THE LAW OF ONE PRICE IN TURKEY

by

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to my family

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ABSTRACT

In this thesis, we use a panel dataset of 51 disaggragated good and service prices at montly frequency in 25 cities of Turkey to examine the working of the law of one price. First, we test whether intercity relative prices are stationary using panel econometric methods and find that a majority of the relative prices reject the null hypothesis of nonstationarity which indicate that the law of one price holds in Turkey. The evidence of stationarity of relative prices also lead us to estimate the speed of convergence. The results show that speed is highly fast compared to the findings for the US cities. Half-lives of convergence average around 4 months for tradable goods and 6.6 months for services. We also test the goodness of fit of TAR models versus AR(1) model and see that non-linear BAND-TAR specification characterize the data better than the linear AR(1) model. This result indicates that relative prices revert to the "band" rather than to the "zero" and the law of one price holds if data outside the band is stationary regardless of what process the data inside the band follow.

Keywords: Law of One Price, Turkey, Threshold Autoregressive Models, Panel Unit Root Tests

TÜRKİYE’DE TEK FİYAT KANUNU

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ÖZET

Bu tezde Türkiye’de 25 ilde aylık 51 ayrı ürün ve hizmet fiyatları verisi kullanılarak tek fiyat kanununun geçerliliği incelenmektedir. Öncelikle, panel ekonometrik teknikler kullanılarak şehirlerarası göreli fiyat serilerinin durağanlığı test edildi ve birçok seride durağan olmama boş hipotezinin reddedildiği görüldü. Bu, Türkiye’de tek fiyat kanunun geçerli olduğunu göstermektedir. Göreli fiyatların durağan olması bizi fiyatların yakınsama hızını ölçmeye yöneltti ve Türkiye’de, ABD şehirleriyle karşılaştırıldığında yakınsamanın oldukça hızlı olduğu görüldü. Ticari ürünlerde yakınsama yarı ömrü 4 ay civarında iken hizmetlerde 6,6 ay olarak bulunmuştur. Ayrıca TAR modellerini AR(1) modeli ile uygunluk testi ile karşılaştırıp doğrusal olmayan BAND-TAR uygulamasının verileri AR(1) modelinden daha iyi açıkladığını gördük. Bu sonuçlar fiyatların “sıfır” yerine “bant”’a döndüğünü ve bant-içinde sürecin rassal yürüyüş veya durağan olmasına bakmaksızın, bant dışında kalan verinin durağan olması durumunda tek fiyat kanunun geçerli olduğunu göstermektedir.

Anahtar Sözcükler: Tek Fiyat Kanunu, Türkiye, Eşikli Otoregresiv Modeller, Panel Birim Kök Testleri

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GLOSSARY

CPI	Consumer price index
Half-life	The amount of time it takes to reduce by half the magnitude of a deviation from the equilibrium caused by an individual shock
IPS	Im, Pesaran and Shin Test
LLC	Levin, Lin and Chu Test
LOP	The law of one price
PPP	Purchasing power parity

1. INTRODUCTION

In economics, the law of one price is such a fundamental and intuitive proposition that Lamont and Thaler (2003) define it as the "Second Law of Economics". The law of one price (LOP) says that identical goods should sell for the same price in two separate markets when there are no transactions costs and no differential taxes applied in the two markets. If prices continue to be different in an economy then profit-making opportunities arise by buying the good in the low price market and reselling it in the high price market. If entrepreneurs acted in this way, then the prices would converge to equality.

Purchasing Power Parity (PPP) theory, on the other hand, is based on an extension and variation of the LOP as applied to the aggregate economy. The difference between PPP and LOP is that the law of one price applies to individual commodities, while PPP applies to some general price level. If LOP holds true for every commodity PPP must hold automatically. On the other hand, validity of PPP does not require the law of one price to hold exactly .

After a quarter century of immense research testing the LOP and PPP, the established consensus is that both hold in the long-run, but price differentials are too persistent in the short-run to explain. The estimated half-lives of reversion to the equilibrium is somewhere between three to six years. The implication of this research is that all open economy models that assume some version of price convergence have limited use in practice and that there is potentially important resource misallocation among economies.

Two sets of explanations are provided for the observed failure of LOP and PPP. First set is concerned about the data and econometric methodology employed in these studies. Most of the researchers focused on rather short post-Bretton Woods era during which the exchange rates were generally left floating. Indeed, the use of longer span of data produced more favorable results for both LOP and PPP. However, the longer span of international prices covers different exchange rate regimes and thus might be biased in favor of PPP. The low power of univariate unit root tests in short samples is seen another culprit for the observed failure of rejection of stationary null and consequently recent studies turned to panel data methods. The first wave of cross-sectional studies were able to reject unit root in real exchange rates, nonetheless, they reported very low rates of convergence to the equilibrium. Yet, latest studies with wide panels rejected the stationarity of relative prices when cross-sectional dependence is allowed or when attention is restricted to tradables only. Finally, linear model specification has been questioned as a valid approach. Recent theoretical models that incorporate costs of transactions imply a band of inaction in which no arbitrage occurs even when there are persistent price differentials.

There are also theoretical reasons why LOP and PPP can fail. The textbooks of open-economy macroeconomics cite these failures as trade barriers, non-tariff barriers, the failure of nominal exchange rates to adjust to relative price shocks, segmented markets, sticky nominal prices, transportation costs and non-traded components of goods or general price level. To assess the importance of some of these factors and to provide an upper bound estimate for the convergence rate to PPP, a strand of studies examine the dynamics of prices within national boundaries. The absence of trade and non-tariff barriers and nominal exchange rates within a country can provide some insight why PPP fails in the short-run.

In this study, we test the intra-national version of the law of one price using a new data set that contain price information for 51 products collected from 25 cities in Turkey between 1994:01 and 2004:12. The data set that is employed here has certain distinct properties compared to data sets used in earlier studies. First, the data consist of average retail prices, not price indexes, that avoid the potential aggregation bias associated with consumer price indices. Second, Turkey is a high inflationary developing country and differs from the previous studies in that sense. Third, the sample covers 25 cities of Turkey, more than the number for which city CPIs are published. In fact, the data provide considerable geographic coverage for actual retail prices of a set of comparable products. In the light of earlier research and properties of our data set, that it covers disaggregated price information from a high-inflationary developing country, we find strong evidence in favor of stationarity of relative prices. The estimated half-lives are around 4 months for food items and 6.6 months for services. Following the lead in studies suggesting possible non-linearities in adjustment process we have estimated Threshold Autoregressive (TAR) processes for relative prices and we have observed that Band-TAR specification characterize the data better and the estimates of half-lives are found to be around 3-3.5 months for food items and 4.5 months for services for the relative prices outside the inaction band. Since Turkey experienced two financial crises in 1994 and 2001, we also implement the same analysis for two relatively stable sub-periods to check the robustness of the results, one with high inflation, 1995:01-1999:12 and the other with inflation coming down, 2002:01-2004:12. What we observed is that financial crises has an upward effect on the results such that convergence occurs faster between the provinces of Turkey when the effects of the two crisis years are excluded from the analysis.

