindi	-0.145	-3.110	-3.37	Accepted	-	-	42.646	0.000
Sialkot	-0.260	-4.178	-3.37	Rejected	0.824	0.261	543.536	0.000
Sukkur	-0.049	-1.436	-3.37	Accepted	-	-	91.864	0.000
Turbat	-0.269	-4.340	-3.37	Rejected	0.895	0.284	12.928	0.000
Vehari	-0.045	-1.174	-3.37	Accepted	-	-	3.194	0.076

4.47 Explanation:

Table 4.47 shows Engle Granger test results with CPI of Sargodha as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.47 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, Gujranwala, Hyderabad, Islamabad, Jhelum, Lahore, Larkana, Loralai&Cantt, Mardan, Mirpurkhas, Nawabshah, Rawalpindi and Sukkur because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Sargodha.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Sargodha shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalnagar, Bahawalpur, Hyderabad, Islamabad, Jhelum, Lahore, Larkana, Mardan, Mirpurkhas, Rawalpindi, Sukkur and Vehari (because $p<0.05$) implying that change in price of Sargodha is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Gujranwala, Loralai&Cantt, Nawabshah and Vehari (because $p>0.05$) implying that prices are same among these cities and Sargodha.

In addition to this, table 4.47 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Bannu, D.G.Khan, D.I.Khan, Faisalabad, Jhang, Karachi, Khuzdar, Mianwali, Multan, Peshawar, Sialkot and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Sargodha.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Sargodha shows that null hypothesis of $\beta=1$ is rejected in case of Bannu, D.G.Khan, D.I.Khan, Faisalabad, Karachi, Mianwali, Multan, Peshawar, Sialkot and Turbat (because $p<0.05$) implying that change in price of Sargodha is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Jhang and Khuzdar (because $p>0.05$) implying that prices are same among these cities and Sargodha.

Table: 4.48 Engle Granger test results with Sialkot as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.022	-0.578	-3.37	Accepted	-	-	0.483	0.488
Attock	-0.241	-4.011	-3.37	Rejected	1.067	0.183	206.094	0.000
Bahawalnagar	-0.208	-3.663	-3.37	Rejected	1.235	0.202	328.465	0.000
Bahawalpur	-0.127	-2.720	-3.37	Accepted	-	-	188.097	0.000
Bannu	-0.266	-4.344	-3.37	Rejected	1.187	0.218	100.529	0.000
D G Khan	-0.331	-4.758	-3.37	Rejected	1.096	0.293	194.227	0.000
D I Khan	-0.318	-4.615	-3.37	Rejected	1.073	0.314	46.780	0.000
Faisalabad	-0.258	-3.057	-3.37	Accepted	-	-	10.034	0.002
Gujranwala	-0.187	-3.537	-3.37	Rejected	1.186	0.183	271.179	0.000
Hyderabad	-0.038	-1.167	-3.37	Accepted	-	-	5.345	0.022
Islamabad	-0.041	-1.451	-3.37	Accepted	-	-	46.673	0.000
Jhelum	-0.418	-5.546	-3.37	Rejected	1.127	0.416	207.968	0.000
Jhang	-0.423	-5.554	-3.37	Rejected	1.206	0.427	422.424	0.000
Karachi	-0.524	-6.425	-3.37	Rejected	0.972	0.524	12.034	0.001
Khuzdar	-0.150	-2.972	-3.37	Accepted	-	-	96.440	0.000
Lahore	-0.249	-3.395	-3.37	Rejected	0.974	0.348	4.658	0.033
Larkana	-0.130	-2.467	-3.37	Accepted	-	-	5.057	0.026
Loralai&Cantt	-0.331	-4.800	-3.37	Rejected	1.217	0.326	171.754	0.000
Mardan	-0.152	-2.950	-3.37	Accepted	-	-	219.996	0.000
Mianwali	-0.183	-3.436	-3.37	Rejected	1.124	0.173	135.341	0.000
Mirpurkhas	-0.014	-0.444	-3.37	Accepted	-	-	2.552	0.113
Multan	-0.244	-4.040	-3.37	Rejected	1.023	0.168	88.876	0.000
Nawabshah	0.005	0.304	-3.37	Accepted	-	-	5.449	0.021
Peshawar	-0.302	-4.607	-3.37	Rejected	1.060	0.284	96.869	0.000
Rawalpindi	-0.215	-3.277	-3.37	Accepted	-	-	247.595	0.000
Sargodha	-0.256	-4.130	-3.37	Rejected	1.163	0.236	337.297	0.000
Sukkur	-0.028	-0.917	-3.37	Accepted	-	-	3.060	0.083
Turbat	-0.242	-4.034	-3.37	Rejected	1.066	0.234	123.891	0.000
Vehari	-0.140	-2.957	-3.37	Accepted	-	-	320.139	0.000

4.48 Explanation:

Table 4.48 shows Engle Granger test results with CPI of Sialkot as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.48 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalpur, Faisalabad, Hyderabad, Islamabad, Khuzdar, Larkana, Mardan, Mirpurkhas, Nawabshah, Rawalpindi, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Sialkot.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Sialkot shows that null hypothesis of $\beta=1$ is rejected in case of Bahawalpur, Faisalabad, Hyderabad, Islamabad, Khuzdar, Larkana, Mardan, Nawabshah, Rawalpindi, and Vehari (because $p<0.05$) implying that change in price of Sialkot is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Abbotabad, Mirpurkhas and Sukkur (because $p>0.05$) implying that prices are same among these cities and Sialkot.

In addition to this, table 4.48 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Gujranwala, Jhelum, Jhang, Karachi, Lahore, Loralai&Cantt, Mianwali, Multan, Peshawar, Sargodha and Turbat because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Sialkot.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Sialkot shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Bannu, D.G.Khan, D.I.Khan, Gujranwala, Jhelum, Jhang, Karachi, Lahore, Loralai&Cantt, Mianwali, Multan, Peshawar, Sargodha and Turbat (because $p<0.05$) implying that change in price of Sialkot is greater than change in prices of these cities.

Table: 4.49 Engle Granger test results with Sukkur as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.264	-4.293	-3.37	Rejected	0.940	0.239	12.687	0.001
Attock	-0.033	-1.210	-3.37	Accepted	-	-	4.419	0.038
Bahawalnagar	-0.043	-1.516	-3.37	Accepted	-	-	36.344	0.000
Bahawalpur	-0.030	-1.250	-3.37	Accepted	-	-	9.503	0.003
Bannu	-0.143	-3.124	-3.37	Accepted	-	-	18.459	0.000
D G Khan	-0.043	-1.470	-3.37	Accepted	-	-	7.975	0.006
D I Khan	-0.198	-3.031	-3.37	Accepted	-	-	5.812	0.017
Faisalabad	-0.039	-1.253	-3.37	Accepted	-	-	8.905	0.003
Gujranwala	-0.030	-1.076	-3.37	Accepted	-	-	15.146	0.000
Hyderabad	-0.259	-4.268	-3.37	Rejected	0.946	0.259	136.086	0.000
Islamabad	-0.007	-0.359	-3.37	Accepted	-	-	0.243	0.623
Jhelum	-0.047	-1.350	-3.37	Accepted	-	-	4.648	0.033
Jhang	-0.097	-1.964	-3.37	Accepted	-	-	33.624	0.000
Karachi	-0.042	-1.044	-3.37	Accepted	-	-	35.557	0.000
Khuzdar	-0.237	-3.944	-3.37	Rejected	1.112	0.236	88.112	0.000
Lahore	-0.017	-0.554	-3.37	Accepted	-	-	22.990	0.000
Larkana	-0.062	-1.849	-3.37	Accepted	-	-	4.347	0.039
Loralai&Cantt	-0.082	-1.630	-3.37	Accepted	-	-	38.662	0.000
Mardan	-0.170	-3.201	-3.37	Accepted	-	-	187.039	0.000
Mianwali	-0.109	-2.343	-3.37	Accepted	-	-	45.067	0.000
Mirpurkhas	-0.217	-3.706	-3.37	Rejected	0.972	0.205	0.060	0.806
Multan	-0.036	-1.237	-3.37	Accepted	-	-	1.310	0.255
Nawabshah	-0.029	-1.180	-3.37	Accepted	-	-	19.613	0.000
Peshawar	-0.050	-1.417	-3.37	Accepted	-	-	3.386	0.068
Rawalpindi	-0.020	-0.873	-3.37	Accepted	-	-	4.730	0.032
Sargodha	-0.059	-1.686	-3.37	Accepted	-	-	44.249	0.000
Sialkot	-0.043	-1.325	-3.37	Accepted	-	-	18.649	0.000
Turbat	-0.132	-2.686	-3.37	Accepted	-	-	30.897	0.000
Vehari	-0.009	-0.433	-3.37	Accepted	-	-	18.750	0.000

4.49 Explanation:

Table 4.49 shows Engle Granger test results with CPI of Sukkur as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.49 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Islamabad, Jhelum, Jhang, Karachi, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari because t-statistic associated with RES(-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Sukkur.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Sukkur shows that null hypothesis of $\beta=1$ is rejected in case of Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Gujranwala, Jhelum, Jhang, Karachi, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Nawabshah, Rawalpindi, Sargodha, Sialkot, Turbat and Vehari (because $p<0.05$) implying that change in price of Sukkur is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Islamabad, Multan and Peshawar (because $p>0.05$) implying that prices are same among these cities and Sukkur.

In addition to this, table 4.49 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Abbotabad, Hyderabad, Khuzdar and Mirpurkhas because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Sukkur.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Sukkur shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Hyderabad and Khuzdar (because $p<0.05$) implying that change in price of Sukkur is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Mirpurkhas (because $p>0.05$) implying that prices are same among these cities and Sukkur.

Table: 4.50 Engle Granger test results with Turbat as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Test for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	-0.168	-2.982	-3.37	Accepted	-	-	115.412	0.000
Attock	-0.234	-4.008	-3.37	Rejected	0.946446	0.226512	9.724	0.002
Bahawalnagar	-0.153	-3.165	-3.37	Accepted	-	-	15.861	0.000
Bahawalpur	-0.128	-2.862	-3.37	Accepted	-	-	0.132	0.717
Bannu	-0.314	-4.744	-3.37	Rejected	1.076681	0.305157	0.842	0.361
D G Khan	-0.261	-4.271	-3.37	Rejected	0.973431	0.263112	6.583	0.012
D I Khan	-0.403	-4.412	-3.37	Rejected	0.971254	0.506001	19.310	0.000
Faisalabad	-0.282	-4.448	-3.37	Rejected	0.870083	0.279779	162.303	0.000
Gujranwala	-0.171	-3.329	-3.37	Accepted	-	-	1.894	0.171
Hyderabad	-0.163	-3.047	-3.37	Accepted	-	-	203.860	0.000
Islamabad	-0.016	-0.541	-3.37	Accepted	-	-	2.920	0.090
Jhelum	-0.313	-4.741	-3.37	Rejected	0.990419	0.318381	7.650	0.007
Jhang	-0.385	-5.369	-3.37	Rejected	1.057174	0.394631	3.062	0.083
Karachi	-0.354	-5.096	-3.37	Rejected	0.875179	0.353963	298.007	0.000
Khuzdar	-0.457	-5.867	-3.37	Rejected	1.023722	0.456185	8.249	0.005
Lahore	-0.223	-3.442	-3.37	Rejected	0.8557	0.251724	163.399	0.000
Larkana	-0.154	-2.646	-3.37	Accepted	-	-	75.171	0.000
Loralai&Cantt	-0.291	-4.523	-3.37	Rejected	1.122722	0.261756	5.013	0.027
Mardan	-0.424	-5.624	-3.37	Rejected	1.0701	0.424638	52.074	0.000
Mianwali	-0.362	-5.171	-3.37	Rejected	1.01542	0.367005	0.053	0.818
Mirpurkhas	-0.095	-1.927	-3.37	Accepted	-	-	57.940	0.000
Multan	-0.266	-4.320	-3.37	Rejected	0.91695	0.25142	33.166	0.000
Nawabshah	-0.003	-0.121	-3.37	Accepted	-	-	0.372	0.543
Peshawar	-0.474	-6.119	-3.37	Rejected	0.963404	0.486172	49.896	0.000
Rawalpindi	-0.155	-3.196	-3.37	Accepted	-	-	5.583	0.020
Sargodha	-0.273	-4.369	-3.37	Rejected	1.040142	0.278881	4.454	0.037
Sialkot	-0.249	-4.113	-3.37	Rejected	0.875539	0.251457	211.628	0.000
Sukkur	-0.127	-2.556	-3.37	Accepted	-	-	62.285	0.000
Vehari	-0.090	-2.283	-3.37	Accepted	-	-	8.293	0.005

4.50 Explanation:

Table 4.50 shows Engle Granger test results with CPI of Turbat as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.50 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Bahawalnagar, Bahawalpur, Gujranwala, Hyderabad, Islamabad, Larkana, Mirpurkhas, Nawabshah, Rawalpindi, Sukkur and Vehari because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Turbat.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Turbat shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Bahawalnagar, Hyderabad, Larkana, Mirpurkhas, Rawalpindi, Sukkur and Vehari (because $p<0.05$) implying that change in price of Turbat is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bahawalpur, Gujranwala, Islamabad and Nawabshah (because $p>0.05$) implying that prices are same among these cities and Turbat.

In addition to this, table 4.50 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Attock, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Jhelum, Jhang, Karachi, Khuzdar, Lahore, Loralai&Cantt, Mardan, Mianwali, Multan, Peshawar, Sargodha and Sialkot because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Turbat.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Turbat shows that null hypothesis of $\beta=1$ is rejected in case of Attock, D.G.Khan, D.I.Khan, Faisalabad, Jhelum, Karachi, Khuzdar, Lahore, Loralai&Cantt, Mardan, Multan, Peshawar, Sargodha and Sialkot (because $p<0.05$) implying that change in price of Turbat is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected in case of Bannu, Jhang and Mianwali (because $p>0.05$) implying that prices are same among these cities and Turbat.

Table: 4.51 Engle Granger test results with Vehari as regressor and other cities as dependent variable

Dependent Variable	Residual(-1)		EG Critical Value	Null Hypothesis	ECM Result		Wald Tes for β=1	
	Coefficient	t-statistic			Short run effect (b1)	Feedback effect (π)	F-statistic	Prob
Abbotabad	0.017	0.736	-3.37	Accepted	-	-	98.592	0.000
Attock	-0.065	-1.471	-3.37	Accepted	-	-	108.055	0.000
Bahawalnagar	-0.049	-0.882	-3.37	Accepted	-	-	0.014	0.905
Bahawalpur	-0.039	-0.791	-3.37	Accepted	-	-	54.700	0.000
Bannu	-0.038	-0.790	-3.37	Accepted	-	-	37.715	0.000
D G Khan	-0.047	-0.948	-3.37	Accepted	-	-	101.987	0.000
D I Khan	-0.056	-0.988	-3.37	Accepted	-	-	65.922	0.000
Faisalabad	-0.075	-1.989	-3.37	Accepted	-	-	378.701	0.000
Gujranwala	-0.203	-3.645	-3.37	Rejected	0.964	0.202	20.129	0.000
Hyderabad	0.020	0.780	-3.37	Accepted	-	-	166.137	0.000
Islamabad	-0.073	-1.843	-3.37	Accepted	-	-	61.754	0.000
Jhelum	-0.208	-3.415	-3.37	Rejected	0.910	0.206	110.300	0.000
Jhang	-0.031	-0.570	-3.37	Accepted	-	-	16.319	0.000
Karachi	-0.173	-1.967	-3.37	Accepted	-	-	687.571	0.000
Khuzdar	-0.053	-1.543	-3.37	Accepted	-	-	11.317	0.001
Lahore	-0.180	-2.678	-3.37	Accepted	-	-	710.347	0.000
Larkana	-0.034	-0.615	-3.37	Accepted	-	-	251.707	0.000
Loralai&Cantt	-0.037	-0.531	-3.37	Accepted	-	-	12.070	0.001
Mardan	-0.041	-1.285	-3.37	Accepted	-	-	1.422	0.235
Mianwali	-0.028	-0.899	-3.37	Accepted	-	-	22.723	0.000
Mirpurkhas	0.030	1.381	-3.37	Accepted	-	-	68.448	0.000
Multan	-0.053	-1.302	-3.37	Accepted	-	-	129.053	0.000
Nawabshah	0.019	1.458	-3.37	Accepted	-	-	12.601	0.001
Peshawar	-0.067	-1.911	-3.37	Accepted	-	-	100.482	0.000
Rawalpindi	-0.058	-1.314	-3.37	Accepted	-	-	97.592	0.000
Sargodha	-0.042	-1.088	-3.37	Accepted	-	-	13.360	0.000
Sialkot	-0.143	-2.976	-3.37	Accepted	-	-	571.013	0.000
Sukkur	0.003	0.164	-3.37	Accepted	-	-	73.752	0.000
Turbat	-0.085	-2.177	-3.37	Accepted	-	-	28.323	0.000

4.51 Explanation:

Table 4.51 shows Engle Granger test results with CPI of Vehari as explanatory variable or regressor and other cities CPI as dependent variable.