2. LITERATURE REVIEW

Parsley and Wei (1996) analyze the influence of transportation costs on the variability of price-differentials between 48 cities of the United States. The data is at the quarterly frequency from 1975:Q1 to 1992:Q4 and consists of 51 products observed in 48 locations. They approximate transportation costs by distance between the cities. Regressing the intercity log of relative prices on the log of distance and the log of distance squared (in order to test for non-linear effects) they conclude that price differences are bigger for cities that are further apart. They also find that the speed of convergence is also influenced by the distance such that the rates of convergence are slower for cities farther apart. However, their estimate suggest that distance alone can only account for a small portion of the much slower convergence rates across national borders. In order to distinguish between tradable and non-tradable goods, Parsley and Wei (1996) divide goods into nonperishable, perishable and services categories. First, they reject the null hypothesis of random walk for most items. They conclude that the estimated median half-life for nonperishable goods is 5.28 quarters, 4.05 quarters for perishable goods, and 15.4 quarters for services; that is, the speed of convergence for services is three times lower than that for tradable goods. To test for non-linear effects, Parsley and Wei add a quadratic term as well, and they find that higher price differential is closed at a faster rate than a smaller price differential.

Building on the analysis of Parsley and Wei, Cecchetti, Nelson and Sonora (2000) study price convergence in a 78 years long panel of annual price indices in 19 US cities. Using a series of panel unit-root tests, they find a surprisingly low speed of convergence, with a half-life of about 9 years. Moreover, they are unable to reject the null of non-stationarity in price differentials when examined in univariate unit root tests. Their findings suggest that prices of non-traded products could also contribute to the apparent non-stationarity of the relative intercity CPI series or their extremely slow rates of convergence.

Engel and Rogers (1999) using price indices for 29 U.S. cities and for 43 different goods examine the reason of the price variability of similar goods across U.S. cities. They address questions similar to those that have arisen in the international context: is the observed variability in prices purely a result of market segmentation or do sticky nominal prices play a role? They also examine how the degree of tradability of a good influences price variability. Surprisingly, they find that variability is larger for traded-goods. They attribute this finding to greater price stickiness for non-traded goods. According to their findings, distance between cities accounts for a significant amount of the variation in prices between pairs of cities. But they also find that nominal price stickiness plays an even more significant role.

Like Parsley and Wei (1996), the work of Koen and De Masi (1997) add more evidence to the fact that degree of good's tradability influences its half-life. They point out that "service prices first lagged but then started to catch up with the prices of goods, as services became increasingly commercialized." Administrative controls and slower productivity growth in non-tradable sectors is the reason for such behavior of service prices. Glushchenko (2001) also divides goods into its subcategories, food, manufactured goods and services, and finds significant differences in the speed of convergence between different groups of goods. He uses the overall regional CPI index for 7 regions of Russia. His findings indicate that the behavior of food prices and manufactured goods prices is quite different. The food price levels tend to converge in most regions. As for the manufactured goods price levels, the convergence is found to be very weak.

In order to capture the nonlinear relationship between the speed of convergence and the magnitude of deviation from the LOP, O'Connell and Wei (1997) use Threshold Autoregressive (TAR) model. This model takes into account the fact that arbitrage takes place only when its gain exceeds transactions costs; and thus the observations are split into 2 regimes, inner and outer regimes. The outer regime makes the arbitrage profitable and there is convergence to the law of one price. In the inner regime, there is little or no adjustment. Using simple continuous-time model, they first indicate that the behavior of deviations from price parity depends on the relative importance of fixed and variable transport costs. Second, employing data on disaggregated commodity prices as a pure measure of the deviations from price parity, they find strong evidence of nonlinear reversion in these deviations. Their model shows that relative goods prices follow "band reversion" rather than "mean reversion" in the presence of fixed and proportional transport costs.

Janet Ceglowski (2003) investigates the behavior of intra-national prices using a semi-annual series of average retail prices for 45 specific consumer goods across 25 Canadian cities for the period 1976:2-1993:2. This analysis finds that provincial borders have a statistically significant effect on intercity price differentials in Canada. For the majority of the consumer goods analyzed in this study, intra-national retail prices exhibit price parity as a long-run characteristic and converge at rates considerably faster than the consensus estimates for international prices (half-lives average well under a year).

Another complementary paper to the growing literature is the paper of Chaudhuri and Sheen (2004). They studied the price convergence in Australia using quarterly data including eight goods/services for seven cities and the overall city CPI from September 1972 to March 1999. In addition to testing the stationarity of the relative prices and estimating the convergence speed of prices, they address the question of whether these conclusions depend on the national exchange rate regime and on inflation outcomes perhaps associated with the monetary policy targeting regime. They find that the persistence of deviations in response to shocks is much lower than the results for international purchasing power parity test. Intra-national LOP was rejected for the floating exchange rate period from 1984 to 1991 when inflation was high and not specifically targeted by the central bank.

Attila Ratfai (2006) analyses the intra-country convergence of price differentials using a relatively long, monthly data of highly disaggregated items in Hungary. In contrast to the consensus in the literature on PPP and the LOP, the findings are strongly reject the null hypothesis of price differentials being non-stationary. Half-lives show very fast convergence in prices (the median half-life is about 4 months). Regressing the mean price differentials on the number of people living in the district and the distance between the main city of the district and the benchmark location, he find that the equilibrium level of price differentials depends on the relative size of the location, but not on its geographical position.

3. THEORATICAL FRAMEWORK

The works by Engel and Rogers (1993, 1995 and 1996) and Parsley and Wei (2000) have shown that the international borders play an important role to explain price differences between cities of different countries. By focusing on price movements within a nation rather than between countries we avoid such obstacles as tariff and non-tariff barriers and excess variation of nominal exchange rates in front of price convergence. To highlight why prices may differ between locations in a country we will rely on a general framework adopted by Engel and Rogers (1996) and O'Connell and Wei (2000). A brief summary of the discussion in the discussion in these studies and how it is related to our data set is in order.

To accommodate the suggestion by Rogoff (1996) that most of the goods that are treated as tradables in fact contain significant non-traded components, the price of good *i* in location *j*, P_{ij}, is modeled as a function of prices of both tradable and non-tradable inputs:

$$p_{ij} = b_{ij} a_{ij} (w_{ij})^{g_i} (q_{ij})^{(1-g_i)} \tag{1}$$

where w_{ij} and q_{ij} are prices of non-tradable and tradable input, respectively; g_i and (1 - g_i) are the shares of the non-tradable and tradable inputs; b_{ij} measures markup, which is inversely related to elasticity of demand and a_{ij}, denotes local technology producing good *i*.