By applying residual based test the calculated value of t-statistic associated with Res (-1) is compared with critical value computed by Engle Granger.

Table 4.51 shows that null hypothesis of unit root in residuals cannot be rejected in case of CPI of Abbotabad, Attock, Bahawalnagar, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Hyderabad, Islamabad, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mardan, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur and Turbat because t-statistic associated with RES (-1) exceeds Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are not cointegrated with CPI of Vehari.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Vehari shows that null hypothesis of $\beta=1$ is rejected in case of Abbotabad, Attock, Bahawalpur, Bannu, D.G.Khan, D.I.Khan, Faisalabad, Hyderabad, Islamabad, Jhang, Karachi, Khuzdar, Lahore, Larkana, Loralai&Cantt, Mianwali, Mirpurkhas, Multan, Nawabshah, Peshawar, Rawalpindi, Sargodha, Sialkot, Sukkur and Turbat (because $p<0.05$) implying that change in price of Vehari is greater than change in prices of these cities. While null hypothesis of $\beta=1$ cannot be rejected only in case of Bahawalnagar and Mardan (because $p>0.05$) implying that prices are same among these cities and Vehari.

In addition to this, table 4.51 shows that null hypothesis of unit root in residuals is rejected in case of CPI of Gujranwala and Jhelum because t-statistic associated with RES (-1) is less than Engle Granger critical value of -3.37 at 5% significance level implying that these cities CPI are cointegrated with CPI of Vehari.

Wald test results for restriction of $\beta=1$ imposed on long run regression of CPI of these cities and Vehari shows that null hypothesis of $\beta=1$ is rejected in case of both Gujranwala and Jhelum (because $p<0.05$) implying that change in price of Vehari is greater than change in prices of these cities.

Chapter 5

Conclusion

In this thesis the importance of choice of numeraire city in convergence analysis is examined by using CPI data of 31 Pakistani cities for period July 2001 to September 2011. For half life estimation 19 numeraire cities included Abbotabad, Bahawalnagar, Bahawalpur, Bannu, D.I.Khan, Faisalabad, Gujranwala, Hyderabad, Islamabad, Karachi, Larkana, Lahore, Loralai&cantt, Multan, Nawabshah, Peshawar, Quetta, Sargodha and Turbat.

Average half life by excluding Quetta is found to be less than a month in case of all numeriare cities except Quetta. Highest average half life is found to be 81 months or almost 8 years in case of Quetta as numeriare city while lowest average half life is found to be about 1.2 months in case of Lahore as numeraire. These results imply that Choice of numeraire city matters in convergence analysis and PPP holds in case of Pakistan.

No clearcut evidence is found whether relative price converges faster with low or high inflation cities because Quetta a low inflation city has average half life of 81 months while Karachi, Hyderabad and Lahore which are also low inflation cities but average half life is almost a month in case of these cities while in case of high inflation cities for instance Bannu, Bahawalpur, Sargodha, Loralai and Nawabshah etc average half life varies from 3 to 4 months.

This thesis further investigates the effect of rise in world food prices for period 2007 to 2011 on relative city prices in case of 19 numeriare cities. It is found that with Abbotabad, Larkana and Quetta as numeraire cities, relative prices of different cities are not affected by rise of world food prices. While with turbat as numeraire relative price of only 13 cities were affected by rise of world food prices. The whole analysis showed that generally there is no effect of rise in world food prices on different cities relative prices in case of all numeraire cities.

Moreover in this thesis cointegration test of Engle Granger is applied to CPI data of 30 Pakistani cities. ADF test showed that all cities CPI series contains unit root and all are I(1) series except Quetta which is I(0) or stationary at level hence Engle Granger is applied to all CPI series except Quetta. Engle Granger test results showed that in case of CPI series of Islamabad and Nawabshah no longrun relationship exist between CPI series of 28 cities and Islamabad and

Nawabshah. Higher number of cointegrating relationships with different cities CPI exist in case of Attock, Bannu, D.G.Khan, D.I.Khan, Jhelum, Jhang, Karachi, Khuzdar, Loralai, Multan, Peshawar, Sialkot and Turbat.

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Appendix

Table:1 Relative price convergence with Abbotabad as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob	H(p)
Attock	0.048	0.030	-1.616	0.109	0.229
Bahawalnagar	0.064	0.034	-1.913	0.058	0.253
Bahawalpur	0.052	0.029	-1.827	0.070	0.235
Bannu	0.143	0.050	-2.883	0.005	0.356
D.G. Khan	0.070	0.035	-1.978	0.050	0.260
D.I.Khan	0.216	0.059	-3.638	0.000	0.452
Faisalabad	0.054	0.034	-1.613	0.110	0.238
Gujranwala	0.054	0.032	-1.698	0.092	0.238
Hyderabad	0.225	0.061	-3.703	0.000	0.464
Islamabad	0.024	0.022	-1.119	0.266	0.187
Jhang	0.123	0.046	-2.685	0.008	0.330
Jhelum	0.095	0.041	-2.320	0.022	0.294
Karachi	0.217	0.059	-3.662	0.000	0.454
Khuzdar	0.174	0.054	-3.210	0.002	0.396
Lahore	0.133	0.049	-2.694	0.008	0.343
Larkana	0.105	0.039	-2.703	0.008	0.307
Loralai	0.129	0.047	-2.780	0.006	0.339
Mardan	0.114	0.045	-2.531	0.013	0.319
Mianwali	0.132	0.049	-2.709	0.008	0.342
MirpurKhas	0.422	0.080	-5.264	0.000	0.804
Multan	0.074	0.037	-2.006	0.047	0.266
Nawabshah	0.057	0.031	-1.808	0.073	0.242
Peshawar	0.075	0.039	-1.907	0.059	0.267
Quetta	1.017	0.096	-10.564	0.000	42.314
Rawalpindi	0.037	0.026	-1.413	0.161	0.210
Sargodha	0.081	0.037	-2.189	0.031	0.276
Sialkot	0.093	0.042	-2.203	0.030	0.292
Sukkur	0.273	0.066	-4.141	0.000	0.535
Turbat	0.138	0.049	-2.797	0.006	0.350
Vehari	0.042	0.028	-1.494	0.138	0.218
Average half life					1.727
Average half life Excluding Quetta					0.317

Table:2 Relative price convergence with Bahawalnagar as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.064	0.034	-1.913	0.058	0.253
Attock	0.127	0.049	-2.616	0.010	0.336
Bahawalpur	0.360	0.071	-5.032	0.000	0.678
Bannu	0.110	0.044	-2.479	0.015	0.313
D.G. Khan	0.192	0.057	-3.348	0.001	0.421
D.I.Khan	0.205	0.058	-3.511	0.001	0.438
Faisalabad	0.088	0.042	-2.111	0.037	0.285
Gujranwala	0.128	0.053	-2.422	0.017	0.337
Hyderabad	0.058	0.032	-1.820	0.072	0.243
Islamabad	0.082	0.043	-1.913	0.058	0.277
Jhang	0.301	0.070	-4.325	0.000	0.577
Jehlum	0.198	0.058	-3.401	0.001	0.428
Karachi	0.158	0.052	-3.030	0.003	0.375
Khuzdar	0.122	0.046	-2.666	0.009	0.330
Lahore	0.130	0.049	-2.634	0.010	0.339
Larkana	0.113	0.043	-2.609	0.010	0.317
Loralai	0.184	0.056	-3.308	0.001	0.409
Mardan	0.121	0.046	-2.632	0.010	0.328
Mianwali	0.084	0.040	-2.086	0.039	0.280
MirpurKhas	0.058	0.032	-1.824	0.071	0.243
Multan	0.135	0.050	-2.704	0.008	0.346
Nawabshah	0.029	0.022	-1.333	0.186	0.196
Peshawar	0.080	0.040	-1.989	0.049	0.274
Quetta	0.987	0.096	-10.259	0.000	53.809
Rawalpindi	0.155	0.053	-2.927	0.004	0.371
Sargodha	0.136	0.050	-2.728	0.007	0.348
Sialkot	0.101	0.044	-2.268	0.025	0.302
Sukkur	0.058	0.032	-1.808	0.073	0.244
Turbat	0.139	0.050	-2.766	0.007	0.351
Vehari	0.104	0.054	-1.949	0.054	0.307
Average half life					2.125
Average half life Excluding Quetta					0.332

Table:3 Relative price convergence with Bahawalpur as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.052	0.029	-1.827	0.070	0.235
Attock	0.086	0.040	-2.167	0.032	0.283
Bahawalnagar	0.360	0.071	-5.032	0.000	0.678
Bannu	0.138	0.047	-2.911	0.004	0.350
D.G. Khan	0.177	0.052	-3.393	0.001	0.400
D.I.Khan	0.252	0.063	-4.018	0.000	0.503
Faisalabad	0.061	0.035	-1.746	0.084	0.249
Gujranwala	0.078	0.043	-1.835	0.069	0.272
Hyderabad	0.044	0.026	-1.712	0.090	0.222
Islamabad	0.047	0.035	-1.346	0.181	0.227
Jhang	0.313	0.070	-4.486	0.000	0.596
Jhelum	0.204	0.057	-3.553	0.001	0.436
Karachi	0.148	0.050	-2.970	0.004	0.362
Khuzdar	0.158	0.050	-3.179	0.002	0.376
Lahore	0.102	0.044	-2.297	0.024	0.304
Larkana	0.098	0.042	-2.362	0.020	0.299
Loralai	0.254	0.064	-3.995	0.000	0.506
Mardan	0.145	0.047	-3.097	0.003	0.359
Mianwali	0.093	0.041	-2.257	0.026	0.292
MirpurKhas	0.046	0.026	-1.772	0.079	0.225
Multan	0.107	0.044	-2.424	0.017	0.310
Nawabshah	0.022	0.017	-1.346	0.181	0.183
Peshawar	0.075	0.038	-1.962	0.052	0.267
Quetta	0.993	0.096	-10.314	0.000	92.444
Rawalpindi	0.116	0.045	-2.614	0.010	0.322
Sargodha	0.226	0.063	-3.587	0.001	0.467
Sialkot	0.073	0.039	-1.846	0.068	0.264
Sukkur	0.046	0.027	-1.700	0.092	0.226
Turbat	0.150	0.052	-2.906	0.004	0.366
Vehari	0.101	0.049	-2.083	0.040	0.303
Average half life					3.411
Average half life Excluding Quetta					0.329

Table:4 Relative price convergence with Bannu as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.143	0.050	-2.883	0.005	0.356
Attock	0.184	0.056	-3.289	0.001	0.409
Bahawalnagar	0.110	0.044	-2.479	0.015	0.313
Bahawalpur	0.138	0.047	-2.911	0.004	0.350
D.G. Khan	0.261	0.065	-4.029	0.000	0.517
D.I.Khan	0.347	0.073	-4.748	0.000	0.654
Faisalabad	0.209	0.060	-3.498	0.001	0.442
Gujranwala	0.150	0.052	-2.908	0.004	0.366
Hyderabad	0.131	0.047	-2.755	0.007	0.341
Islamabad	0.046	0.030	-1.548	0.125	0.225
Jhang	0.281	0.067	-4.224	0.000	0.546
Jhelum	0.258	0.065	-3.998	0.000	0.511
Karachi	0.355	0.073	-4.828	0.000	0.669
Khuzdar	0.349	0.073	-4.768	0.000	0.659
Lahore	0.227	0.062	-3.672	0.000	0.468
Larkana	0.232	0.060	-3.875	0.000	0.474
Loralai	0.233	0.062	-3.783	0.000	0.476
Mardan	0.267	0.065	-4.092	0.000	0.524
Mianwali	0.286	0.068	-4.205	0.000	0.554
MirpurKhas	0.128	0.048	-2.678	0.009	0.337
Multan	0.302	0.069	-4.364	0.000	0.579
Nawabshah	0.048	0.029	-1.645	0.103	0.228
Peshawar	0.210	0.061	-3.472	0.001	0.444
Quetta	1.005	0.096	-10.415	0.000	130.858
Rawalpindi	0.130	0.048	-2.738	0.007	0.340
Sargodha	0.160	0.052	-3.110	0.002	0.379
Sialkot	0.249	0.064	-3.865	0.000	0.499
Sukkur	0.137	0.049	-2.797	0.006	0.348
Turbat	0.366	0.075	-4.893	0.000	0.690
Vehari	0.074	0.037	-2.004	0.048	0.266
Average half life					4.794
Average half life Excluding Quetta					0.432

Table:5 Relative price convergence with D.I.Khan as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.216	0.059	-3.638	0.000	0.452
Attock	0.237	0.063	-3.762	0.000	0.481
Bahawalnagar	0.205	0.058	-3.511	0.001	0.438
Bahawalpur	0.252	0.063	-4.018	0.000	0.503
Bannu	0.347	0.073	-4.748	0.000	0.654
D.G. Khan	0.388	0.076	-5.088	0.000	0.732
Faisalabad	0.275	0.068	-4.040	0.000	0.537
Gujranwala	0.163	0.054	-3.019	0.003	0.382
Hyderabad	0.156	0.051	-3.056	0.003	0.373
Islamabad	0.080	0.039	-2.047	0.043	0.274
Jhang	0.301	0.069	-4.373	0.000	0.577
Jhelum	0.341	0.073	-4.692	0.000	0.644
Karachi	0.405	0.077	-5.232	0.000	0.767
Khuzdar	0.448	0.080	-5.598	0.000	0.862
Lahore	0.276	0.068	-4.073	0.000	0.539
Larkana	0.391	0.074	-5.259	0.000	0.738
Loralai	0.469	0.081	-5.771	0.000	0.917
Mardan	0.401	0.077	-5.210	0.000	0.759
Mianwali	0.323	0.072	-4.492	0.000	0.613
MirpurKhas	0.191	0.056	-3.386	0.001	0.418
Multan	0.330	0.072	-4.564	0.000	0.626
Nawabshah	0.055	0.031	-1.811	0.073	0.239
Peshawar	0.353	0.076	-4.662	0.000	0.666
Quetta	1.004	0.096	-10.435	0.000	164.521
Rawalpindi	0.224	0.061	-3.657	0.000	0.463
Sargodha	0.442	0.080	-5.523	0.000	0.849
Sialkot	0.320	0.073	-4.403	0.000	0.608
Sukkur	0.216	0.060	-3.625	0.000	0.453
Turbat	0.433	0.080	-5.383	0.000	0.828
Vehari	0.118	0.046	-2.539	0.013	0.324
Average half life					6.041
Average half life Excluding Quetta					0.557

Table:6 Relative price convergence with Faisalabad as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.054	0.034	-1.613	0.110	0.238
Attock	0.116	0.045	-2.553	0.012	0.321
Bahawalnagar	0.088	0.042	-2.111	0.037	0.285
Bahawalpur	0.061	0.035	-1.746	0.084	0.249
Bannu	0.209	0.060	-3.498	0.001	0.442
D.G. Khan	0.167	0.055	-3.043	0.003	0.387
D.I.Khan	0.275	0.068	-4.040	0.000	0.537
Gujranwala	0.112	0.044	-2.532	0.013	0.316
Hyderabad	0.060	0.034	-1.744	0.084	0.246
Islamabad	0.048	0.029	-1.640	0.104	0.228
Jhang	0.249	0.064	-3.874	0.000	0.499
Jhelum	0.240	0.063	-3.783	0.000	0.486
Karachi	0.550	0.088	-6.235	0.000	1.160
Khuzdar	0.262	0.067	-3.916	0.000	0.518
Lahore	0.414	0.078	-5.311	0.000	0.785
Larkana	0.143	0.053	-2.699	0.008	0.356
Loralai	0.259	0.067	-3.880	0.000	0.514
Mardan	0.239	0.063	-3.803	0.000	0.484
Mianwali	0.235	0.062	-3.780	0.000	0.478
MirpurKhas	0.035	0.031	-1.144	0.255	0.208
Multan	0.174	0.055	-3.186	0.002	0.396
Nawabshah	0.017	0.019	-0.904	0.368	0.171
Peshawar	0.331	0.071	-4.632	0.000	0.626
Quetta	1.013	0.096	-10.531	0.000	52.619
Rawalpindi	0.071	0.036	-1.958	0.053	0.263
Sargodha	0.157	0.052	-3.033	0.003	0.375
Sialkot	0.375	0.075	-5.017	0.000	0.707
Sukkur	0.055	0.035	-1.576	0.118	0.239
Turbat	0.309	0.070	-4.434	0.000	0.590
Vehari	0.066	0.034	-1.932	0.056	0.255
Average half life					2.166
Average half life Excluding Quetta					0.412

Table:7 Relative price convergence with Gujranwala as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.054	0.032	-1.698	0.092	0.238
Attock	0.152	0.051	-2.951	0.004	0.368
Bahawalnagar	0.128	0.053	-2.422	0.017	0.337
Bahawalpur	0.078	0.043	-1.835	0.069	0.272
Bannu	0.150	0.052	-2.908	0.004	0.366
D.G. Khan	0.142	0.051	-2.787	0.006	0.355
D.I.Khan	0.163	0.054	-3.019	0.003	0.382
Faisalabad	0.112	0.044	-2.532	0.013	0.316
Hyderabad	0.052	0.031	-1.673	0.097	0.235
Islamabad	0.121	0.046	-2.634	0.010	0.328
Jhang	0.215	0.061	-3.514	0.001	0.451
Jhelum	0.244	0.064	-3.808	0.000	0.491
Karachi	0.189	0.057	-3.300	0.001	0.416
Khuzdar	0.148	0.052	-2.870	0.005	0.363
Lahore	0.177	0.055	-3.242	0.002	0.401
Larkana	0.097	0.045	-2.166	0.033	0.297
Loralai	0.166	0.056	-2.972	0.004	0.386
Mardan	0.133	0.048	-2.770	0.007	0.343
Mianwali	0.129	0.047	-2.722	0.008	0.338
MirpurKhas	0.049	0.032	-1.555	0.123	0.231
Multan	0.150	0.051	-2.946	0.004	0.366
Nawabshah	0.023	0.021	-1.088	0.279	0.183
Peshawar	0.118	0.045	-2.624	0.010	0.325
Quetta	1.007	0.096	-10.410	0.000	103.248
Rawalpindi	0.151	0.052	-2.923	0.004	0.366
Sargodha	0.088	0.040	-2.195	0.030	0.286
Sialkot	0.114	0.045	-2.556	0.012	0.319
Sukkur	0.048	0.031	-1.559	0.122	0.228
Turbat	0.178	0.055	-3.244	0.002	0.402
Vehari	0.174	0.054	-3.215	0.002	0.397
Average half life					3.768
Average half life Excluding Quetta					0.326

Table: 8 Relative price convergence with Hyderabad as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Abbotabad	0.225	0.061	-3.703	0
Attock	0.046	0.029	-1.59	0.115
Bahawalnagar	0.058	0.032	-1.82	0.072
Bahawalpur	0.044	0.026	-1.712	0.09
Bannu	0.131	0.047	-2.755	0.007
D.G. Khan	0.061	0.033	-1.847	0.067
D.I.Khan	0.156	0.051	-3.056	0.003
Faisalabad	0.06	0.034	-1.744	0.084
Gujranwala	0.052	0.031	-1.673	0.097
Islamabad	0.021	0.02	-1.034	0.303
Jhang	0.097	0.041	-2.378	0.019
Jhelum	0.074	0.036	-2.043	0.044
Karachi	0.106	0.042	-2.511	0.014
Khuzdar	0.145	0.05	-2.912	0.004
Lahore	0.084	0.04	-2.11	0.037
Larkana	0.085	0.034	-2.533	0.013
Loralai	0.106	0.042	-2.515	0.013
Mardan	0.085	0.039	-2.167	0.032
Mianwali	0.128	0.048	-2.687	0.008
MirpurKhas	0.349	0.074	-4.696	0
Multan	0.072	0.036	-1.998	0.048
Nawabshah	0.082	0.038	-2.17	0.032
Peshawar	0.066	0.036	-1.815	0.072
Quetta	1.021	0.096	-10.611	0
Rawalpindi	0.035	0.025	-1.389	0.168
Sargodha	0.069	0.034	-2.02	0.046
Sialkot	0.063	0.035	-1.803	0.074
Sukkur	0.216	0.059	-3.664	0
Turbat	0.111	0.044	-2.502	0.014
Vehari	0.036	0.026	-1.4	0.164
Average half life				1.399
Average half life Excluding Quetta				0.288

Table: 9 Relative price convergence with Islamabad as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.024	0.022	-1.119	0.266	0.187
Attock	0.048	0.030	-1.606	0.111	0.229
Bahawalnagar	0.082	0.043	-1.913	0.058	0.277
Bahawalpur	0.047	0.035	-1.346	0.181	0.227
Bannu	0.046	0.030	-1.548	0.125	0.225
D.G. Khan	0.067	0.036	-1.881	0.063	0.257
D.I.Khan	0.080	0.039	-2.047	0.043	0.274
Faisalabad	0.048	0.029	-1.640	0.104	0.228
Gujranwala	0.121	0.046	-2.634	0.010	0.328
Hyderabad	0.021	0.020	-1.034	0.303	0.179
Jhang	0.088	0.041	-2.155	0.033	0.285
Jhelum	0.127	0.048	-2.651	0.009	0.335
Karachi	0.054	0.032	-1.665	0.099	0.237
Khuzdar	0.052	0.032	-1.630	0.106	0.234
Lahore	0.091	0.040	-2.271	0.025	0.289
Larkana	0.038	0.030	-1.279	0.204	0.213
Loralai	0.070	0.038	-1.826	0.071	0.260
Mardan	0.052	0.030	-1.697	0.093	0.234
Mianwali	0.053	0.031	-1.718	0.089	0.236
MirpurKhas	0.018	0.020	-0.903	0.368	0.173
Multan	0.051	0.031	-1.665	0.099	0.233
Nawabshah	0.011	0.015	-0.754	0.453	0.154
Peshawar	0.042	0.027	-1.541	0.126	0.218
Quetta	1.004	0.096	-10.435	0.000	170.904
Rawalpindi	0.028	0.024	-1.171	0.244	0.195
Sargodha	0.041	0.028	-1.458	0.148	0.218
Sialkot	0.039	0.026	-1.456	0.148	0.213
Sukkur	0.018	0.020	-0.910	0.365	0.172
Turbat	0.067	0.035	-1.920	0.058	0.256
Vehari	0.137	0.049	-2.811	0.006	0.348
Average half life					5.927
Average half life Excluding Quetta					0.230

Table: 10 Relative price convergence with Karachi as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.217	0.059	-3.662	0.000	0.454
Attock	0.274	0.067	-4.111	0.000	0.535
Bahawalnagar	0.158	0.052	-3.030	0.003	0.375
Bahawalpur	0.148	0.050	-2.970	0.004	0.362
Bannu	0.355	0.073	-4.828	0.000	0.669
D.G. Khan	0.333	0.072	-4.645	0.000	0.630
D.I.Khan	0.405	0.077	-5.232	0.000	0.767
Faisalabad	0.550	0.088	-6.235	0.000	1.160
Gujranwala	0.189	0.057	-3.300	0.001	0.416
Hyderabad	0.106	0.042	-2.511	0.014	0.309
Islamabad	0.054	0.032	-1.665	0.099	0.237
Jhang	0.304	0.069	-4.401	0.000	0.582
Jhelum	0.353	0.073	-4.809	0.000	0.666
Khuzdar	0.485	0.082	-5.897	0.000	0.957
Lahore	0.405	0.079	-5.099	0.000	0.767
Larkana	0.282	0.066	-4.294	0.000	0.548
Loralai	0.292	0.068	-4.297	0.000	0.564
Mardan	0.376	0.075	-5.038	0.000	0.709
Mianwali	0.442	0.081	-5.487	0.000	0.849
MirpurKhas	0.179	0.055	-3.258	0.002	0.403
Multan	0.374	0.076	-4.941	0.000	0.705
Nawabshah	0.048	0.028	-1.699	0.092	0.229
Peshawar	0.632	0.092	-6.872	0.000	1.512
Quetta	1.019	0.096	-10.595	0.000	36.108
Rawalpindi	0.167	0.054	-3.128	0.002	0.388
Sargodha	0.223	0.060	-3.683	0.000	0.461
Sialkot	0.497	0.086	-5.773	0.000	0.991
Sukkur	0.152	0.051	-2.981	0.004	0.368
Turbat	0.537	0.086	-6.231	0.000	1.116
Vehari	0.109	0.044	-2.457	0.016	0.313
Average half life					1.805
Average half life Excluding Quetta					0.601

Table:11 Relative price convergence with Lahore as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.133	0.049	-2.694	0.008	0.343
Attock	0.323	0.071	-4.523	0.000	0.613
Bahawalnagar	0.130	0.049	-2.634	0.010	0.339
Bahawalpur	0.102	0.044	-2.297	0.024	0.304
Bannu	0.227	0.062	-3.672	0.000	0.468
D.G. Khan	0.176	0.056	-3.161	0.002	0.399
D.I.Khan	0.276	0.068	-4.073	0.000	0.539
Faisalabad	0.414	0.078	-5.311	0.000	0.785
Gujranwala	0.177	0.055	-3.242	0.002	0.401
Hyderabad	0.084	0.040	-2.110	0.037	0.279
Islamabad	0.091	0.040	-2.271	0.025	0.289
Jhang	0.214	0.060	-3.547	0.001	0.450
Jhelum	0.194	0.058	-3.317	0.001	0.423
Karachi	0.405	0.079	-5.099	0.000	0.767
Khuzdar	0.278	0.068	-4.093	0.000	0.542
Larkana	0.169	0.057	-2.969	0.004	0.390
Loralai	0.254	0.066	-3.845	0.000	0.506
Mardan	0.256	0.065	-3.973	0.000	0.509
Mianwali	0.388	0.076	-5.091	0.000	0.732
MirpurKhas	0.089	0.043	-2.069	0.041	0.287
Multan	0.262	0.065	-4.009	0.000	0.517
Nawabshah	0.034	0.026	-1.318	0.190	0.204
Peshawar	0.452	0.080	-5.633	0.000	0.872
Quetta	1.032	0.096	-10.728	0.000	22.167
Rawalpindi	0.218	0.061	-3.596	0.001	0.455
Sargodha	0.166	0.054	-3.106	0.002	0.386
Sialkot	0.350	0.073	-4.788	0.000	0.660
Sukkur	0.067	0.037	-1.797	0.075	0.256
Turbat	0.401	0.077	-5.191	0.000	0.758
Vehari	0.109	0.044	-2.491	0.014	0.312
Average half life					1.198
Average half life Excluding Quetta					0.460

Table:12 Relative price convergence with Larkana as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.225	0.061	-3.703	0.000	0.464
Attock	0.046	0.029	-1.590	0.115	0.226
Bahawalnagar	0.058	0.032	-1.820	0.072	0.243
Bahawalpur	0.044	0.026	-1.712	0.090	0.222
Bannu	0.131	0.047	-2.755	0.007	0.341
D.G. Khan	0.061	0.033	-1.847	0.067	0.247
D.I.Khan	0.156	0.051	-3.056	0.003	0.373
Faisalabad	0.060	0.034	-1.744	0.084	0.246
Gujranwala	0.052	0.031	-1.673	0.097	0.235
Hyderabad	0.085	0.034	-2.533	0.013	0.282
Islamabad	0.021	0.020	-1.034	0.303	0.179
Jhang	0.097	0.041	-2.378	0.019	0.297
Jhelum	0.074	0.036	-2.043	0.044	0.266
Karachi	0.106	0.042	-2.511	0.014	0.309
Khuzdar	0.145	0.050	-2.912	0.004	0.359
Lahore	0.084	0.040	-2.110	0.037	0.279
Loralai	0.106	0.042	-2.515	0.013	0.309
Mardan	0.085	0.039	-2.167	0.032	0.281
Mianwali	0.128	0.048	-2.687	0.008	0.338
MirpurKhas	0.349	0.074	-4.696	0.000	0.659
Multan	0.072	0.036	-1.998	0.048	0.264
Nawabshah	0.082	0.038	-2.170	0.032	0.277
Peshawar	0.066	0.036	-1.815	0.072	0.255
Quetta	1.021	0.096	-10.611	0.000	33.326
Rawalpindi	0.035	0.025	-1.389	0.168	0.207
Sargodha	0.069	0.034	-2.020	0.046	0.260
Sialkot	0.063	0.035	-1.803	0.074	0.250
Sukkur	0.216	0.059	-3.664	0.000	0.452
Turbat	0.111	0.044	-2.502	0.014	0.315
Vehari	0.036	0.026	-1.400	0.164	0.209
Average half life					1.399
Average half life Excluding Quetta					0.288

Table:13 Relative price convergence with Loralai as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.129	0.047	-2.780	0.006	0.339
Attock	0.251	0.065	-3.867	0.000	0.501
Bahawalnagar	0.184	0.056	-3.308	0.001	0.409
Bahawalpur	0.254	0.064	-3.995	0.000	0.506
Bannu	0.233	0.062	-3.783	0.000	0.476
D.G. Khan	0.393	0.076	-5.146	0.000	0.743
D.I.Khan	0.469	0.081	-5.771	0.000	0.917
Faisalabad	0.259	0.067	-3.880	0.000	0.514
Gujranwala	0.166	0.056	-2.972	0.004	0.386
Hyderabad	0.106	0.042	-2.515	0.013	0.309
Islamabad	0.070	0.038	-1.826	0.071	0.260
Jhang	0.367	0.075	-4.911	0.000	0.692
Jhelum	0.424	0.079	-5.367	0.000	0.807
Karachi	0.292	0.068	-4.297	0.000	0.564
Khuzdar	0.300	0.068	-4.437	0.000	0.575
Lahore	0.254	0.066	-3.845	0.000	0.506
Larkana	0.316	0.069	-4.559	0.000	0.602
Mardan	0.349	0.072	-4.828	0.000	0.658
Mianwali	0.219	0.061	-3.568	0.001	0.457
MirpurKhas	0.119	0.045	-2.672	0.009	0.326
Multan	0.225	0.062	-3.636	0.000	0.464
Nawabshah	0.048	0.028	-1.719	0.089	0.228
Peshawar	0.275	0.069	-3.992	0.000	0.537
Quetta	1.009	0.096	-10.484	0.000	78.184
Rawalpindi	0.217	0.061	-3.589	0.001	0.454
Sargodha	0.291	0.069	-4.216	0.000	0.562
Sialkot	0.262	0.067	-3.878	0.000	0.517
Sukkur	0.124	0.046	-2.707	0.008	0.333
Turbat	0.318	0.072	-4.407	0.000	0.604
Vehari	0.111	0.047	-2.381	0.019	0.315
Average half life					3.092
Average half life Excluding Quetta					0.485

Table: 14 Relative price convergence with Multan as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.074	0.037	-2.006	0.047	0.266
Attock	0.222	0.060	-3.670	0.000	0.460
Bahawalnagar	0.135	0.050	-2.704	0.008	0.346
Bahawalpur	0.107	0.044	-2.424	0.017	0.310
Bannu	0.302	0.069	-4.364	0.000	0.579
D.G. Khan	0.241	0.063	-3.817	0.000	0.487
D.I.Khan	0.330	0.072	-4.564	0.000	0.626
Faisalabad	0.174	0.055	-3.186	0.002	0.396
Gujranwala	0.150	0.051	-2.946	0.004	0.366
Hyderabad	0.072	0.036	-1.998	0.048	0.264
Islamabad	0.051	0.031	-1.665	0.099	0.233
Jhang	0.389	0.076	-5.087	0.000	0.734
Jhelum	0.377	0.075	-4.992	0.000	0.710
Karachi	0.374	0.076	-4.941	0.000	0.705
Khuzdar	0.263	0.066	-3.990	0.000	0.519
Lahore	0.262	0.065	-4.009	0.000	0.517
Larkana	0.118	0.046	-2.553	0.012	0.325
Loralai	0.225	0.062	-3.636	0.000	0.464
Mardan	0.303	0.069	-4.420	0.000	0.580
Mianwali	0.398	0.077	-5.181	0.000	0.753
MirpurKhas	0.079	0.040	-1.996	0.048	0.273
Nawabshah	0.023	0.021	-1.118	0.266	0.184
Peshawar	0.244	0.063	-3.859	0.000	0.492
Quetta	1.007	0.096	-10.465	0.000	99.297
Rawalpindi	0.164	0.053	-3.104	0.002	0.384
Sargodha	0.182	0.055	-3.320	0.001	0.407
Sialkot	0.193	0.057	-3.372	0.001	0.422
Sukkur	0.051	0.032	-1.608	0.111	0.233
Turbat	0.297	0.068	-4.338	0.000	0.570
Vehari	0.089	0.040	-2.241	0.027	0.287
Average half life					3.740
Average half life Excluding Quetta					0.430