A major reason why prices may differ across locations is the markups as emphasized in the pricing-to-market literature. When firms could separate markets and differentiate prices across locations prices are likely to observe persistence differences. In our data set, however, most of the goods are likely to have a very competitive market, as they are mostly food products very likely to have a wide variety of producers, both local and foreign. A second reason for non-convergence is differences in local technology stemming from geography and endowments of natural resources. While such variation across locations may generate permanent deviations from the LOP, existence of free trade will eliminate such differences. Similarly, the diffusion of technology will eliminate other differences in local production over time. Thus, difference in local technology may generate bands in which trade is not profitable and prices deviate, but outside the bands there will be fast convergence.

Equation (1) allows prices to be different in two locations also because of variations in prices of inputs. Dumas (1992), Uppal (1993), and Sercu et. al. (1995) developed theoretical models where traded goods are subject to transportation costs. These models carry significant implications for relative prices. When the transportation costs are modeled in Samuelson iceberg form, a band of no-arbitrage occurs. Whenever relative prices reach the thresholds defined by the transport cost, d_i and $(1/d_i)$ where d_i is the transport cost, sufficient amount of trade eliminates the arbitrage opportunity. In our data set, most of the goods are tradable (41 tradable goods, 10 services), thus, the price differentials are mostly due to transportation costs which could be arbitraged at the wholesale level.

In the case of non-traded inputs, the wedge between the prices of such inputs due to nominal wage differences or factors such as climate or quality of living may generate a permanent wedge between prices of the same good across locations. To the extent the wages are independent of permanent factors such a climate, factor mobility will ensure in the long-run that prices of the same good do not stray away from each other.

Of course, for many reasons the law of one price does not hold even between markets within a country. The simple reason for the discrepancies is that there are costs to transport goods between locations, there are different taxes applied in different states and different countries, non-tradable input prices may vary, people do not have perfect information about the prices of goods in all markets at all times and people in different provinces may have different preferences.

Two competing hypotheses to be tested empirically are then, that either the prices are non-stationary because of non-tradables and frictions in the factor market and obstacles in front of migration or prices follow a non-linear adjustment process because of local technological differences or transportation costs. The linear specification adopted in most of the earlier PPP literature is then not suitable provided that prices are determined as modeled in Equation (1).

4. METHODOLOGY

Following the theoretical considerations outlined above, first we test whether relative prices of goods are stationary because stationarity of relative prices ensures that prices are mean reverting. Then we estimate non-linear models for price adjustment. The lack of power in univariate unit root tests lead researchers to use panel data methods. In this thesis, the stationarity of relative prices is tested using both Levin, Lin and Chu (LLC) (2002) panel unit root test which applies time series procedures to panel data and Im, Pesaran and Smith (IPS) (2003) test which is based on pooled regression and allows for heterogeneity across cities.

As a second step we estimate threshold autoregressive models for relative prices and test them against linear specification. Two different specification has been estimated following O'Connell and Wei (1997). The first specification is referred as Band Threshold Autoregressive model (BAND-TAR) and the second model is called Equilibrium Threshold Autoregressive (EQ-TAR) model; both of which are described below.

4.1 Panel Unit Root Tests

"In finite samples, univariate augmented Dickey-Fuller (ADF) test inevitably has limited power against alternative hypothesis with highly persistent deviation from equilibrium" (Levin and Lin, 1993). Thus, it is very difficult to reject unit root with ADF when in fact hypothesis of unit root is false. Panel unit root tests have been proposed as an alternative and more powerful tests than those based on individual time series unit root tests. Panel unit root tests allow one to overcome some of the problems associated with univariate unit root tests. Their main advantage is increasing sample size by pooling the data. Another advantage of panel unit root tests is that their asymptotic distribution is standard normal. This is in contrast to individual time series unit roots which have non-standard asymptotic distributions. The most popular panel unit root tests are LLC and IPS tests.

Both panel unit root tests assume that the data generating process is:

$$\Delta q_{i,j,t} = b_{i,j} q_{i,j,t-1} + \sum_{m=1}^{s(k)} g_m \Delta q_{i,j,t-m} + e_{i,j,t} \tag{2}$$

where $q_{i,j,t}$ is the log of relative price for good *i* in city *j* at time *t*. The g_m are lag coefficients in the process characterizing $q_{i,j,t}$. $b_{i,j}$ is the coefficient that indicates the speed of convergence of good *i*, for cross-section *j*. Using these b values, we compute half-life of a shock.

LLC and IPS tests differ in their treatment of $b_{i,j}$. The LLC test is restrictive in the sense that it requires b to be homogeneous across cross-sections. IPS allow for a heterogeneous coefficient of $q_{i,j,t-1}$ and propose an alternative testing procedure based on averaging individual unit root test statistics. The null hypothesis in both tests is the same, i.e. that all cross-sectional units are non-stationary.

$$H_0 : b_{i,j} = b = 0$$

However, these tests have different alternative hypotheses. In the LLC test, the alternative hypothesis is that

$$H_1 : b_{i,j} = b < 0,$$

i.e. all cross-sections are stationary. In contrast, IPS allows for heterogeneous coefficient $b_{i,j}$ in cross-sections and the alternative hypothesis of IPS test is

$$H_1 : b_{i,j} < 0,$$

i.e. at least one of the individual series in the panel is stationary.

4.2 Threshold Autoregressive Model (TAR)

Typically simple linear Autoregressive (AR) model is used to study the potential convergence of prices toward the law of one price without making any distinction between the big price deviations and the small price deviations. Convergence speed is then interpreted to measure market integration or efficiency of arbitrage. However, O'Connell and Wei (1997) suggest that price deviations follow a nonlinear pattern concerning their convergence to the long-run equilibrium. A TAR model is used to capture this effect. According to this model, arbitrage takes place only when its gain exceeds transaction costs. If the price gap is inside the band, arbitrage does not affect the ratio of prices. In the TAR presentation, the observations are split into two regimes, the inner regime where there is little or no adjustment and the outer regime where large deviations make arbitrage profitable and there is convergence to the law of one price. TAR models suggest that the law of one price holds in an economy if the observations outside the band follow a stationarity process no matter whatever process the observations inside the band follow.

There are basically two different TAR models to choose from: the EQ-TAR and the Band-TAR.

$$\Delta q_{i,rs,t} = \begin{cases} l^{out}(q_{i,j,t-1} - c) + e_t^{out}, if & q_{i,j,t-1} > c \\ l^{in} q_{i,j,t-1} + e_t^{in}, if & -c \le q_{i,j,t-1} \le c \\ l^{out}(q_{i,j,t-1} + c) + e_t^{out}, if & -c > q_{i,j,t-1} \end{cases} \quad Band-TAR\ Model \tag{3}$$

$$\Delta q_{i,rs,t} = \begin{cases} l^{out} q_{i,j,t-1} + e_t^{out}, if & q_{i,j,t-1} > c \\ l^{in} q_{i,j,t-1} + e_t^{in}, if & -c \le q_{i,j,t-1} \le c \\ l^{out} q_{i,j,t-1} + e_t^{out}, if & -c > q_{i,j,t-1} \end{cases} \quad EQ-TAR\ Model \tag{4}$$

In both models $q_{i,j,t-1}$ are the series of interest (log of relative prices of good *i* in regions *r* and *s*) with l^{in} and l^{out} being the adjustment coefficients, *c* is the threshold that separates two regimes, e_t^{out} and e_t^{in} are the noise. EQ-TAR model exhibit reversion towards the mean of the series, while Band-TAR model represents process that reverts to the edge of the threshold. The process is stationary overall if the outer band dynamics are stationary: the process always reverts to the inner band in this case.

The equilibrium in Band-TAR model is achieved whenever $q_{i,j,t}$ is inside the band, i.e. $-c \leq q_{i,rs,t-1} \leq c$. In contrast to panel unit root tests equilibrium will hold at any point inside the band [-c; +c] and not just at point 0. Since there is no arbitrage inside bounds [-c; +c], $q_{i,j,t}$ may follow random walk, drift or stationary process. Therefore, in many studies l^{in} is restricted to be equal to 0 or not reported.

5. EMPIRICAL WORK

5.1 Data Description and Summary Statistics

We carry out our analysis using disaggregated price data obtained from the Retail Price Statistics published by the State Institute of Statistics of Turkey. The institute collects retail prices of several products from at least three different stores in various province centers on a monthly basis. Agents of the institute visit the same stores, unless a store has gone out of business and collect unit prices of goods along with detailed product information. This approach ensures the consistency of the data between and within province centers. The data then used to compile provincial, regional and national Consumer Price Indices.

Although the original data set contains retail price of hundreds of products, we restrict our attention to a smaller subset. We exclude products from the data set whose prices were directly controlled by the government (e.g., electricity, tea). We also eliminate products from our data set whose quality has changed over time. The data set we use in our analysis contain monthly price information for 51 products collected from 25 provinces in Turkey between 1994:01 and 2004:12. Of the 51 products, 41 are tradable goods and 10 are services. Grouping goods as tradables and non-tradables, allows us to examine how the tradability of a good affects its price behavior. 19 of the 41 tradable goods are perishables and 22 of them are non-perishables. Goods and services were included into analysis by the principle of the largest share in the households consumption and availability of the data. The 25 cities in our data set are not only have the largest population in the country but also they are geographically widely dispersed. Furthermore, these provinces are specifically chosen by the Statistics Institute of Turkey as regional centers to conduct several other surveys, such as Survey of Income Distribution, Household Employment Survey, etc. Appendix Tables A1 and A2 lists the cities and the products selected for this study respectively.

The 19 perishable goods includes prices for: flodough, mutton, veal, chicken, sucuk, sausage, salami, kasari, feta, egg, margarin, halvah, tompuree, olive, apple, lemon, tomato, potato, raisin. The 22 non-perishable goods are: flour, rice, pasta, bulgur, oliveoil, jam, honey, readysoup, driedbeans, chickpeas, lentil, terilen, keten, shirt, socks, blanket, lipstick, toilet paper, napkins, towel, toothpaste, sleepers. The 10 non-tradables goods in the sample are: dentist, hotel room, man's haircut, woman's haircut, doctor, a glass of tea, football field rental fee, cleaning services, photo development, shoe repair men.

We constructed a panel data set grouping the prices by product. The prices of goods in each panel are converted to relative prices for the purposes of our analysis (in order to test the Law of One Price). This requires choosing a numeraire for each panel. We choose the average price across all cities as the numeraire. So, each relative price series is constructed as:

$$q_{i,j,t} = \ln P_{i,j,t} - \frac{1}{M}\sum_{j=1}^{M} \ln P_{i,j,t} \tag{5}$$

where $P_{i,j,t}$ is the price of i^{th} product in city j at time t, and M is the total number of cities.

Local non-tradable factors of production, costs of transportation, persistent income differences and other time invariant barriers of trade may create a constant wedge among prices at different locations. In this case, forces of arbitrage may never fully drive price differentials to zero, but potentially to non-zero mean. To account for time-invariant, location specific effects in price differentials, we also demean the each relative price series[1].

As a summary measure, the variability of relative prices are calculated. For each city *j*, and each product *i*, variability was measured as the standard deviation of the relative price series over time. The standard deviations were averaged for each product. The results are presented in Appendix Table A3. Table 1 below also summarizes the results. These measures of variability ranges from 0.05 (pasta, flour, margarine) to 0.33 (hotel). For all 51 products, the variability of relative prices averages 0.12. Mean absolute price differentials are also calculated as a second summary measure for each product. The mean absolute differentials average 10% for all 51 products and range

[1] See Parsley and Wei (1996)

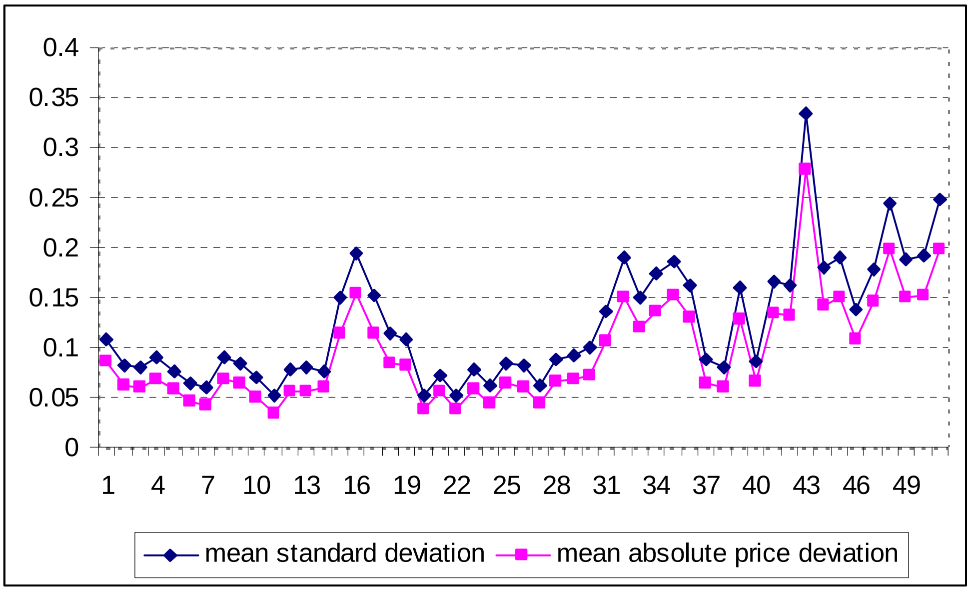
from 3% (margarine) to 28% (hotel). From Table 1 below it is observed that, of the three groups, services has, on average, the highest variability of the inter-city price differential and also the highest mean absolute price differential while food items has the lowest price differentials in both summary measures.