Table:15 Relative price convergence with Nawabshah as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.057	0.031	-1.808	0.073	0.242
Attock	0.017	0.017	-0.954	0.342	0.169
Bahawalnagar	0.029	0.022	-1.333	0.186	0.196
Bahawalpur	0.022	0.017	-1.346	0.181	0.183
Bannu	0.048	0.029	-1.645	0.103	0.228
D.G. Khan	0.024	0.020	-1.167	0.246	0.186
D.I.Khan	0.055	0.031	-1.811	0.073	0.239
Faisalabad	0.017	0.019	-0.904	0.368	0.171
Gujranwala	0.023	0.021	-1.088	0.279	0.183
Hyderabad	0.082	0.038	-2.170	0.032	0.277
Islamabad	0.011	0.015	-0.754	0.453	0.154
Jhang	0.045	0.027	-1.626	0.107	0.223
Jhelum	0.033	0.024	-1.364	0.176	0.203
Karachi	0.048	0.028	-1.699	0.092	0.229
Khuzdar	0.048	0.029	-1.662	0.099	0.229
Lahore	0.034	0.026	-1.318	0.190	0.204
Larkana	0.036	0.019	-1.870	0.064	0.208
Loralai	0.048	0.028	-1.719	0.089	0.228
Mardan	0.031	0.024	-1.278	0.204	0.199
Mianwali	0.038	0.027	-1.418	0.159	0.212
MirpurKhas	0.064	0.033	-1.946	0.054	0.252
Multan	0.023	0.021	-1.118	0.266	0.184
Peshawar	0.019	0.021	-0.947	0.346	0.176
Quetta	1.007	0.096	-10.459	0.000	105.051
Rawalpindi	0.014	0.016	-0.880	0.381	0.162
Sargodha	0.030	0.022	-1.367	0.174	0.198
Sialkot	0.022	0.021	-1.050	0.296	0.181
Sukkur	0.050	0.028	-1.780	0.078	0.232
Turbat	0.041	0.027	-1.512	0.134	0.218
Vehari	0.017	0.018	-0.961	0.339	0.171
Average half life					3.700
Average half life Excluding Quetta					0.198

Table:16 Relative price convergence with Peshawar as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.075	0.039	-1.907	0.059	0.267
Attock	0.167	0.054	-3.109	0.002	0.387
Bahawalnagar	0.080	0.040	-1.989	0.049	0.274
Bahawalpur	0.075	0.038	-1.962	0.052	0.267
Bannu	0.210	0.061	-3.472	0.001	0.444
D.G. Khan	0.173	0.056	-3.106	0.002	0.396
D.I.Khan	0.353	0.076	-4.662	0.000	0.666
Faisalabad	0.331	0.071	-4.632	0.000	0.626
Gujranwala	0.118	0.045	-2.624	0.010	0.325
Hyderabad	0.066	0.036	-1.815	0.072	0.255
Islamabad	0.042	0.027	-1.541	0.126	0.218
Jhang	0.244	0.064	-3.835	0.000	0.492
Jhelum	0.320	0.072	-4.468	0.000	0.609
Karachi	0.632	0.092	-6.872	0.000	1.512
Khuzdar	0.279	0.070	-3.991	0.000	0.543
Lahore	0.452	0.080	-5.633	0.000	0.872
Larkana	0.158	0.055	-2.886	0.005	0.376
Loralai	0.275	0.069	-3.992	0.000	0.537
Mardan	0.255	0.066	-3.884	0.000	0.507
Mianwali	0.249	0.064	-3.909	0.000	0.498
MirpurKhas	0.057	0.038	-1.508	0.135	0.242
Multan	0.244	0.063	-3.859	0.000	0.492
Nawabshah	0.019	0.021	-0.947	0.346	0.176
Quetta	1.019	0.096	-10.589	0.000	37.325
Rawalpindi	0.102	0.043	-2.363	0.020	0.303
Sargodha	0.132	0.047	-2.783	0.006	0.342
Sialkot	0.471	0.081	-5.824	0.000	0.921
Sukkur	0.063	0.037	-1.679	0.096	0.250
Turbat	0.495	0.083	-5.965	0.000	0.985
Vehari	0.064	0.033	-1.906	0.059	0.252
Average half life					1.712
Average half life Excluding Quetta					0.468

Table:17 Relative price convergence with Quetta as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	1.017	0.096	-10.564	0.000	42.314
Attock	1.016	0.096	-10.564	0.000	42.624
Bahawalnagar	0.987	0.096	-10.259	0.000	53.809
Bahawalpur	0.993	0.096	-10.314	0.000	92.444
Bannu	1.005	0.096	-10.415	0.000	130.858
D.G. Khan	1.007	0.096	-10.461	0.000	103.432
D.I.Khan	1.004	0.096	-10.435	0.000	164.521
Faisalabad	1.013	0.096	-10.531	0.000	52.619
Gujranwala	1.007	0.096	-10.410	0.000	103.248
Hyderabad	1.021	0.096	-10.611	0.000	33.326
Islamabad	1.004	0.096	-10.435	0.000	170.904
Jhang	0.995	0.096	-10.366	0.000	127.187
Jhelum	1.021	0.096	-10.610	0.000	33.679
Karachi	1.019	0.096	-10.595	0.000	36.108
Khuzdar	1.009	0.096	-10.486	0.000	76.608
Lahore	1.032	0.096	-10.728	0.000	22.167
Larkana	1.012	0.096	-10.519	0.000	57.045
Loralai	1.009	0.096	-10.484	0.000	78.184
Mardan	1.011	0.096	-10.507	0.000	62.752
Mianwali	1.006	0.096	-10.406	0.000	109.452
MirpurKhas	1.015	0.096	-10.546	0.000	46.916
Multan	1.007	0.096	-10.465	0.000	99.297
Nawabshah	1.007	0.096	-10.459	0.000	105.051
Peshawar	1.019	0.096	-10.589	0.000	37.325
Rawalpindi	1.005	0.096	-10.415	0.000	132.299
Sargodha	1.005	0.096	-10.448	0.000	129.328
Sialkot	1.014	0.096	-10.541	0.000	49.238
Sukkur	1.021	0.096	-10.609	0.000	33.729
Turbat	1.006	0.096	-10.456	0.000	112.542
Vehari	0.993	0.096	-10.317	0.000	95.128
Average half life					81.138

Table:18 Relative price convergence with Sargodha as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.081	0.037	-2.189	0.031	0.276
Attock	0.139	0.048	-2.869	0.005	0.351
Bahawalnagar	0.136	0.050	-2.728	0.007	0.348
Bahawalpur	0.226	0.063	-3.587	0.001	0.467
Bannu	0.160	0.052	-3.110	0.002	0.379
D.G. Khan	0.304	0.068	-4.475	0.000	0.582
D.I.Khan	0.442	0.080	-5.523	0.000	0.849
Faisalabad	0.157	0.052	-3.033	0.003	0.375
Gujranwala	0.088	0.040	-2.195	0.030	0.286
Hyderabad	0.069	0.034	-2.020	0.046	0.260
Islamabad	0.041	0.028	-1.458	0.148	0.218
Jhang	0.467	0.082	-5.729	0.000	0.910
Jhelum	0.294	0.067	-4.360	0.000	0.566
Karachi	0.223	0.060	-3.683	0.000	0.461
Khuzdar	0.192	0.056	-3.429	0.001	0.420
Lahore	0.166	0.054	-3.106	0.002	0.386
Larkana	0.163	0.055	-2.996	0.003	0.383
Loralai	0.291	0.069	-4.216	0.000	0.562
Mardan	0.224	0.058	-3.854	0.000	0.463
Mianwali	0.169	0.053	-3.185	0.002	0.390
MirpurKhas	0.072	0.036	-2.016	0.046	0.264
Multan	0.182	0.055	-3.320	0.001	0.407
Nawabshah	0.030	0.022	-1.367	0.174	0.198
Peshawar	0.132	0.047	-2.783	0.006	0.342
Quetta	1.005	0.096	-10.448	0.000	129.328
Rawalpindi	0.171	0.053	-3.236	0.002	0.392
Sialkot	0.187	0.057	-3.299	0.001	0.414
Sukkur	0.071	0.035	-1.994	0.049	0.262
Turbat	0.248	0.063	-3.918	0.000	0.498
Vehari	0.086	0.040	-2.171	0.032	0.283
Average half life					4.711
Average half life Excluding Quetta					0.400

Table:19 Relative price convergence with Turbat as Numeraire

Variable	Coefficient	Std. Error	t-Statistic	Prob.	H(P)
Abbotabad	0.138	0.049	-2.797	0.006	0.350
Attock	0.270	0.066	-4.104	0.000	0.529
Bahawalnagar	0.139	0.050	-2.766	0.007	0.351
Bahawalpur	0.150	0.052	-2.906	0.004	0.366
Bannu	0.366	0.075	-4.893	0.000	0.690
D.G. Khan	0.261	0.065	-4.004	0.000	0.516
D.I.Khan	0.433	0.080	-5.383	0.000	0.828
Faisalabad	0.309	0.070	-4.434	0.000	0.590
Gujranwala	0.178	0.055	-3.244	0.002	0.402
Hyderabad	0.111	0.044	-2.502	0.014	0.315
Islamabad	0.067	0.035	-1.920	0.058	0.256
Jhang	0.316	0.071	-4.479	0.000	0.602
Jhelum	0.399	0.077	-5.173	0.000	0.754
Karachi	0.537	0.086	-6.231	0.000	1.116
Khuzdar	0.518	0.086	-6.044	0.000	1.053
Lahore	0.401	0.077	-5.191	0.000	0.758
Larkana	0.218	0.062	-3.530	0.001	0.455
Loralai	0.318	0.072	-4.407	0.000	0.604
Mardan	0.398	0.076	-5.209	0.000	0.752
Mianwali	0.337	0.072	-4.684	0.000	0.638
MirpurKhas	0.115	0.047	-2.459	0.016	0.321
Multan	0.297	0.068	-4.338	0.000	0.570
Nawabshah	0.041	0.027	-1.512	0.134	0.218
Peshawar	0.495	0.083	-5.965	0.000	0.985
Quetta	1.006	0.096	-10.456	0.000	112.542
Rawalpindi	0.180	0.055	-3.266	0.002	0.405
Sargodha	0.248	0.063	-3.918	0.000	0.498
Sialkot	0.398	0.077	-5.158	0.000	0.752
Sukkur	0.133	0.049	-2.697	0.008	0.343
Vehari	0.100	0.042	-2.383	0.019	0.301
Average half life					4.295
Average half life Excluding Quetta					0.544

Table: 4.2 Reports the results of regression (2) with Abbotabad as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.013	-0.241	**rpattock(-1)*d**	-0.051	-0.83	0.119	0.73
rpbawalnagar(-1)	-0.048	-0.972	**rpbawalnagar(-1)*d**	-0.031	-0.601	0.034	0.855
rpbahawalpur(-1)	-0.02	-0.501	**rpbahawalpur(-1)*d**	-0.048	-1.058	0.126	0.724
rpbannu(-1)	-0.153	-1.961	**rpbannu(-1)*d**	0.005	0.066	1.219	0.272
rpdgkhan(-1)	-0.068	-1.298	**rpdgkhan(-1)*d**	-0.018	-0.273	0.212	0.646
rpdikhan(-1)	-0.122	-1.663	**rpdikhan(-1)*d**	-0.177	-2.115	0.152	0.697
rpfaisalabad(-1)	-0.076	-1.255	**rpfaisalabad(-1)*d**	0.046	0.601	0.86	0.356
rpgujranwala(-1)	-0.034	-0.534	**rpgujranwala(-1)*d**	-0.029	-0.435	0.001	0.97
rphyderabad(-1)	-0.135	-2.224	**rphyderabad(-1)*d**	-0.169	-2.147	0.078	0.781
rpislamabad(-1)	0.031	0.713	**rpislamabad(-1)*d**	-0.062	-1.217	1.03	0.312
rpjhelum(-1)	-0.04	-0.6	**rpjhelum(-1)*d**	-0.091	-1.225	0.147	0.702
rpjhang(-1)	-0.096	-1.495	**rpjhang(-1)*d**	-0.062	-0.935	0.077	0.782
rpkarachi(-1)	-0.108	-0.798	**rpkarachi(-1)*d**	0.000	0.001	0.143	0.706
rpkhuzdar(-1)	-0.177	-2.136	**rpkhuzdar(-1)*d**	0.007	0.08	1.339	0.25
rplahore(-1)	-0.171	-1.144	**rplahore(-1)*d**	0.098	0.613	0.771	0.382
rplarkana(-1)	-0.058	-1.283	**rplarkana(-1)*d**	-0.041	-0.623	0.031	0.862
rploralai(-1)	-0.113	-1.903	**rploralai(-1)*d**	-0.069	-1.176	0.178	0.674
rpmardan(-1)	-0.067	-1.216	**rpmardan(-1)*d**	-0.045	-0.806	0.047	0.829
rpmianwali(-1)	-0.142	-1.716	**rpmianwali(-1)*d**	0.007	0.089	0.948	0.332
rpmirpurkhas(-1)	-0.304	-2.812	**rpmirpurkhas(-1)*d**	-0.152	-0.989	0.389	0.534
rpmultan(-1)	-0.055	-0.653	**rpmultan(-1)*d**	-0.03	-0.329	0.02	0.887
rpnawabshah(-1)	-0.069	-1	**rpnawabshah(-1)*d**	0.059	0.709	0.732	0.394
rppeshawar(-1)	-0.045	-0.822	**rppeshawar(-1)*d**	-0.052	-0.838	0.004	0.952
rpquetta(-1)	-1.512	-0.896	**rpquetta(-1)*d**	0.491	0.292	0.354	0.553
rprawalpindi(-1)	0.006	0.133	**rprawalpindi(-1)*d**	-0.063	-1.296	0.648	0.422
rpsargodha(-1)	-0.06	-1.429	**rpsargodha(-1)*d**	-0.052	-1.249	0.011	0.918
rpsialkot(-1)	-0.034	-0.458	**rpsialkot(-1)*d**	-0.026	-0.267	0.003	0.958
rpsukkur(-1)	-0.182	-2.042	**rpsukkur(-1)*d**	-0.16	-1.293	0.012	0.913
rpturbat(-1)	-0.154	-2.217	**rpturbat(-1)*d**	-0.003	-0.05	1.464	0.229
rpvehari(-1)	-0.016	-0.36	**rpvehari(-1)*d**	-0.04	-0.828	0.081	0.777

Table: 4.3 Reports the results of regression (2) with Bahawalnagar as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.171	-2.679	**rpattock(-1)*d**	0.025	0.396	2.897	0.091
rpabotabad(-1)	-0.048	-0.972	**rpabotabad(-1)*d**	-0.031	-0.601	0.034	0.855
rpbahawalpur(-1)	-0.459	-3.854	**rpbahawalpur(-1)*d**	0.304	2.100	8.939	**0.003**
rpbannu(-1)	-0.127	-2.002	**rpbannu(-1)*d**	-0.003	-0.034	0.825	0.366
rpdgkhan(-1)	-0.254	-3.242	**rpdgkhan(-1)*d**	0.057	0.809	5.093	**0.026**
rpdikhan(-1)	-0.224	-1.942	**rpdikhan(-1)*d**	0.007	0.059	1.042	0.309
rpfaisalabad(-1)	-0.113	-1.608	**rpfaisalabad(-1)*d**	0.016	0.265	1.079	0.301
rpgujranwala(-1)	-0.171	-2.379	**rpgujranwala(-1)*d**	0.026	0.327	1.990	0.161
rphyderabad(-1)	-0.035	-0.922	**rphyderabad(-1)*d**	-0.052	-1.312	0.058	0.810
rpislamabad(-1)	-0.187	-2.721	**rpislamabad(-1)*d**	0.148	2.308	6.852	**0.010**
rpjhelum(-1)	-0.240	-2.692	**rpjhelum(-1)*d**	0.014	0.153	2.227	0.138
rpjhang(-1)	-0.298	-2.507	**rpjhang(-1)*d**	-0.022	-0.158	1.266	0.263
rpkarachi(-1)	-0.140	-1.954	**rpkarachi(-1)*d**	0.010	0.154	1.405	0.238
rpkhuzdar(-1)	-0.101	-1.503	**rpkhuzdar(-1)*d**	-0.015	-0.171	0.359	0.550
rplahore(-1)	-0.144	-1.920	**rplahore(-1)*d**	0.022	0.353	1.614	0.206
rplarkana(-1)	-0.104	-1.551	**rplarkana(-1)*d**	0.014	0.183	0.746	0.389
rploralai(-1)	-0.497	-3.354	**rploralai(-1)*d**	0.332	2.084	7.543	**0.007**
rpmardan(-1)	-0.116	-1.472	**rpmardan(-1)*d**	0.045	0.453	0.871	0.353
rpmianwali(-1)	-0.092	-1.597	**rpmianwali(-1)*d**	0.010	0.136	0.698	0.405
rpmirpurkhas(-1)	-0.020	-0.449	**rpmirpurkhas(-1)*d**	-0.067	-1.316	0.277	0.600
rpmultan(-1)	-0.138	-2.264	**rpmultan(-1)*d**	-0.020	-0.355	1.249	0.266
rpnawabshah(-1)	0.031	0.869	**rpnawabshah(-1)*d**	-0.076	-1.690	1.919	0.169
rppeshawar(-1)	-0.123	-1.798	**rppeshawar(-1)*d**	0.038	0.541	1.495	0.224
rpquetta(-1)	0.602	0.169	**rpquetta(-1)*d**	-1.599	-0.448	0.095	0.758
rprawalpindi(-1)	-0.185	-2.668	**rprawalpindi(-1)*d**	0.026	0.355	2.668	0.105
rpsargodha(-1)	-0.307	-2.821	**rpsargodha(-1)*d**	0.177	1.446	4.643	**0.033**
rpsialkot(-1)	-0.129	-1.795	**rpsialkot(-1)*d**	0.039	0.587	1.613	0.207
rpsukkur(-1)	-0.024	-0.519	**rpsukkur(-1)*d**	-0.060	-1.258	0.177	0.675
rpturbat(-1)	-0.226	-2.447	**rpturbat(-1)*d**	0.104	0.956	2.902	0.091
rpvehari(-1)	-0.289	-3.305	**rpvehari(-1)*d**	0.228	2.235	8.342	**0.005**

Table: 4.4 Reports the results of regression (2) with Bahawalpur as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.091	-2.068	**rpattock(-1)*d**	-0.011	-0.191	0.821	0.367
rpabotabad(-1)	-0.020	-0.501	**rpabotabad(-1)*d**	-0.048	-1.058	0.126	0.724
rpbawalnagar(-1)	-0.459	-3.854	**rpbawalnagar(-1)*d**	0.304	2.100	8.939	**0.003**
rpbannu(-1)	-0.136	-1.842	**rpbannu(-1)*d**	0.003	0.034	0.696	0.406
rpdgkhan(-1)	-0.145	-2.598	**rpdgkhan(-1)*d**	-0.012	-0.170	1.432	0.234
rpdikhan(-1)	-0.199	-1.845	**rpdikhan(-1)*d**	-0.040	-0.328	0.521	0.472
rpfaisalabad(-1)	-0.064	-1.321	**rpfaisalabad(-1)*d**	-0.007	-0.156	0.445	0.506
rpgujranwala(-1)	-0.099	-1.669	**rpgujranwala(-1)*d**	0.020	0.248	0.807	0.371
rphyderabad(-1)	-0.017	-0.594	**rphyderabad(-1)*d**	-0.064	-1.943	0.751	0.388
rpislamabad(-1)	-0.133	-2.464	**rpislamabad(-1)*d**	0.111	2.068	5.768	**0.018**
rpjhelum(-1)	-0.172	-2.269	**rpjhelum(-1)*d**	-0.072	-0.765	0.404	0.526
rpjhang(-1)	-0.149	-1.322	**rpjhang(-1)*d**	-0.087	-0.592	0.059	0.808
rpkarachi(-1)	-0.127	-2.041	**rpkarachi(-1)*d**	-0.024	-0.443	0.947	0.332
rpkhuzdar(-1)	-0.058	-0.796	**rpkhuzdar(-1)*d**	-0.064	-0.624	0.002	0.968
rplahore(-1)	-0.107	-1.765	**rplahore(-1)*d**	-0.006	-0.112	0.965	0.328
rplarkana(-1)	-0.107	-1.676	**rplarkana(-1)*d**	0.008	0.101	0.766	0.383
rploralai(-1)	-0.667	-3.837	**rploralai(-1)*d**	0.484	2.614	10.579	**0.001**
rpmardan(-1)	-0.090	-1.157	**rpmardan(-1)*d**	0.047	0.440	0.573	0.451
rpmianwali(-1)	-0.090	-1.615	**rpmianwali(-1)*d**	0.043	0.527	1.033	0.312
rpmirpurkhas(-1)	0.004	0.116	**rpmirpurkhas(-1)*d**	-0.073	-1.695	1.169	0.282
rpmultan(-1)	-0.090	-2.038	**rpmultan(-1)*d**	-0.053	-1.008	0.210	0.648
rpnawabshah(-1)	0.045	1.589	**rpnawabshah(-1)*d**	-0.079	-2.135	3.884	**0.051**
rppeshawar(-1)	-0.098	-1.680	**rppeshawar(-1)*d**	0.029	0.417	1.112	0.294
rpquetta(-1)	1.636	0.395	**rpquetta(-1)*d**	-2.635	-0.636	0.266	0.607
rprawalpindi(-1)	-0.110	-2.315	**rprawalpindi(-1)*d**	-0.050	-0.710	0.372	0.543
rpsargodha(-1)	-0.360	-3.314	**rpsargodha(-1)*d**	0.276	2.247	7.909	**0.006**
rpsialkot(-1)	-0.090	-1.643	**rpsialkot(-1)*d**	0.020	0.378	1.220	0.272
rpsukkur(-1)	0.000	-0.009	**rpsukkur(-1)*d**	-0.070	-1.771	1.080	0.301
rpturbat(-1)	-0.218	-2.312	**rpturbat(-1)*d**	0.141	1.161	2.930	0.090
rpvehari(-1)	-0.165	-2.331	**rpvehari(-1)*d**	0.108	1.118	2.958	0.088

Table: 4.5 Reports the results of regression (2) with Bannu as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.170	-2.450	**rpattock(-1)*d**	-0.044	-0.535	0.860	0.356
rpabotabad(-1)	-0.153	-1.961	**rpabotabad(-1)*d**	0.005	0.066	1.219	0.272
rpbawalnagar(-1)	-0.127	-2.002	**rpbawalnagar(-1)*d**	-0.003	-0.034	0.825	0.366
rpbahawalpur(-1)	-0.136	-1.842	**rpbahawalpur(-1)*d**	0.003	0.034	0.696	0.406
rpdgkhan(-1)	-0.289	-3.561	**rpdgkhan(-1)*d**	0.000	-0.004	2.898	0.091
rpdikhan(-1)	-0.365	-2.298	**rpdikhan(-1)*d**	0.002	0.010	1.272	0.262
rpfaisalabad(-1)	-0.275	-3.001	**rpfaisalabad(-1)*d**	0.085	1.032	4.771	**0.031**
rpgujranwala(-1)	-0.171	-2.157	**rpgujranwala(-1)*d**	0.008	0.075	1.119	0.292
rphyderabad(-1)	-0.125	-2.100	**rphyderabad(-1)*d**	-0.042	-0.789	0.688	0.408
rpislamabad(-1)	-0.075	-1.435	**rpislamabad(-1)*d**	0.049	0.828	1.341	0.249
rpjhelum(-1)	-0.200	-2.180	**rpjhelum(-1)*d**	-0.136	-1.154	0.108	0.743
rpjhang(-1)	-0.172	-2.033	**rpjhang(-1)*d**	-0.265	-2.106	0.236	0.628
rpkarachi(-1)	-0.445	-3.843	**rpkarachi(-1)*d**	0.208	2.201	10.276	**0.002**
rpkhuzdar(-1)	-0.191	-2.312	**rpkhuzdar(-1)*d**	-0.051	-0.393	0.491	0.485
rplahore(-1)	-0.315	-2.994	**rplahore(-1)*d**	0.133	1.523	5.799	**0.018**
rplarkana(-1)	-0.238	-2.370	**rplarkana(-1)*d**	0.095	0.741	2.280	0.134
rploralai(-1)	-0.180	-2.426	**rploralai(-1)*d**	-0.199	-1.891	0.014	0.907
rpmardan(-1)	-0.090	-1.446	**rpmardan(-1)*d**	-0.034	-0.338	0.136	0.713
rpmianwali(-1)	-0.198	-2.305	**rpmianwali(-1)*d**	-0.061	-0.496	0.492	0.484
rpmirpurkhas(-1)	-0.102	-1.426	**rpmirpurkhas(-1)*d**	-0.045	-0.607	0.174	0.677
rpmultan(-1)	-0.336	-3.595	**rpmultan(-1)*d**	0.035	0.403	4.973	**0.028**
rpnawabshah(-1)	0.010	0.181	**rpnawabshah(-1)*d**	-0.055	-0.803	0.291	0.591
rppeshawar(-1)	-0.242	-2.956	**rppeshawar(-1)*d**	0.035	0.372	2.908	0.091
rpquetta(-1)	-0.737	-0.242	**rpquetta(-1)*d**	-0.271	-0.089	0.006	0.939
rprawalpindi(-1)	-0.115	-1.837	**rprawalpindi(-1)*d**	-0.046	-0.547	0.271	0.604
rpsargodha(-1)	-0.124	-2.090	**rpsargodha(-1)*d**	-0.106	-1.211	0.019	0.890
rpsialkot(-1)	-0.289	-2.837	**rpsialkot(-1)*d**	0.126	1.272	4.611	**0.034**
rpsukkur(-1)	-0.126	-1.793	**rpsukkur(-1)*d**	-0.027	-0.391	0.598	0.441
rpturbat(-1)	-0.331	-3.497	**rpturbat(-1)*d**	0.033	0.231	2.778	0.098
rpvehari(-1)	-0.078	-1.448	**rpvehari(-1)*d**	-0.016	-0.206	0.265	0.608

Table: 4.6 Reports the results of regression (2) with D.I.Khan as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.141	-1.528	**rpattock(-1)*d**	-0.170	-1.519	0.024	0.878
rpabotabad(-1)	-0.122	-1.663	**rpabotabad(-1)*d**	-0.177	-2.115	0.152	0.697
rpbawalnagar(-1)	-0.224	-1.942	**rpbawalnagar(-1)*d**	0.007	0.059	1.042	0.309
rpbahawalpur(-1)	-0.199	-1.845	**rpbahawalpur(-1)*d**	-0.040	-0.328	0.521	0.472
rpbannu(-1)	-0.365	-2.298	**rpbannu(-1)*d**	0.002	0.010	1.272	0.262
rpdgkhan(-1)	-0.351	-2.903	**rpdgkhan(-1)*d**	-0.063	-0.433	1.299	0.257
rpfaisalabad(-1)	-0.268	-2.562	**rpfaisalabad(-1)*d**	0.017	0.168	2.169	0.143
rpgujranwala(-1)	-0.199	-1.474	**rpgujranwala(-1)*d**	0.031	0.210	0.683	0.410
rphyderabad(-1)	-0.114	-2.118	**rphyderabad(-1)*d**	-0.165	-2.749	0.294	0.589
rpislamabad(-1)	-0.046	-0.533	**rpislamabad(-1)*d**	-0.025	-0.269	0.014	0.906
rpjhelum(-1)	-0.191	-1.455	**rpjhelum(-1)*d**	-0.225	-1.458	0.015	0.903
rpjhang(-1)	-0.268	-2.189	**rpjhang(-1)*d**	-0.024	-0.174	0.967	0.327
rpkarachi(-1)	-0.286	-2.777	**rpkarachi(-1)*d**	0.035	0.386	3.052	0.083
rpkhuzdar(-1)	0.084	0.718	**rpkhuzdar(-1)*d**	-0.630	-3.540	6.283	**0.014**
rplahore(-1)	-0.271	-2.414	**rplahore(-1)*d**	0.056	0.559	2.571	0.112
rplarkana(-1)	-0.162	-1.469	**rplarkana(-1)*d**	-0.184	-1.280	0.008	0.929
rploralai(-1)	-0.410	-3.051	**rploralai(-1)*d**	-0.074	-0.571	1.786	0.184
rpmardan(-1)	0.011	0.103	**rpmardan(-1)*d**	-0.246	-1.765	1.175	0.281
rpmianwali(-1)	-0.063	-0.476	**rpmianwali(-1)*d**	-0.292	-1.703	0.606	0.438
rpmirpurkhas(-1)	-0.059	-0.869	**rpmirpurkhas(-1)*d**	-0.265	-2.880	1.993	0.161
rpmultan(-1)	-0.258	-2.496	**rpmultan(-1)*d**	-0.130	-1.156	0.403	0.527
rpnawabshah(-1)	0.041	0.758	**rpnawabshah(-1)*d**	-0.114	-1.575	1.605	0.208
rppeshawar(-1)	-0.203	-1.534	**rppeshawar(-1)*d**	-0.220	-1.398	0.003	0.953
rpquetta(-1)	-1.502	-0.368	**rpquetta(-1)*d**	0.492	0.121	0.060	0.807
rprawalpindi(-1)	-0.095	-1.017	**rprawalpindi(-1)*d**	-0.215	-1.846	0.368	0.545
rpsargodha(-1)	-0.318	-3.248	**rpsargodha(-1)*d**	-0.100	-0.993	1.433	0.234
rpsialkot(-1)	-0.246	-2.229	**rpsialkot(-1)*d**	0.024	0.212	1.590	0.210
rpsukkur(-1)	-0.104	-1.540	**rpsukkur(-1)*d**	-0.234	-2.861	0.963	0.328
rpturbat(-1)	-0.245	-1.765	**rpturbat(-1)*d**	-0.180	-1.038	0.047	0.829
rpvehari(-1)	-0.080	-0.872	**rpvehari(-1)*d**	-0.056	-0.545	0.017	0.897

Table: 4.7 Reports the results of regression (2) with Faisalabad as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.094	-1.246	**rpattock(-1)*d**	-0.031	-0.364	0.171	0.68
rpabotabad(-1)	-0.076	-1.255	**rpabotabad(-1)*d**	0.046	0.601	0.86	0.356
rpbawalnagar(-1)	-0.113	-1.608	**rpbawalnagar(-1)*d**	0.016	0.265	1.079	0.301
rpbahawalpur(-1)	-0.064	-1.321	**rpbahawalpur(-1)*d**	-0.007	-0.156	0.445	0.506
rpbannu(-1)	-0.275	-3.001	**rpbannu(-1)*d**	0.085	1.032	4.771	**0.031**
rpdgkhan(-1)	-0.228	-2.674	**rpdgkhan(-1)*d**	0.095	1.115	3.994	**0.048**
rpdikhan(-1)	-0.268	-2.562	**rpdikhan(-1)*d**	0.017	0.168	2.169	0.143
rpgujranwala(-1)	-0.127	-1.328	**rpgujranwala(-1)*d**	0.019	0.211	0.646	0.423
rphyderabad(-1)	-0.029	-0.735	**rphyderabad(-1)*d**	-0.132	-1.991	1.216	0.272
rpislamabad(-1)	0.013	0.219	**rpislamabad(-1)*d**	-0.085	-1.277	0.657	0.419
rpjhelum(-1)	-0.224	-2.126	**rpjhelum(-1)*d**	-0.031	-0.322	1.018	0.315
rpjhang(-1)	-0.298	-2.733	**rpjhang(-1)*d**	0.089	1.025	4.19	**0.043**
rpkarachi(-1)	-0.23	-2.026	**rpkarachi(-1)*d**	-0.269	-1.901	0.026	0.871
rpkhuzdar(-1)	-0.539	-3.359	**rpkhuzdar(-1)*d**	0.419	2.644	9.22	**0.003**
rplahore(-1)	-0.177	-1.663	**rplahore(-1)*d**	-0.224	-1.842	0.049	0.826
rplarkana(-1)	-0.134	-2.486	**rplarkana(-1)*d**	-0.083	-1.03	0.204	0.652
rploralai(-1)	-0.336	-3.565	**rploralai(-1)*d**	0.07	0.994	6.955	**0.009**
rpmardan(-1)	-0.159	-1.572	**rpmardan(-1)*d**	0.084	0.887	1.596	0.209
rpmianwali(-1)	-0.336	-2.885	**rpmianwali(-1)*d**	0.217	2.001	6.261	**0.014**
rpmirpurkhas(-1)	-0.05	-0.955	**rpmirpurkhas(-1)*d**	0.048	0.686	0.702	0.404
rpmultan(-1)	-0.122	-1.026	**rpmultan(-1)*d**	-0.054	-0.404	0.076	0.783
rpnawabshah(-1)	-0.009	-0.203	**rpnawabshah(-1)*d**	0.015	0.268	0.059	0.809
rppeshawar(-1)	-0.288	-2.851	**rppeshawar(-1)*d**	0.078	0.82	3.804	**0.053**
rpquetta(-1)	-2.838	-1.11	**rpquetta(-1)*d**	1.821	0.714	0.832	0.363
rprawalpindi(-1)	-0.038	-0.667	**rprawalpindi(-1)*d**	-0.062	-1.031	0.046	0.831
rpsargodha(-1)	-0.132	-2.103	**rpsargodha(-1)*d**	0.013	0.281	2.005	0.159
rpsialkot(-1)	-0.124	-1.27	**rpsialkot(-1)*d**	-0.264	-1.967	0.411	0.523
rpsukkur(-1)	-0.06	-0.929	**rpsukkur(-1)*d**	0.027	0.336	0.386	0.535
rpturbat(-1)	-0.485	-4.269	**rpturbat(-1)*d**	0.286	2.958	14.195	**0**
rpvehari(-1)	-0.038	-0.713	**rpvehari(-1)*d**	-0.041239	-0.79962	0.000764	0.978002