Table 1: Summary Statistics of relative price levels

	Mean	Standard Deviation
Variability of Price Differential		
Perishables	0.095	0.008
Non-Perishables	0.109	0.015
Food	0.072	0.009
Non-Food	0.140	0.015
Services	0.205	0.030
Mean Absolute Price Differential		
Perishables	0.071	0.075
Non-Perishables	0.084	0.028
Food	0.054	0.012
Non-Food	0.110	0.024
Services	0.166	0.037

Looking at the mean absolute price differentials as well as the mean standard deviations from Appendix Table A3, we observe considerable variation across products. As it is seen from Figure 1, there is a close, positive association between the mean standard deviation for each product and its mean absolute deviation, indicating that goods with highly volatile relative prices have average values that tend to be further from absolute price parity.

Figure 1: Mean standard deviation and mean absolute price deviation



Although the data exhibit sizeable deviation from the law of one price in the short run, that need not rule out a long-run tendency towards parity. In the following section, we analyze whether these deviations disappear in the long-run.

5.2 Stationarity Tests and Estimating Rates of Convergence

In this section, we examine the hypothesis of market integration using the panel of cities on a commodity by commodity basis and provide estimates of the rates of convergence to the law of one price. By testing the data for the stationarity of intercity price differentials, we ask whether intercity price differentials fluctuate around and return to their hypothetical mean level of zero or if they follow a random walk. To do so, two panel unit root tests are employed using the procedure developed by Levin, Lin, Chu (2002) and Im,Pesaran, Shin (2003) .

Equation (2) in part 4.1 is the product-specific regression specified to estimate the speed of convergence. The optimal lag structure in the regressions is determined by a series of product-city specific t-tests. As a result, the number of lags differs across cities. In this specification, the parameter of the primary interest is b which captures the degree of persistence in price differentials. Given these estimated autoregressive coefficients, the half-life of deviations from the law of one price is calculated under the assumption that the price differential process is AR(1). The reason for neglecting higher order lags is because higher order lags differ across locations which make it difficult to characterize persistence at the product level.

Results of LLC and IPS tests are presented in Appendix Tables A4, A5 and A6 for each product in different subcategories, respectively. The estimated autoregressive coefficients from the LLC test are reported in the first column of the table. Comparisons with the critical values for the LLC test suggest that the null of unit root is rejected 46 of the 51 products (or 90%) at 10% level, of which 42 of 51 (or 80%) are rejected at 5% level and 36 of 51 (or 69%) are rejected at 1%. In addition, the p-values of the IPS test are reported in the third column of Tables A6, A7 and A8. When we look at the results of IPS test, we observe that the null of unit root is rejected for all products, i.e., the point estimates are significantly different from zero for all products. Thus, the above results show that for the majority of the products relative prices converge to their long-run values. What about the rates of convergence to the law of one price? That is, what is the length of time it takes for deviations from market integration to disappear? Half-lives for relative price differentials are calculated by:

$$\frac{\ln(0.5)}{\ln(1+b)}$$

where b is the coefficient obtained from the LLC equation (Equation(2)). The estimated half-lives are displayed in the second column of Appendix Tables A4, A5 and A6. The results show that the estimated half-lives ranges from 1.1 (tomato) to 16.9 (hotel) months, with a median value of 5.4 months.

In addition to the above results, examining the test results according to the product characteristics is more instructive. We observe that the unit root null hypothesis is rejected at 10% level in 16 of the 19 perishables, 21 of 22 non-perishables and 9 of 10 services. The median value of estimated half-lives is 3.9 months for perishables, 6.2 months for non-perishables and 6.6 months for services as shown in Table 2. However, we observe that the estimated half-lives differ significantly between the food and non-food products of non-perishables. Therefore, we divide the non-perishables into two subcategories as food and non-food products. The estimated half-life is 4.4 months for food items and it is 8.6 months for non-food items.

Table 2 below shows median speed of convergence and the corresponding half-lives for each subcategory of commodities.

Table 2: Average estimates from panel unit root tests

	Speed of convergence	Half-Life
Perishables	-0.164	3.9
Non-Perishables	-0.105	6.2
Food	-0.147	4.4
Non-Food	-0.078	8.6
Services	-0.101	6.6

The results indicate that adjustment in food prices is relatively faster (all perisables are food items). Prices of perishables adjust only slightly faster than prices of non-perishable food items; the median half-life of perishables is 3.9 months compared to the 4.4 months for non-perishable food items. As expected, convergence speed of services is slower compared to perishables and the food items of non-perishables. What makes these results surprising is that price differentials of non-food items of non-perishables appear to be particulary persistent (median half-life 8.6 months). In fact, one would expect non-perishable items to be more easily transportable and thus having less persistent price differentials. The results above show that the adjustment among the cities of Turkey is faster for perishables, non-perishables and for services than the corresponding results obtained in Parsley and Wei (1996) for respective groups of products.

5.3 TAR Estimation Results

In this subsection, the BAND-TAR and EQ-TAR models are applied to search for the optimal threshold values. Tables A7 and A8 reports the estimation results for perishables from BAND-TAR and EQ-TAR models respectively, Tables A9 and A10 reports the corresponding results for nonperishables and Tables A11 and A12 exhibit the results for services.

In all these tables, results both from the AR(1) secification and the TAR specification are reported. The goodness of fit of the TAR models versus AR(1) model is tested by Likelihood Ratio tests (LLR):

$$LLR=2*(L_{TAR}-L_{AR}) \sim c^{2}(q) \tag{6}$$

where L_{TAR} is the log likelihood function of TAR model (either Band-TAR or EQ-TAR) and L_{AR} is the log-likelihood function of AR(1) model, and the test statistics has c^{2} distribution with degrees of freedom equal to the difference in the number of parameters between the two models, q.

The LLR results are reported at the last column of the Tables. For all goods regardless of their categories (perishables, non-perishables or services) the AR(1) model is rejected in favor of both TAR alternatives (p-values are all zero for LLR test and are not reported). In other words, nonlinear models characterize price behavior better than the linear model. These results make us conclude that the law of one price holds if the data outside the threshold is stationary regardless of the behaviour of the data inside the threshold, i.e. small deviations may or may not revert to mean but large deviations do.

At this point, a second question may be which TAR model (Band-TAR or EQ-TAR) describes the price behavior better. Comparing the commodities' maximum likelihood, we observe that for all commodities the tests favor Band-TAR model to EQ-TAR specification in our data. Thus, we can say that our data regardless of their categories (tradable or non-tradable) is characterized by Band-TAR specification. This result indicates that relative goods prices revert to a "band" rather than to "zero".