Table: 4.8 Reports the results of regression (2) with Gujranwala as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.274	-2.743	**rpattock(-1)*d**	0.129	1.232	4.161	**0.044**
rpabotabad(-1)	-0.034	-0.534	**rpabotabad(-1)*d**	-0.029	-0.435	0.001	0.970
rpbawalnagar(-1)	-0.171	-2.379	**rpbawalnagar(-1)*d**	0.026	0.327	1.990	0.161
rpbahawalpur(-1)	-0.099	-1.669	**rpbahawalpur(-1)*d**	0.020	0.248	0.807	0.371
rpbannu(-1)	-0.171	-2.157	**rpbannu(-1)*d**	0.008	0.075	1.119	0.292
rpdgkhan(-1)	-0.283	-2.455	**rpdgkhan(-1)*d**	0.147	1.148	3.292	0.072
rpdikhan(-1)	-0.199	-1.474	**rpdikhan(-1)*d**	0.031	0.210	0.683	0.410
rpfaisalabad(-1)	-0.127	-1.328	**rpfaisalabad(-1)*d**	0.019	0.211	0.646	0.423
rphyderabad(-1)	-0.022	-0.503	**rphyderabad(-1)*d**	-0.063	-1.336	0.248	0.619
rpislamabad(-1)	-0.161	-1.774	**rpislamabad(-1)*d**	0.111	1.056	2.012	0.159
rpjhelum(-1)	-0.287	-2.043	**rpjhelum(-1)*d**	0.046	0.288	1.285	0.259
rpjhang(-1)	-0.316	-2.414	**rpjhang(-1)*d**	0.095	0.700	2.517	0.115
rpkarachi(-1)	-0.143	-1.576	**rpkarachi(-1)*d**	-0.011	-0.123	0.576	0.450
rpkhuzdar(-1)	-0.255	-2.221	**rpkhuzdar(-1)*d**	0.146	1.127	2.817	0.096
rplahore(-1)	-0.175	-1.799	**rplahore(-1)*d**	0.039	0.449	1.435	0.233
rplarkana(-1)	-0.065	-1.015	**rplarkana(-1)*d**	-0.044	-0.474	0.021	0.886
rploralai(-1)	-0.258	-2.705	**rploralai(-1)*d**	0.051	0.517	2.818	0.096
rpmardan(-1)	-0.375	-2.714	**rpmardan(-1)*d**	0.316	2.173	6.062	**0.015**
rpmianwali(-1)	-0.247	-2.373	**rpmianwali(-1)*d**	0.160	1.370	3.557	0.062
rpmirpurkhas(-1)	-0.013	-0.233	**rpmirpurkhas(-1)*d**	-0.054	-0.831	0.120	0.730
rpmultan(-1)	-0.184	-2.009	**rpmultan(-1)*d**	0.028	0.299	1.442	0.232
rpnawabshah(-1)	0.023	0.517	**rpnawabshah(-1)*d**	-0.045	-0.861	0.522	0.471
rppeshawar(-1)	-0.247	-2.070	**rppeshawar(-1)*d**	0.134	1.059	2.490	0.117
rpquetta(-1)	-1.819	-0.568	**rpquetta(-1)*d**	0.816	0.255	0.170	0.681
rprawalpindi(-1)	-0.254	-2.397	**rprawalpindi(-1)*d**	0.118	0.966	2.825	0.095
rpsargodha(-1)	-0.133	-1.834	**rpsargodha(-1)*d**	0.038	0.525	1.531	0.218
rpsialkot(-1)	-0.116	-1.280	**rpsialkot(-1)*d**	0.028	0.296	0.628	0.430
rpsukkur(-1)	-0.006	-0.104	**rpsukkur(-1)*d**	-0.057	-0.949	0.210	0.647
rpturbat(-1)	-0.481	-3.579	**rpturbat(-1)*d**	0.339	2.366	9.085	**0.003**
rpvehari(-1)	-0.113	-1.739	**rpvehari(-1)*d**	-0.152	-1.647	0.076	0.784

Table: 4.9 Reports the results of regression (2) with Hyderabad as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.021	-0.569	**rpattock(-1)*d**	-0.089	-1.901	0.850	0.358
rpabotabad(-1)	-0.135	-2.224	**rpabotabad(-1)*d**	-0.169	-2.147	0.078	0.781
rpbawalnagar(-1)	-0.035	-0.922	**rpbawalnagar(-1)*d**	-0.052	-1.312	0.058	0.810
rpbahawalpur(-1)	-0.017	-0.594	**rpbahawalpur(-1)*d**	-0.064	-1.943	0.751	0.388
rpbannu(-1)	-0.125	-2.100	**rpbannu(-1)*d**	-0.042	-0.789	0.688	0.408
rpdgkhan(-1)	-0.038	-1.028	**rpdgkhan(-1)*d**	-0.074	-1.585	0.255	0.615
rpdikhan(-1)	-0.114	-2.118	**rpdikhan(-1)*d**	-0.165	-2.749	0.294	0.589
rpfaisalabad(-1)	-0.029	-0.735	**rpfaisalabad(-1)*d**	-0.132	-1.991	1.216	0.272
rpgujranwala(-1)	-0.022	-0.503	**rpgujranwala(-1)*d**	-0.063	-1.336	0.248	0.619
rpislamabad(-1)	0.025	0.881	**rpislamabad(-1)*d**	-0.077	-2.083	2.808	0.096
rpjhelum(-1)	-0.042	-0.974	**rpjhelum(-1)*d**	-0.111	-2.157	0.705	0.403
rpjhang(-1)	-0.069	-1.516	**rpjhang(-1)*d**	-0.071	-1.492	0.000	0.983
rpkarachi(-1)	0.019	0.338	**rpkarachi(-1)*d**	-0.180	-2.229	2.367	0.127
rpkhuzdar(-1)	-0.094	-1.714	**rpkhuzdar(-1)*d**	-0.044	-0.796	0.243	0.623
rplahore(-1)	-0.005	-0.081	**rplahore(-1)*d**	-0.128	-1.585	0.875	0.352
rplarkana(-1)	-0.057	-1.689	**rplarkana(-1)*d**	-0.094	-2.041	0.321	0.572
rploralai(-1)	-0.087	-1.911	**rploralai(-1)*d**	-0.087	-1.962	0.000	0.998
rpmardan(-1)	-0.046	-1.164	**rpmardan(-1)*d**	-0.051	-1.240	0.004	0.947
rpmianwali(-1)	-0.075	-1.415	**rpmianwali(-1)*d**	-0.072	-1.421	0.001	0.981
rpmirpurkhas(-1)	-0.178	-2.373	**rpmirpurkhas(-1)*d**	0.042	0.598	2.617	0.108
rpmultan(-1)	-0.010	-0.220	**rpmultan(-1)*d**	-0.127	-2.303	1.598	0.209
rpnawabshah(-1)	-0.311	-2.515	**rpnawabshah(-1)*d**	0.307	2.468	6.245	**0.014**
rppeshawar(-1)	-0.048	-1.245	**rppeshawar(-1)*d**	-0.113	-2.427	0.818	0.368
rpquetta(-1)	-1.154	-0.992	**rpquetta(-1)*d**	0.132	0.114	0.307	0.581
rprawalpindi(-1)	-0.005	-0.159	**rprawalpindi(-1)*d**	-0.090	-2.343	1.998	0.160
rpsargodha(-1)	-0.054	-1.533	**rpsargodha(-1)*d**	-0.069	-1.940	0.068	0.795
rpsialkot(-1)	-0.017	-0.431	**rpsialkot(-1)*d**	-0.109	-1.748	1.005	0.318
rpsukkur(-1)	-0.114	-1.908	**rpsukkur(-1)*d**	-0.059	-0.844	0.223	0.638
rpturbat(-1)	-0.081	-1.749	**rptarbat(-1)*d**	-0.053	-1.180	0.123	0.726
rpvehari(-1)	-0.008	-0.249	**rpvehari(-1)*d**	-0.063	-1.729	0.815	0.369

Table: 4.10 Reports the results of regression (2) with Islamabad as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.045	-0.646	**rpattock(-1)*d**	0.020	0.250	0.194	0.661
rpabotabad(-1)	0.031	0.713	**rpabotabad(-1)*d**	-0.062	-1.217	1.030	0.312
rpbawalnagar(-1)	-0.187	-2.721	**rpbawalnagar(-1)*d**	0.148	2.308	6.852	**0.010**
rpbahawalpur(-1)	-0.133	-2.464	**rpbahawalpur(-1)*d**	0.111	2.068	5.768	**0.018**
rpbannu(-1)	-0.075	-1.435	**rpbannu(-1)*d**	0.049	0.828	1.341	0.249
rpdgkhan(-1)	-0.117	-1.762	**rpdgkhan(-1)*d**	0.092	1.161	2.206	0.140
rpdikhan(-1)	-0.046	-0.533	**rpdikhan(-1)*d**	-0.025	-0.269	0.014	0.906
rpfaisalabad(-1)	0.013	0.219	**rpfaisalabad(-1)*d**	-0.085	-1.277	0.657	0.419
rpgujranwala(-1)	-0.161	-1.774	**rpgujranwala(-1)*d**	0.111	1.056	2.012	0.159
rphyderabad(-1)	0.025	0.881	**rphyderabad(-1)*d**	-0.077	-2.083	2.808	0.096
rpjhelum(-1)	-0.193	-1.706	**rpjhelum(-1)*d**	0.111	0.899	1.719	0.192
rpjhang(-1)	-0.193	-2.115	**rpjhang(-1)*d**	0.145	1.589	3.562	0.062
rpkarachi(-1)	0.006	0.126	**rpkarachi(-1)*d**	-0.107	-1.848	1.291	0.258
rpkhuzdar(-1)	-0.037	-0.520	**rpkhuzdar(-1)*d**	0.015	0.182	0.119	0.731
rplahore(-1)	-0.008	-0.117	**rplahore(-1)*d**	-0.132	-1.845	0.919	0.340
rplarkana(-1)	-0.064	-1.403	**rplarkana(-1)*d**	0.032	0.519	0.931	0.337
rploralai(-1)	-0.164	-2.045	**rploralai(-1)*d**	0.110	1.479	3.299	0.072
rpmardan(-1)	-0.093	-1.008	**rpmardan(-1)*d**	0.088	0.894	0.913	0.341
rpmianwali(-1)	-0.094	-1.332	**rpmianwali(-1)*d**	0.076	0.953	1.320	0.253
rpmirpurkhas(-1)	0.037	0.960	**rpmirpurkhas(-1)*d**	-0.063	-1.344	1.471	0.228
rpmultan(-1)	-0.030	-0.529	**rpmultan(-1)*d**	-0.021	-0.296	0.006	0.940
rpnawabshah(-1)	0.042	1.278	**rpnawabshah(-1)*d**	-0.053	-1.333	1.790	0.183
rppeshawar(-1)	-0.030	-0.478	**rppeshawar(-1)*d**	0.002	0.034	0.061	0.805
rpquetta(-1)	-1.136	-0.428	**rpquetta(-1)*d**	0.133	0.050	0.057	0.812
rprawalpindi(-1)	-0.074	-0.893	**rprawalpindi(-1)*d**	0.071	0.819	0.743	0.391
rpsargodha(-1)	-0.167	-2.843	**rpsargodha(-1)*d**	0.142	2.608	7.789	**0.006**
rpsialkot(-1)	-0.007	-0.120	**rpsialkot(-1)*d**	-0.057	-0.890	0.189	0.664
rpsukkur(-1)	0.045	1.263	**rpsukkur(-1)*d**	-0.076	-1.785	2.584	0.111
rpturbat(-1)	-0.192	-2.160	**rpturbat(-1)*d**	0.166	1.765	3.930	**0.050**
rpvehari(-1)	-0.155	-2.551	**rpvehari(-1)*d**	0.090	1.481	4.531	**0.035**

Table: 4.11 Reports the results of regression (2) with Karachi as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.121	-1.429	**rpattock(-1)*d**	-0.092	-0.958	0.029	0.865
rpabotabad(-1)	-0.108	-0.798	**rpabotabad(-1)*d**	0.000	0.001	0.143	0.706
rpbawalnagar(-1)	-0.140	-1.954	**rpbawalnagar(-1)*d**	0.010	0.154	1.405	0.238
rpbahawalpur(-1)	-1	-3.16E+15	**rpbahawalpur(-1)*d**	1	3.15E+15	1.07E+31	**0**
rpbannu(-1)	-0.445	-3.843	**rpbannu(-1)*d**	0.208	2.201	10.276	**0.002**
rpdgkhan(-1)	-0.203	-2.399	**rpdgkhan(-1)*d**	0.000	-0.001	1.570	0.213
rpdikhan(-1)	-0.286	-2.777	**rpdikhan(-1)*d**	0.035	0.386	3.052	0.083
rpfaisalabad(-1)	-0.230	-2.026	**rpfaisalabad(-1)*d**	-0.269	-1.901	0.026	0.871
rpgujranwala(-1)	-0.143	-1.576	**rpgujranwala(-1)*d**	-0.011	-0.123	0.576	0.450
rphyderabad(-1)	0.019	0.338	**rphyderabad(-1)*d**	-0.180	-2.229	2.367	0.127
rpislamabad(-1)	0.006	0.126	**rpislamabad(-1)*d**	-0.107	-1.848	1.291	0.258
rpjhelum(-1)	-0.230	-2.402	**rpjhelum(-1)*d**	-0.050	-0.554	1.059	0.305
rpjhang(-1)	-0.239	-2.637	**rpjhang(-1)*d**	0.051	0.654	3.269	0.073
rpkhuzdar(-1)	-0.224	-1.972	**rpkhuzdar(-1)*d**	0.127	1.117	2.471	0.119
rplahore(-1)	-0.174	-1.396	**rplahore(-1)*d**	-0.404	-2.608	0.748	0.389
rplarkana(-1)	-0.272	-3.848	**rplarkana(-1)*d**	-0.089	-1.230	2.373	0.126
rploralai(-1)	-0.207	-2.710	**rploralai(-1)*d**	0.028	0.475	3.505	0.064
rpmardan(-1)	-0.092	-1.240	**rpmardan(-1)*d**	0.022	0.297	0.635	0.427
rpmianwali(-1)	-0.286	-2.251	**rpmianwali(-1)*d**	0.136	1.129	3.017	0.085
rpmirpurkhas(-1)	-0.048	-0.386	**rpmirpurkhas(-1)*d**	-0.015	-0.103	0.016	0.901
rpmultan(-1)	-0.142	-1.016	**rpmultan(-1)*d**	-0.089	-0.592	0.034	0.854
rpnawabshah(-1)	0.033	0.399	**rpnawabshah(-1)*d**	-0.046	-0.492	0.204	0.652
rppeshawar(-1)	-0.208	-2.145	**rppeshawar(-1)*d**	0.008	0.087	1.393	0.240
rpquetta(-1)	-2.305	-1.092	**rpquetta(-1)*d**	1.285	0.610	0.725	0.396
rprawalpindi(-1)	-0.072	-1.118	**rprawalpindi(-1)*d**	-0.088	-1.286	0.016	0.901
rpsargodha(-1)	-0.137	-2.254	**rpsargodha(-1)*d**	0.012	0.240	2.128	0.147
rpsialkot(-1)	-0.386	-3.337	**rpsialkot(-1)*d**	-0.159	-1.257	1.023	0.314
rpsukkur(-1)	0.019	0.138	**rpsukkur(-1)*d**	-0.095	-0.596	0.148	0.701
rpturbat(-1)	-0.249	-2.682	**rpturbat(-1)*d**	0.105	1.277	4.379	**0.039**
rpvehari(-1)	-0.075	-1.303	**rpvehari(-1)*d**	-0.044	-0.761	0.088	0.768