Since Band-TAR model best describes the price behavior in Turkey, we can focus on the Band-TAR estimation results in Tables A7, A9 and A11 for each category respectively. First and foremost; the g^{out} coefficient is significantly different from zero and negative, i.e., unit root null hypothesis is rejected for the data outside the threshold level. Secondly, comparing the first and the fifth columns of Tables (i.e. columns of "coefficient" from AR(1) and Band-TAR model), it is seen that the speed of convergence from the Band-TAR model for all commodities is higher than the AR(1) model which does not distinguish between observations outside and inside the band. Accordingly, half-lives from the Band-TAR model are substantially lower than from the AR(1) model. Table 3 shows median speed of convergence and the corresponding half-lives and threshold levels for each subcategory of commodities for each model for the purpose of comparison.

Table 3: Average estimates from the BAND-TAR Model

Category	Lambda AR(1)	Lambda (TAR)	Half-life AR(1)	Half-life TAR	Threshold %
Perishables	-0.153	-0.190	4.2	3.3	5.3
Non-Perishables	-0.133	-0.183	4.9	3.4	5.8
Food	-0.151	-0.198	4.3	3.2	4.7
Non-Food	-0.108	-0.171	6.1	3.7	11.3
Services	-0.107	-0.144	6.1	4.5	13.1

Similar to the results obtained in part 5.2 (LLC results) , we observe that the adjustment is faster for the food categories (median half-life is 3.3 months for perishables and 3.2 months for food commodities of non-perishables). Here once again, services have relatively slower convergence speed compared to perishables and non-perishables. In part 5.1, we see that services have the highest variability of the inter-city price differential. And also we observe in part 5.2 and 5.3 that services has the slowest convergence speed compared to other categories. Since services are not tradable goods, these results are what one expects.

In the third columns of Tables A7, A9 and A11 , we also present the threshold levels from Band-TAR model as a percentage of the mean of relative prices. Percentage thresholds are calculated:

$$C = (e^{c} - 1) * 100$$

where c is the value of threshold obtained from the estimation procedure. The results show that thresholds range from 2% to 14% for perishables and the median level of thesholds is 5.3% (see Table 3) for this group . The corresponding range is between 2.8% and 13.5% for non-perishables and between 8.9% and 23.9% for services. The median value of threshold is 5.9% for non-perishables and 13.1% for services. As expected, the highest thresholds are observed in the service category while the lowest ones are observed for the food category (median level of thresholds is 5.3% for perishables and 4.7% for food items of non-perishables)

5.4 Robustness Analysis

Since the time coverage of this study is between 1994:01 and 2004:12, the empirical results of this study may be biased due to two crises in 1994 and 2001 in Turkey (Appendix Figure A1 shows the aggregate inflation graph for the whole period). To test whether these two episodes had an influence on our findings, we also estimate the TAR models for distinct and relatively stable subperiods, one with high inflation, 1995:01-1999:12 and the other with inflation coming down, 2002:01-2004:12. Doing so, we also have the opportunity to compare two sub-periods among themselves besides comparing them with the whole period. By the way, the reported threshold values and the half-lives in Appendix Tables A15-A20 are the results obtained from the EQ-TAR specification instead of Band-TAR model. Band-TAR specification results are not reported because half-lives obtained from the EQ-TAR model gives reversion to the "zero" rather than to the "band". It enables us to compare the results between sub-periods and whole period regardless of taking into account the threshold level. However, half-lives obtained from Band-TAR model give us reversion to the "band" and band levels differ from period to period and thus comparisons of half-lives become complicated. As it is seen from Table 4, variability of price differantials, percentage threshold levels and half-lives for each category of commodities are higher in the whole period compared to the corresponding results in the two sub-periods indicating that the 1994 and 2001 financial crises had an upward bias on the results. Particularly, estimated half-lives in the whole period is nearly twice higher than the half-lives estimates for the two sub-periods. We observe that adjustment to the long-run equilibrium in Turkey is much faster eliminating the financial crisis bias. In fact, median half-life of convergence is between 2-3 months for perishables, around 3.5 months for non-perishables and around 3.7 months for services. Appendix Figures A2 and A3 show for the three time periods the thresholds levels and half-lives respectively.

Table 4: Summary Statistics and EQ-TAR Estimates for whole period and sub-periods

	Variability of price differential			Threshold %			Half-life		
Category	Whole period	95-99	2002-2004	Whole period	95-99	2002-2004	Whole period	95-99	2002-2004
Perishable	0.095	0.08	0.06	5.26	4.24	2.83	4.23	2.22	2.68
Non-perishable	0.109	0.09	0.05	5.83	4.67	3.46	4.73	3.49	3.62
Services	0.205	0.19	0.1	13.14	12.21	7.14	6.16	3.69	3.78

NOTE: Appendix Tables A13 and A14 reports the descriptive statistics for the two sub-periods respectively and Tables A15, A16, A17 reports the EQ-TAR model results for each commodity group for the period between 1995:01 and 1999:12 while Tables A18, A19 and A20 reports the corresponding results for the time period between 2002:01 and 2004:12.

Comparing the two sub-periods, it is seen that relative price variability is higher in the high inflationary period than the low inflationary period, confirming the positive correlation between inflation and the variability of the relative prices (Caglayan and Filiztekin (2001)). Moreover, threshold levels are also higher in the high inflationary period for each category of commodities. However, we observe that half-lives of convergence for each group of goods are lower in the high inflationary period than the low inflationary period. One can explain this fact by the existence of significant search costs incurred by buyers. In fact, high inflation raises search intensity of households and weakens sellers' market power putting downward pressure on price deviations. Since relative price variability is relatively lower in the low inflationary period, then search costs overcomes the arbitrage profit and thus convergence speed is expected to be slower in the low inflationary period than the high inflationary period.

6. CONCLUSION

In this thesis, we analyzed the intra-national convergence of price differentials in Turkey using a large panel data set for final goods and services across 25 cities of Turkey over the period 1994:01-2004:12. We also do the same analysis for two sub-periods (1995:01-1999:12 and 2002:01-2004:12) to eliminate the possible biases of 1994 and 2001 financial crises in Turkey. Initially, we divided goods into two subcategories as tradables and non-tradables to see whether the tradability of the goods affects its price behavior. We begin our analysis examining the variability of relative prices across the provinces of Turkey and observe sizeable deviations from the law of one price in all commodity groups with services having the highest variability. Then, we test whether these price deviations disappear in the long-run using panel unit root techniques and observe strong evidence of stationarity of price differentials for the majority of commodities. The evidence of stationarity lead us to estimate the speed of convergence of price deviations to LOP and find that convergence speed is highly fast compared to the findings for the US cities (Parsley and Wei (1996). No significant difference is observed between tradable and non-tradable goods concerning their stationarity however the difference arises concerning the speed of convergence to LOP such that non-tradable goods convergence relatively slower than tradable ones and the highest speed is observed for food commodities.