Table: 4.12 Reports the results of regression (2) with Lahore as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.227	-1.968	**rpattock(-1)*d**	0.056	0.521	1.709	0.194
rpabotabad(-1)	-0.171	-1.144	**rpabotabad(-1)*d**	0.098	0.613	0.771	0.382
rpbawalnagar(-1)	-0.144	-1.920	**rpbawalnagar(-1)*d**	0.022	0.353	1.614	0.206
rpbahawalpur(-1)	-0.107	-1.765	**rpbahawalpur(-1)*d**	-0.006	-0.112	0.965	0.328
rpbannu(-1)	-0.315	-2.994	**rpbannu(-1)*d**	0.133	1.523	5.799	**0.018**
rpdgkhan(-1)	-0.159	-2.061	**rpdgkhan(-1)*d**	0.032	0.429	1.766	0.186
rpdikhan(-1)	-0.271	-2.414	**rpdikhan(-1)*d**	0.056	0.559	2.571	0.112
rpfaisalabad(-1)	-0.177	-1.663	**rpfaisalabad(-1)*d**	-0.224	-1.842	0.049	0.826
rpgujranwala(-1)	-0.175	-1.799	**rpgujranwala(-1)*d**	0.039	0.449	1.435	0.233
rphyderabad(-1)	-0.005	-0.081	**rphyderabad(-1)*d**	-0.128	-1.585	0.875	0.352
rpislamabad(-1)	-0.008	-0.117	**rpislamabad(-1)*d**	-0.132	-1.845	0.919	0.340
rpjhelum(-1)	-0.202	-2.467	**rpjhelum(-1)*d**	0.071	1.081	3.781	**0.054**
rpjhang(-1)	-0.195	-2.180	**rpjhang(-1)*d**	0.048	0.655	2.420	0.122
rpkarachi(-1)	-0.174	-1.396	**rpkarachi(-1)*d**	-0.404	-2.608	0.748	0.389
rpkhuzdar(-1)	-0.293	-2.304	**rpkhuzdar(-1)*d**	0.182	1.481	3.726	0.056
rplarkana(-1)	-0.179	-2.806	**rplarkana(-1)*d**	-0.069	-0.969	0.927	0.338
rploralai(-1)	-0.254	-2.852	**rploralai(-1)*d**	0.049	0.723	4.202	**0.043**
rpmardan(-1)	-0.125	-1.359	**rpmardan(-1)*d**	0.052	0.607	1.038	0.310
rpmianwali(-1)	-0.510	-3.203	**rpmianwali(-1)*d**	0.335	2.377	8.106	**0.005**
rpmirpurkhas(-1)	-0.064	-0.612	**rpmirpurkhas(-1)*d**	0.027	0.228	0.173	0.678
rpmultan(-1)	-0.251	-1.512	**rpmultan(-1)*d**	0.076	0.465	1.013	0.316
rpnawabshah(-1)	-0.010	-0.140	**rpnawabshah(-1)*d**	0.005	0.067	0.011	0.919
rppeshawar(-1)	-0.284	-2.525	**rppeshawar(-1)*d**	0.101	1.020	3.511	0.063
rpquetta(-1)	-2.330	-1.180	**rpquetta(-1)*d**	1.299	0.661	0.849	0.359
rprawalpindi(-1)	-0.146	-1.549	**rprawalpindi(-1)*d**	-0.018	-0.215	0.578	0.449
rpsargodha(-1)	-0.121	-1.920	**rpsargodha(-1)*d**	0.019	0.382	1.763	0.187
rpsialkot(-1)	-0.310	-2.611	**rpsialkot(-1)*d**	-0.072	-0.603	1.112	0.294
rpsukkur(-1)	-0.063	-0.715	**rpsukkur(-1)*d**	0.028	0.279	0.243	0.623
rpturbat(-1)	-0.409	-3.288	**rpturbat(-1)*d**	0.222	2.126	7.934	**0.006**
rpvehari(-1)	-0.077	-1.297	**rpvehari(-1)*d**	-0.036	-0.647	0.149	0.700

Table: 4.13 Reports the results of regression (2) with Larkana as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.066	-1.469	**rpattock(-1)*d**	-0.101	-0.978	0.068	0.795
rpabotabad(-1)	-0.058	-1.283	**rpabotabad(-1)*d**	-0.041	-0.623	0.031	0.862
rpbawalnagar(-1)	-0.104	-1.551	**rpbawalnagar(-1)*d**	0.014	0.183	0.746	0.389
rpbahawalpur(-1)	-0.107	-1.676	**rpbahawalpur(-1)*d**	0.008	0.101	0.766	0.383
rpbannu(-1)	-0.238	-2.37	**rpbannu(-1)*d**	0.095	0.741	2.28	0.134
rpdgkhan(-1)	-0.116	-1.843	**rpdgkhan(-1)*d**	-0.068	-0.627	0.093	0.761
rpdikhan(-1)	-0.162	-1.469	**rpdikhan(-1)*d**	-0.184	-1.28	0.008	0.929
rpfaisalabad(-1)	-0.134	-2.486	**rpfaisalabad(-1)*d**	-0.083	-1.03	0.204	0.652
rpgujranwala(-1)	-0.065	-1.015	**rpgujranwala(-1)*d**	-0.044	-0.474	0.021	0.886
rphyderabad(-1)	-0.057	-1.689	**rphyderabad(-1)*d**	-0.094	-2.041	0.321	0.572
rpislamabad(-1)	-0.064	-1.403	**rpislamabad(-1)*d**	0.032	0.519	0.931	0.337
rpjhelum(-1)	-0.078	-1.195	**rpjhelum(-1)*d**	-0.297	-2.465	1.676	0.198
rpjhang(-1)	-0.125	-1.497	**rpjhang(-1)*d**	-0.037	-0.36	0.241	0.625
rpkarachi(-1)	-0.272	-3.848	**rpkarachi(-1)*d**	-0.089	-1.23	2.373	0.126
rpkhuzdar(-1)	-0.102	-1.364	**rpkhuzdar(-1)*d**	0.01	0.082	0.362	0.549
rplahore(-1)	-0.179	-2.806	**rplahore(-1)*d**	-0.069	-0.969	0.927	0.338
rploralai(-1)	-0.198	-2.322	**rploralai(-1)*d**	-0.025	-0.263	1.043	0.309
rpmardan(-1)	-0.081	-1.285	**rpmardan(-1)*d**	0.021	0.226	0.469	0.495
rpmianwali(-1)	-0.05	-0.769	**rpmianwali(-1)*d**	-0.050804	-0.5	4.21E-06	0.998367
rpmirpurkhas(-1)	-0.028	-0.668	**rpmirpurkhas(-1)*d**	-0.051	-0.799	0.054	0.817
rpmultan(-1)	-0.073	-1.528	**rpmultan(-1)*d**	-0.069	-0.827	0.001	0.97
rpnawabshah(-1)	0.027	0.814	**rpnawabshah(-1)*d**	-0.049	-1.092	0.992	0.321
rppeshawar(-1)	-0.086	-1.42	**rppeshawar(-1)*d**	-0.088	-0.721	0	0.99
rpquetta(-1)	-0.128	-0.048	**rpquetta(-1)*d**	-0.884	-0.335	0.021	0.886
rprawalpindi(-1)	-0.068	-1.529	**rprawalpindi(-1)*d**	-0.04	-0.465	0.057	0.811
rpsargodha(-1)	-0.13	-1.917	**rpsargodha(-1)*d**	0.025	0.325	1.29	0.258
rpsialkot(-1)	-0.143	-2.473	**rpsialkot(-1)*d**	0.021	0.261	1.864	0.175
rpsukkur(-1)	-0.024	-0.607	**rpsukkur(-1)*d**	-0.08	-1.409	0.415	0.521
rpturbat(-1)	-0.181	-2.403	**rpturbat(-1)*d**	0.108	0.964	2.618	0.108
rpvehari(-1)	-0.043	-0.84	**rpvehari(-1)*d**	-0.027	-0.408	0.022	0.883

Table: 4.14 Reports the results of regression (2) with Loralai as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.287	-3.526	**rpattock(-1)*d**	-0.026	-0.336	3.476	0.065
rpabotabad(-1)	-0.113	-1.903	**rpabotabad(-1)*d**	-0.069	-1.176	0.178	0.674
rpbawalnagar(-1)	-0.497	-3.354	**rpbawalnagar(-1)*d**	0.332	2.084	7.543	**0.007**
rpbahawalpur(-1)	-0.667	-3.837	**rpbahawalpur(-1)*d**	0.484	2.614	10.579	**0.001**
rpbannu(-1)	-0.180	-2.426	**rpbannu(-1)*d**	-0.199	-1.891	0.014	0.907
rpdgkhan(-1)	-0.481	-4.640	**rpdgkhan(-1)*d**	0.073	0.781	9.280	**0.003**
rpdikhan(-1)	-0.410	-3.051	**rpdikhan(-1)*d**	-0.074	-0.571	1.786	0.184
rpfaisalabad(-1)	-0.336	-3.565	**rpfaisalabad(-1)*d**	0.070	0.994	6.955	**0.009**
rpgujranwala(-1)	-0.258	-2.705	**rpgujranwala(-1)*d**	0.051	0.517	2.818	0.096
rphyderabad(-1)	-0.087	-1.911	**rphyderabad(-1)*d**	-0.087	-1.962	3.96E-06	0.998
rpislamabad(-1)	-0.164	-2.045	**rpislamabad(-1)*d**	0.110	1.479	3.299	0.072
rpjhelum(-1)	-0.475	-4.120	**rpjhelum(-1)*d**	0.043	0.384	5.957	**0.016**
rpjhang(-1)	-0.493	-3.136	**rpjhang(-1)*d**	0.081	0.478	3.290	0.072
rpkarachi(-1)	-0.207	-2.710	**rpkarachi(-1)*d**	0.028	0.475	3.505	0.064
rpkhuzdar(-1)	-0.118	-1.778	**rpkhuzdar(-1)*d**	-0.262	-2.558	0.933	0.336
rplahore(-1)	-0.254	-2.852	**rplahore(-1)*d**	0.049	0.723	4.202	**0.043**
rplarkana(-1)	-0.198	-2.322	**rplarkana(-1)*d**	-0.025	-0.263	1.043	0.309
rpmardan(-1)	-0.085	-0.965	**rpmardan(-1)*d**	-0.205	-1.579	0.340	0.561
rpmianwali(-1)	-0.160	-2.142	**rpmianwali(-1)*d**	-0.165	-1.649	0.001	0.972
rpmirpurkhas(-1)	-0.073	-1.370	**rpmirpurkhas(-1)*d**	-0.131	-2.161	0.343	0.559
rpmultan(-1)	-0.252	-3.285	**rpmultan(-1)*d**	-0.018	-0.269	3.308	0.071
rpnawabshah(-1)	0.025	0.625	**rpnawabshah(-1)*d**	-0.100	-1.835	1.958	0.164
rppeshawar(-1)	-0.303	-3.484	**rppeshawar(-1)*d**	-0.020	-0.243	3.491	0.064
rpquetta(-1)	1.459	0.321	**rpquetta(-1)*d**	-2.475	-0.544	0.187	0.666
rprawalpindi(-1)	-0.252	-2.914	**rprawalpindi(-1)*d**	0.009	0.114	2.768	0.099
rpsargodha(-1)	-0.542	-3.816	**rpsargodha(-1)*d**	0.241	1.474	7.021	**0.009**
rpsialkot(-1)	-0.273	-2.868	**rpsialkot(-1)*d**	0.075	0.938	4.368	**0.039**
rpsukkur(-1)	-0.095	-1.784	**rpsukkur(-1)*d**	-0.102	-1.935	0.006	0.936
rpturbat(-1)	-0.228	-2.413	**rpturbat(-1)*d**	-0.130	-1.052	0.232	0.631
rpvehari(-1)	-0.264	-2.324	**rpvehari(-1)*d**	0.144	1.190	3.174	0.077

Table: 4.15 Reports the results of regression (2) with Multan as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.250	-2.838	**rpattock(-1)*d**	-0.047	-0.408	1.160	0.284
rpabotabad(-1)	-0.055	-0.653	**rpabotabad(-1)*d**	-0.030	-0.329	0.020	0.887
rpbawalnagar(-1)	-0.138	-2.264	**rpbawalnagar(-1)*d**	-0.020	-0.355	1.249	0.266
rpbahawalpur(-1)	-0.090	-2.038	**rpbahawalpur(-1)*d**	-0.053	-1.008	0.210	0.648
rpbannu(-1)	-0.336	-3.595	**rpbannu(-1)*d**	0.035	0.403	4.973	**0.028**
rpdgkhan(-1)	-0.196	-2.829	**rpdgkhan(-1)*d**	-0.213	-2.037	0.012	0.912
rpdikhan(-1)	-0.258	-2.496	**rpdikhan(-1)*d**	-0.130	-1.156	0.403	0.527
rpfaisalabad(-1)	-0.122	-1.026	**rpfaisalabad(-1)*d**	-0.054	-0.404	0.076	0.783
rpgujranwala(-1)	-0.184	-2.009	**rpgujranwala(-1)*d**	0.028	0.299	1.442	0.232
rphyderabad(-1)	-0.010	-0.220	**rphyderabad(-1)*d**	-0.127	-2.303	1.598	0.209
rpislamabad(-1)	-0.030	0.056	**rpislamabad(-1)*d**	-0.021	0.070	0.006	0.940
rpjhelum(-1)	-0.305	-3.202	**rpjhelum(-1)*d**	-0.194	-1.778	0.357	0.551
rpjhang(-1)	-0.352	-3.991	**rpjhang(-1)*d**	-0.054	-0.685	4.092	**0.045**
rpkarachi(-1)	-0.142	-1.016	**rpkarachi(-1)*d**	-0.089	-0.592	0.034	0.854
rpkhuzdar(-1)	-0.411	-3.349	**rpkhuzdar(-1)*d**	0.259	2.039	7.571	**0.007**
rplahore(-1)	-0.251	-1.512	**rplahore(-1)*d**	0.076	0.465	1.013	0.316
rplarkana(-1)	-0.073	-1.528	**rplarkana(-1)*d**	-0.069	-0.827	0.001	0.970
rploralai(-1)	-0.252	-3.285	**rploralai(-1)*d**	-0.018	-0.269	3.308	0.071
rpmardan(-1)	-0.216	-2.403	**rpmardan(-1)*d**	0.100	1.152	3.441	0.066
rpmianwali(-1)	-0.535	-4.345	**rpmianwali(-1)*d**	0.302	2.652	13.237	**0.000**
rpmirpurkhas(-1)	0.006	0.086	**rpmirpurkhas(-1)*d**	-0.104	-1.161	0.479	0.490
rpnawabshah(-1)	0.056	1.150	**rpnawabshah(-1)*d**	-0.073	-1.289	1.550	0.216
rppeshawar(-1)	-0.287	-2.675	**rppeshawar(-1)*d**	0.021	0.189	2.158	0.144
rpquetta(-1)	-2.202	-0.932	**rpquetta(-1)*d**	1.191	0.505	0.517	0.474
rprawalpindi(-1)	-0.145	-2.358	**rprawalpindi(-1)*d**	-0.198	-2.172	0.167	0.684
rpsargodha(-1)	-0.173	-3.096	**rpsargodha(-1)*d**	-0.028	-0.618	2.903	0.091
rpsialkot(-1)	-0.130	-1.285	**rpsialkot(-1)*d**	0.016	0.121	0.412	0.522
rpsukkur(-1)	0.050	0.771	**rpsukkur(-1)*d**	-0.126	-1.754	1.775	0.185
rpturbat(-1)	-0.469	-4.443	**rpturbat(-1)*d**	0.236	2.487	13.499	**0.000**
rpvehari(-1)	-0.071	-1.430	**rpvehari(-1)*d**	-0.047	-0.839	0.064	0.800

Table: 4.16 Reports the results of regression (2) with Nawabshah as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	0.009	0.218	**rpattock(-1)*d**	-0.021	-0.432	0.118	0.731
rpabotabad(-1)	-0.069	-1.000	**rpabotabad(-1)*d**	0.059	0.709	0.732	0.394
rpbawalnagar(-1)	0.031	0.869	**rpbawalnagar(-1)*d**	-0.076	-1.690	1.919	0.169
rpbahawalpur(-1)	0.045	1.589	**rpbahawalpur(-1)*d**	-0.079	-2.135	3.884	**0.051**
rpbannu(-1)	0.010	0.181	**rpbannu(-1)*d**	-0.055	-0.803	0.291	0.591
rpdgkhan(-1)	0.019	0.490	**rpdgkhan(-1)*d**	-0.040	-0.831	0.491	0.485
rpdikhan(-1)	0.041	0.758	**rpdikhan(-1)*d**	-0.114	-1.575	1.605	0.208
rpfaisalabad(-1)	-0.009	-0.203	**rpfaisalabad(-1)*d**	0.015	0.268	0.059	0.809
rpgujranwala(-1)	0.023	0.517	**rpgujranwala(-1)*d**	-0.045	-0.861	0.522	0.471
rphyderabad(-1)	-0.311	-2.515	**rphyderabad(-1)*d**	0.307	2.468	6.245	**0.014**
rpislamabad(-1)	0.042	1.278	**rpislamabad(-1)*d**	-0.053	-1.333	1.790	0.183
rpjhelum(-1)	0.033	0.703	**rpjhelum(-1)*d**	-0.075	-1.263	1.093	0.298
rpjhang(-1)	0.020	0.465	**rpjhang(-1)*d**	-0.079	-1.370	1.049	0.308
rpkarachi(-1)	0.033	0.399	**rpkarachi(-1)*d**	-0.046	-0.492	0.204	0.652
rpkhuzdar(-1)	-0.016	-0.290	**rpkhuzdar(-1)*d**	-0.043	-0.629	0.052	0.820
rplahore(-1)	-0.010	-0.140	**rplahore(-1)*d**	0.005	0.067	0.011	0.919
rplarkana(-1)	0.027	0.814	**rplarkana(-1)*d**	-0.049	-1.092	0.992	0.321
rploralai(-1)	0.025	0.625	**rploralai(-1)*d**	-0.100	-1.835	1.958	0.164
rpmardan(-1)	0.004	0.109	**rpmardan(-1)*d**	-0.078	-1.436	0.865	0.354
rpmianwali(-1)	0.028	0.570	**rpmianwali(-1)*d**	-0.072	-1.184	0.889	0.348
rpmirpurkhas(-1)	-0.102	-1.353	**rpmirpurkhas(-1)*d**	0.094	1.068	1.475	0.227
rpmultan(-1)	0.056	1.150	**rpmultan(-1)*d**	-0.073	-1.289	1.550	0.216
rppeshawar(-1)	0.018	0.412	**rppeshawar(-1)*d**	-0.034	-0.627	0.302	0.584
rpquetta(-1)	-0.500	-0.410	**rpquetta(-1)*d**	-0.513	-0.421	0.000	0.996
rprawalpindi(-1)	0.035	1.076	**rprawalpindi(-1)*d**	-0.056	-1.354	1.614	0.206
rpsargodha(-1)	0.025	0.801	**rpsargodha(-1)*d**	-0.083	-1.847	2.287	0.133
rpsialkot(-1)	-0.007	-0.147	**rpsialkot(-1)*d**	0.015	0.269	0.047	0.828
rpsukkur(-1)	-0.095	-1.314	**rpsukkur(-1)*d**	0.096	1.169	1.563	0.214
rpturbat(-1)	0.015	0.347	**rpturbat(-1)*d**	-0.059	-1.041	0.597	0.441
rpvehari(-1)	0.036	1.143	**rpvehari(-1)*d**	-0.062	-1.560	2.040	0.156