TAR specifications use more advanced analysis allowing for nonlinearity in the speed of convergence and bounds of inaction in which arbitrage profit do not cover transaction costs. Compared with the linear AR(1) counterpart and the nonlinear EQ-TAR model, Band-TAR specification is observed to characterize the data better, indicating that price differentials show “band reversion” rather than “mean reversion”. Partitioning sample into deviations inside and outside the bounds of inaction, Band-TAR estimation results reduce half-lives of deviations from the long-run equilibrium. Results of the Band-TAR model suggest that price deviations converge to the LOP with food items having the fastest convergence speed. Services category is shown to have slower speed of convergence compared to food category. Threshold levels for services are also estimated to be nearly three times more than the threshold levels for food items. Services are also observed to have the highest relative price variability, while food items have the smallest. Thus, there may be relationship between the estimated thresholds and price variability as Parsley and Wei (1996) and Taylor and Obstfeld (1997) suggest.

Finally, it is observed that the financial crises of 1994 and 2001 create an upward bias on our estimates and that convergence speed in all commodity groups becomes much more faster when crises years are left out. Moreover, convergence speed is found to be slower in the low inflationary period than high inflationary period, indicating the importance of search costs.

APPENDIX

Table A1: Cities

1	Adana	14	Konya
2	Ankara	15	Malatya
3	Antalya	16	Samsun
4	Bursa	17	Trabzon
5	Denizli	18	Zonguldak
6	Diyarbakır	19	Manisa
7	Eskişehir	20	Karaman
8	Gaziantep	21	Kilis
9	İçel	22	Adıyaman
10	İstanbul	23	Van
11	İzmir	24	Balıkesir
12	Kayseri	25	Ordu
13	Kocaeli		

Table A2: Products

1	flodough	18	Potato	35	Blanket
2	mutton	19	raisin	36	Lipstick
3	veal	20	flour	37	Toilet paper
4	chicken	21	rice	38	Napkins
5	sucuk	22	pasta	39	towel
6	sausage	23	bulgur	40	Toothpaste
7	salami	24	oliveoil	41	Sleepers
8	Kasari	25	jam	42	dent1
9	Feta	26	honey	43	hotel
10	egg	27	readysoup	44	coiffeure
11	margarin	28	driedbeans	45	barber
12	halvah	29	Chickpeas	46	Doctor's fee
13	tompuree	30	Lentil	47	Glass Tea
14	olive	31	Terilen	48	Football field rental fee
15	apple	32	keten	49	Cleaning Services
16	lemon	33	shirt	50	Photo Development
17	tomato	34	Socks	51	Shoe Repair Men

Table A3 : Summary Statistics of Relative Prices (1994:01-2004:12)

	Mean Standard Deviation				
Product	**Mean**	**Std. Dev.**	**Min**	**Max**	**Mean Absolute Price Differantials**
Flodough	0.11	0.03	0.04	0.17	0.09
Mutton	0.08	0.05	0.04	0.27	0.06
Veal	0.08	0.05	0.04	0.27	0.06
Chicken	0.09	0.04	0.04	0.22	0.07
Sucuk	0.08	0.04	0.04	0.20	0.06
Sausage	0.06	0.04	0.02	0.21	0.05
Salami	0.06	0.04	0.03	0.21	0.04
Kasari	0.09	0.04	0.05	0.20	0.07
Feta	0.08	0.04	0.04	0.24	0.06
Egg	0.07	0.04	0.03	0.25	0.05
Margarin	0.05	0.03	0.02	0.19	0.03
Halvah	0.08	0.04	0.05	0.23	0.06
Tompuree	0.08	0.06	0.04	0.30	0.06
Olive	0.08	0.04	0.03	0.20	0.06
Apple	0.15	0.03	0.10	0.23	0.11
Lemon	0.19	0.05	0.12	0.32	0.15
Tomato	0.15	0.03	0.09	0.21	0.11
Potato	0.11	0.05	0.06	0.30	0.08
Raisin	0.11	0.05	0.05	0.22	0.08
Flour	0.05	0.03	0.03	0.16	0.04
Rice	0.07	0.03	0.04	0.16	0.06
Pasta	0.05	0.02	0.03	0.16	0.04
Bulgur	0.08	0.03	0.04	0.21	0.06
Oliveoil	0.06	0.04	0.03	0.23	0.04
Jam	0.08	0.05	0.04	0.25	0.06
Honey	0.08	0.04	0.03	0.24	0.06
Readysoup	0.06	0.03	0.03	0.17	0.04
Driedbeans	0.09	0.04	0.04	0.24	0.07
Chickpeas	0.09	0.05	0.04	0.31	0.07
Lentil	0.10	0.06	0.04	0.31	0.07
Terilen	0.14	0.06	0.06	0.31	0.11
Keten	0.19	0.06	0.11	0.35	0.15
Shirt	0.15	0.05	0.09	0.27	0.12
Socks	0.17	0.06	0.09	0.31	0.14
Blanket	0.19	0.08	0.09	0.36	0.15
Lipstick	0.16	0.05	0.08	0.29	0.13
Toilet paper	0.09	0.04	0.04	0.21	0.06
Napkins	0.08	0.04	0.04	0.20	0.06
Towel	0.16	0.07	0.08	0.37	0.13
Toothpaste	0.09	0.03	0.05	0.19	0.07
Sleepers	0.17	0.04	0.09	0.28	0.13
Dentist	0.16	0.10	0.08	0.57	0.13
Hotel	0.33	0.15	0.13	0.68	0.28
Coiffeure	0.18	0.05	0.10	0.37	0.14
Barber	0.19	0.05	0.11	0.30	0.15
Doctor's fee	0.14	0.07	0.07	0.42	0.11
Glass Tea	0.18	0.09	0.10	0.38	0.15
Football field rental fee	0.24	0.08	0.13	0.41	0.20
Cleaning Services	0.19	0.08	0.10	0.45	0.15
Photo Development	0.19	0.06	0.11	0.38	0.15
Shoe Repair Men	0.25	0.10	0.12	0.50	0.20

NOTE: The summary statistics refer to demeaned relative prices. The mean standard deviation is calculated as the average of the standard deviation for each relative price series. Absolute deviations are measured as $|q_{i,j,t,}|$, where $q_{i,j,t}$ is the demeaned relative price of good *i*, in city *j* at time *t*.