Table: 4.17 Reports the results of regression (2) with Peshawar as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.193	-2.149	**rpattock(-1)*d**	0.023	0.222	1.352	0.247
rpabotabad(-1)	-0.045	-0.822	**rpabotabad(-1)*d**	-0.052	-0.838	0.004	0.952
rpbawalnagar(-1)	-0.123	-1.798	**rpbawalnagar(-1)*d**	0.038	0.541	1.495	0.224
rpbahawalpur(-1)	-0.098	-1.680	**rpbahawalpur(-1)*d**	0.029	0.417	1.112	0.294
rpbannu(-1)	-0.242	-2.956	**rpbannu(-1)*d**	0.035	0.372	2.908	0.091
rpdgkhan(-1)	-0.251	-2.822	**rpdgkhan(-1)*d**	0.069	0.581	2.681	0.104
rpdikhan(-1)	-0.203	-1.534	**rpdikhan(-1)*d**	-0.220	-1.398	0.003	0.953
rpfaisalabad(-1)	-0.288	-2.851	**rpfaisalabad(-1)*d**	0.078	0.820	3.804	**0.053**
rpgujranwala(-1)	-0.247	-2.070	**rpgujranwala(-1)*d**	0.134	1.059	2.490	0.117
rphyderabad(-1)	-0.048	-1.245	**rphyderabad(-1)*d**	-0.113	-2.427	0.818	0.368
rpislamabad(-1)	-0.030	-0.478	**rpislamabad(-1)*d**	0.002	0.034	0.061	0.805
rpjhelum(-1)	-0.297	-2.212	**rpjhelum(-1)*d**	-0.042	-0.266	0.816	0.368
rpjhang(-1)	-0.295	-2.791	**rpjhang(-1)*d**	0.033	0.303	2.577	0.111
rpkarachi(-1)	-0.208	-2.145	**rpkarachi(-1)*d**	0.008	0.087	1.393	0.240
rpkhuzdar(-1)	-0.369	-2.782	**rpkhuzdar(-1)*d**	0.238	1.521	4.623	**0.034**
rplahore(-1)	-0.284	-2.525	**rplahore(-1)*d**	0.101	1.020	3.511	0.063
rplarkana(-1)	-0.086	-1.420	**rplarkana(-1)*d**	-0.088	-0.721	0.000	0.990
rploralai(-1)	-0.303	-3.484	**rploralai(-1)*d**	-0.020	-0.243	3.491	0.064
rpmardan(-1)	-0.144	-1.597	**rpmardan(-1)*d**	0.090	0.953	1.684	0.197
rpmianwali(-1)	-0.357	-2.834	**rpmianwali(-1)*d**	0.187	1.325	4.370	**0.039**
rpmirpurkhas(-1)	-0.024	-0.466	**rpmirpurkhas(-1)*d**	-0.093	-1.315	0.390	0.533
rpmultan(-1)	-0.287	-2.675	**rpmultan(-1)*d**	0.021	0.189	2.158	0.144
rpnawabshah(-1)	0.018	0.412	**rpnawabshah(-1)*d**	-0.034	-0.627	0.302	0.584
rpquetta(-1)	-2.648	-0.788	**rpquetta(-1)*d**	1.624	0.484	0.405	0.526
rprawalpindi(-1)	-0.101	-1.385	**rprawalpindi(-1)*d**	0.000	-0.004	0.418	0.519
rpsargodha(-1)	-0.140	-2.420	**rpsargodha(-1)*d**	-0.004	-0.071	1.847	0.177
rpsialkot(-1)	-0.199	-1.931	**rpsialkot(-1)*d**	0.043	0.360	1.263	0.263
rpsukkur(-1)	-0.028	-0.543	**rpsukkur(-1)*d**	-0.086	-1.419	0.331	0.566
rpturbat(-1)	-0.573	-4.741	**rpturbat(-1)*d**	0.223	1.772	11.560	**0.001**
rpvehari(-1)	-0.072	-1.233	**rpvehari(-1)*d**	0.002	0.037	0.397	0.530

Table: 4.18 Reports the results of regression (2) with Quetta as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-1.918	-0.769	**rpattock(-1)*d**	0.898	0.361	0.320	0.573
rpabotabad(-1)	-1.512	-0.896	**rpabotabad(-1)*d**	0.491	0.292	0.354	0.553
rpbawalnagar(-1)	0.602	0.169	**rpbawalnagar(-1)*d**	-1.599	-0.448	0.095	0.758
rpbahawalpur(-1)	1.636	0.395	**rpbahawalpur(-1)*d**	-2.635	-0.636	0.266	0.607
rpbannu(-1)	-0.737	-0.242	**rpbannu(-1)*d**	-0.271	-0.089	0.006	0.939
rpdgkhan(-1)	-2.145	-0.680	**rpdgkhan(-1)*d**	1.135	0.360	0.270	0.604
rpdikhan(-1)	-1.502	-0.368	**rpdikhan(-1)*d**	0.492	0.121	0.060	0.807
rpfaisalabad(-1)	-2.838	-1.110	**rpfaisalabad(-1)*d**	1.821	0.714	0.832	0.363
rpgujranwala(-1)	-1.819	-0.568	**rpgujranwala(-1)*d**	0.816	0.255	0.170	0.681
rphyderabad(-1)	-1.154	-0.992	**rphyderabad(-1)*d**	0.132	0.114	0.307	0.581
rpislamabad(-1)	-1.136	-0.428	**rpislamabad(-1)*d**	0.133	0.050	0.057	0.812
rpjhelum(-1)	-1.713	-0.512	**rpjhelum(-1)*d**	0.690	0.206	0.129	0.720
rpjhang(-1)	-0.575	-0.130	**rpjhang(-1)*d**	-0.428	-0.097	0.000	0.987
rpkarachi(-1)	-2.305	-1.092	**rpkarachi(-1)*d**	1.285	0.610	0.725	0.396
rpkhuzdar(-1)	-1.987	-0.656	**rpkhuzdar(-1)*d**	0.968	0.320	0.238	0.626
rplahore(-1)	-2.330	-1.180	**rplahore(-1)*d**	1.299	0.661	0.849	0.359
rplarkana(-1)	-0.128	-0.048	**rplarkana(-1)*d**	-0.884	-0.335	0.021	0.886
rploralai(-1)	1.459	0.321	**rploralai(-1)*d**	-2.475	-0.544	0.187	0.666
rpmardan(-1)	-1.444	-0.437	**rpmardan(-1)*d**	0.427	0.129	0.080	0.778
rpmianwali(-1)	-1.721	-0.577	**rpmianwali(-1)*d**	0.712	0.239	0.167	0.684
rpmirpurkhas(-1)	-1.195	-0.760	**rpmirpurkhas(-1)*d**	0.176	0.112	0.191	0.663
rpmultan(-1)	-2.202	-0.932	**rpmultan(-1)*d**	1.191	0.505	0.517	0.474
rpnawabshah(-1)	-0.500	-0.410	**rpnawabshah(-1)*d**	-0.513	-0.421	2.75E-05	0.996
rppeshawar(-1)	-2.648	-0.788	**rppeshawar(-1)*d**	1.624	0.484	0.405	0.526
rprawalpindi(-1)	-1.450	-0.503	**rprawalpindi(-1)*d**	0.445	0.155	0.108	0.743
rpsargodha(-1)	0.601	0.176	**rpsargodha(-1)*d**	-1.613	-0.472	0.105	0.746
rpsialkot(-1)	-2.290	-0.832	**rpsialkot(-1)*d**	1.277	0.465	0.421	0.518
rpsukkur(-1)	-1.496	-0.919	**rpsukkur(-1)*d**	0.473	0.292	0.368	0.545
rpturbat(-1)	-1.614	-0.443	**rpturbat(-1)*d**	0.600	0.165	0.092	0.762
rpvehari(-1)	0.055	0.018	**rpvehari(-1)*d**	-1.055	-0.341	0.032	0.858

Table: 4.19 Reports the results of regression (2) with Sargodha as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.137	-2.675	**rpattock(-1)*d**	0.006	0.122	2.940	0.089
rpabotabad(-1)	-0.060	-1.429	**rpabotabad(-1)*d**	-0.052	-1.249	0.011	0.918
rpbawalnagar(-1)	-0.307	-2.821	**rpbawalnagar(-1)*d**	0.177	1.446	4.643	**0.033**
rpbahawalpur(-1)	-0.360	-3.314	**rpbahawalpur(-1)*d**	0.276	2.247	7.909	**0.006**
rpbannu(-1)	-0.124	-2.090	**rpbannu(-1)*d**	-0.106	-1.211	0.019	0.890
rpdgkhan(-1)	-0.324	-4.135	**rpdgkhan(-1)*d**	0.035	0.557	8.067	**0.005**
rpdikhan(-1)	-0.318	-3.248	**rpdikhan(-1)*d**	-0.100	-0.993	1.433	0.234
rpfaisalabad(-1)	-0.132	-2.103	**rpfaisalabad(-1)*d**	0.013	0.281	2.005	0.159
rpgujranwala(-1)	-0.133	-1.834	**rpgujranwala(-1)*d**	0.038	0.525	1.531	0.218
rphyderabad(-1)	-0.054	-1.533	**rphyderabad(-1)*d**	-0.069	-1.940	0.068	0.795
rpislamabad(-1)	-0.167	-2.843	**rpislamabad(-1)*d**	0.142	2.608	7.789	**0.006**
rpjhelum(-1)	-0.282	-3.348	**rpjhelum(-1)*d**	0.027	0.336	4.203	**0.043**
rpjhang(-1)	-0.353	-2.967	**rpjhang(-1)*d**	-0.228	-1.699	0.280	0.598
rpkarachi(-1)	-0.137	-2.254	**rpkarachi(-1)*d**	0.012	0.240	2.128	0.147
rpkhuzdar(-1)	-0.137	-2.185	**rpkhuzdar(-1)*d**	-0.173	-1.711	0.061	0.805
rplahore(-1)	-0.121	-1.920	**rplahore(-1)*d**	0.019	0.382	1.763	0.187
rplarkana(-1)	-0.130	-1.917	**rplarkana(-1)*d**	0.025	0.325	1.290	0.258
rploralai(-1)	-0.542	-3.816	**rploralai(-1)*d**	0.241	1.474	7.021	**0.009**
rpmardan(-1)	-0.051	-0.737	**rpmardan(-1)*d**	-0.219	-1.839	0.920	0.339
rpmianwali(-1)	-0.137	-2.532	**rpmianwali(-1)*d**	-0.162	-1.802	0.043	0.837
rpmirpurkhas(-1)	-0.040	-1.038	**rpmirpurkhas(-1)*d**	-0.104	-2.252	0.791	0.376
rpmultan(-1)	-0.173	-3.096	**rpmultan(-1)*d**	-0.028	-0.618	2.903	0.091
rpnawabshah(-1)	0.025	0.801	**rpnawabshah(-1)*d**	-0.083	-1.847	2.287	0.133
rppeshawar(-1)	-0.140	-2.420	**rppeshawar(-1)*d**	-0.004	-0.071	1.847	0.177
rpquetta(-1)	0.601	0.176	**rpquetta(-1)*d**	-1.613	-0.472	0.105	0.746
rprawalpindi(-1)	-0.168	-2.975	**rprawalpindi(-1)*d**	0.031	0.588	4.223	**0.042**
rpsialkot(-1)	-0.131	-2.103	**rpsialkot(-1)*d**	0.038	0.712	2.420	0.122
rpsukkur(-1)	-0.048	-1.212	**rpsukkur(-1)*d**	-0.074	-1.834	0.148	0.701
rpturbat(-1)	-0.274	-3.138	**rpturbat(-1)*d**	0.010	0.087	2.290	0.133
rpvehari(-1)	-0.287	-2.954	**rpvehari(-1)*d**	0.224	2.191	6.858	**0.010**

Table: 4.20 Reports the results of regression (2) with Turbat as numeraire

Relative price Variable	Coefficient	t-statistic	Relative Price Variable with Dummy Variable	Coefficient	t-statistic	Wald Test for ρ1=ρ2	
						F-statistic	Prob
rpattock(-1)	-0.473	-4.272	**rpattock(-1)*d**	0.267	2.444	12.229	**0.001**
rpabotabad(-1)	-0.154	-2.217	**rpabotabad(-1)*d**	-0.003	-0.050	1.464	0.229
rpbawalnagar(-1)	-0.226	-2.447	**rpbawalnagar(-1)*d**	0.104	0.956	2.902	0.091
rpbahawalpur(-1)	-0.218	-2.312	**rpbahawalpur(-1)*d**	0.141	1.161	2.930	0.090
rpbannu(-1)	-0.331	-3.497	**rpbannu(-1)*d**	0.033	0.231	2.778	0.098
rpdgkhan(-1)	-0.414	-3.932	**rpdgkhan(-1)*d**	0.222	1.865	8.801	**0.004**
rpdikhan(-1)	-0.245	-1.765	**rpdikhan(-1)*d**	-0.180	-1.038	0.047	0.829
rpfaisalabad(-1)	-0.485	-4.269	**rpfaisalabad(-1)*d**	0.286	2.958	14.195	**0.000**
rpgujranwala(-1)	-0.481	-3.579	**rpgujranwala(-1)*d**	0.339	2.366	9.085	**0.003**
rphyderabad(-1)	-0.081	-1.749	**rphyderabad(-1)*d**	-0.053	-1.180	0.123	0.726
rpislamabad(-1)	-0.192	-2.160	**rpislamabad(-1)*d**	0.166	1.765	3.930	**0.050**
rpjhelum(-1)	-0.590	-3.805	**rpjhelum(-1)*d**	0.334	1.950	8.405	**0.004**
rpjhang(-1)	-0.395	-2.884	**rpjhang(-1)*d**	0.086	0.527	2.753	0.100
rpkarachi(-1)	-0.249	-2.682	**rpkarachi(-1)*d**	0.105	1.277	4.379	**0.039**
rpkhuzdar(-1)	-0.304	-2.691	**rpkhuzdar(-1)*d**	-0.261	-1.730	0.031	0.860
rplahore(-1)	-0.409	-3.288	**rplahore(-1)*d**	0.222	2.126	7.934	**0.006**
rplarkana(-1)	-0.181	-2.403	**rplarkana(-1)*d**	0.108	0.964	2.618	0.108
rploralai(-1)	-0.228	-2.413	**rploralai(-1)*d**	-0.130	-1.052	0.232	0.631
rpmardan(-1)	-0.275	-2.436	**rpmardan(-1)*d**	-0.051	-0.343	0.812	0.369
rpmianwali(-1)	-0.519	-4.228	**rpmianwali(-1)*d**	0.216	1.497	8.317	**0.005**
rpmirpurkhas(-1)	-0.092	-1.642	**rpmirpurkhas(-1)*d**	-0.066	-1.050	0.060	0.806
rpmultan(-1)	-0.469	-4.443	**rpmultan(-1)*d**	0.236	2.487	13.499	**0.000**
rpnawabshah(-1)	0.015	0.347	**rpnawabshah(-1)*d**	-0.059	-1.041	0.597	0.441
rppeshawar(-1)	-0.573	-4.741	**rppeshawar(-1)*d**	0.223	1.772	11.560	**0.001**
rpquetta(-1)	-1.614	-0.443	**rpquetta(-1)*d**	0.600	0.165	0.092	0.762
rprawalpindi(-1)	-0.357	-3.413	**rprawalpindi(-1)*d**	0.245	2.144	8.012	**0.005**
rpsargodha(-1)	-0.274	-3.138	**rpsargodha(-1)*d**	0.010	0.087	2.290	0.133
rpsialkot(-1)	-0.350	-3.255	**rpsialkot(-1)*d**	0.242	2.301	8.102	**0.005**
rpsukkur(-1)	-0.117	-1.855	**rpsukkur(-1)*d**	-0.039	-0.648	0.478	0.491
rpvehari(-1)	-0.157	-1.860	**rpvehari(-1)*d**	0.074	0.745	1.683	0.197