Table A4: Panel Unit Root Tests: Perishables

	LLC Test		IPS Test
Product	**Coefficient**	**Half-life**	**p-value**
Flodough	-0.13*	4.8	0.00
Mutton	-0.17	3.8	0.00
Veal	-0.20*	3.2	0.00
Chicken	-0.21***	2.9	0.00
Sucuk	-0.11*	5.8	0.00
Sausage	-0.16*	3.9	0.00
Salami	-0.14*	4.7	0.00
Kasari	-0.08*	8.2	0.00
Feta	-0.09*	7.3	0.00
Egg	-0.33**	1.7	0.00
Margarine	-0.22**	2.7	0.00
Halvah	-0.14*	4.6	0.00
Tompuree	-0.15*	4.1	0.00
Olive	-0.08*	7.9	0.00
Apple	-0.45*	1.2	0.00
Lemon	-0.27*	2.2	0.00
Tomato	-0.46	1.1	0.00
Potato	-0.37	1.5	0.00
Raisin	-0.15*	4.1	0.00
Mean	-0.21	3.99	
Median	-0.16	3.87	
Standard Deviation	0.12	2.15	

(*), (**), (***) denote significant at the 1%, 5% and 10% levels respectively. For each good, the following regression is run:

$$\Delta q_{ij,k,t} = bq_{ij,k,t-1} + \sum_{m=1}^{s(k)} g_m \Delta q_{ij,k,t-m} + e_{ij,k,t}, \quad \text{where } q_{i,j,t} = \ln P_{i,j,t} - \frac{1}{M}\sum_{j=1}^{M} \ln P_{i,j,t}$$

Where $\ln P_{i,j,k}$ is the log price of i^{th} product in city j at time t, and M is the total number of cities.

Table A5: Panel Unit Root Tests: Non-Perishables

	LLC Test		IPS Test
Product	Coefficient	Half-life	p-value
Flour	-0.19*	3.3	0.00
Rice	-0.08***	8.3	0.00
Pasta	-0.14**	4.5	0.00
Bulgur	-0.08***	8.3	0.00
Oliveoil	-0.16*	3.9	0.00
Jam	-0.11*	6.2	0.00
Honey	-0.11*	6.0	0.00
Readysoup	-0.17*	3.6	0.00
Driedbeans	-0.15*	4.1	0.00
Chickpeas	-0.15*	4.2	0.00
Lentil	-0.16*	3.9	0.00
Terilen	-0.07*	9.9	0.00
Keten	-0.06**	11.0	0.00
Shirt	-0.11	6.1	0.00
Socks	-0.07**	10.1	0.00
Blanket1	-0.07*	9.9	0.00
Lipstick	-0.07***	9.7	0.00
Toilet paper	-0.12*	5.4	0.00
Napkins	-0.10*	6.3	0.00
Towel	-0.07*	9.7	0.00
Toothpaste	-0.10***	6.3	0.00
Sleepers	-0.09*	7.6	0.00
Mean	-0.11	6.74	
Median	-0.11	6.22	
Standard Deviation	0.04	2.51	

See notes in Table A4

Table A6: Panel Unit Root Tests: Services

	LLC Test		IPS Test
Product	**Coefficient**	**Half-life**	**p-value**
Dentist	-0.11*	5.8	0.00
Hotel	-0.04**	16.9	0.00
Coiffeure	-0.12*	5.3	0.00
Barber	-0.12*	5.2	0.00
Doctor's fee	-0.12	5.4	0.00
Glass Tea	-0.09*	7.6	0.00
Football field rental fee	-0.08*	8.8	0.00
Cleaning Services	-0.12*	5.5	0.00
Photo Development	-0.09*	7.5	0.00
Shoe Repair Men	-0.06*	11.7	0.00
Mean	-0.09	7.97	
Median	-0.10	6.63	
Standard Deviation	0.03	3.75	

See notes in Table A4

Table A7: Band-TAR Estimation Results: Perishables

	AR(1)		BAND-TAR				
Product	Coefficient	Half Life	c (%)	Nout	Coefficient	Half-life	LLR_{BA}
Flodough	-0.163***	3.9	6.49	1803	-0.247***	2.44	5417.39
Mutton	-0.153***	4.17	4.81	1660	-0.180***	3.49	5602.58
Veal	-0.135***	4.78	4.76	1528	-0.147***	4.37	6182.52
Chicken	-0.260***	2.3	5.26	1633	-0.314***	1.84	5188.14
Sucuk	-0.113***	5.78	5.04	1478	-0.151***	4.25	6731.23
Sausage	-0.142***	4.53	2.71	1796	-0.163***	3.89	6715.3
Salami	-0.131***	4.94	2.24	1937	-0.136***	4.74	6788.88
Kasari	-0.095***	6.94	5.83	1537	-0.135***	4.78	7011.27
Feta	-0.092***	7.18	4.65	1769	-0.116***	5.65	7105.54
Egg	-0.339***	1.67	3.67	1634	-0.379***	1.45	5633.38
Margarin	-0.202***	3.07	2.04	1720	-0.225***	2.72	8516.25
Halvah	-0.180***	3.49	5.26	1356	-0.251***	2.4	7533.15
Tompuree	-0.103***	6.38	5.34	1133	-0.119***	5.47	8464.55
Olive	-0.085***	7.8	4.83	1590	-0.116***	5.63	6908.77
Apple	-0.473***	1.08	8.55	1760	-0.674***	0.62	4901.5
Lemon	-0.291***	2.02	14.01	1565	-0.455***	1.14	5190.05
Tomato	-0.599***	0.76	9.48	1591	-0.833***	0.39	4893.06
Potato	-0.403***	1.34	6.13	1768	-0.481***	1.06	5083.25
Raisin	-0.151***	4.23	6.96	1597	-0.190***	3.29	6010.47

NOTE: Here, *c* represents the threshold levels in percentage terms, *Nout* is the number of observations outside the band. *LLR* represents the log likelihood ratio test. The reported coeeficients for BAND-TAR Model is the coefficients for the data outside the band.

Table A8: EQ-TAR Estimation Results: Perishables

Product	AR(1) Coefficient	AR(1) Half Life	EQ-TAR c (%)	Nout	Coefficient	Half-life	LLR_{EQ}
Flodough	-0.163***	3.9	7.86	1526	-0.171***	3.69	4694.831
Mutton	-0.153***	4.17	4.79	1654	-0.151***	4.23	4725.247
Veal	-0.135***	4.78	4.77	1509	-0.133***	4.88	4793.103
Chicken	-0.260***	2.3	5.26	1625	-0.257***	2.33	4802.409
Sucuk	-0.113***	5.78	5.03	1467	-0.116***	5.64	4984.915
Sausage	-0.142***	4.53	2.71	1787	-0.141***	4.56	5758.682
Salami	-0.131***	4.94	2.24	1930	-0.131***	4.92	5587.292
Kasari	-0.095***	6.94	6.2	1432	-0.096***	6.88	4724.308
Feta	-0.092***	7.18	4.65	1756	-0.092***	7.16	4666.771
Egg	-0.339***	1.67	3.71	1602	-0.337***	1.69	4845.198
Margarin	-0.202***	3.07	2.04	1704	-0.202***	3.07	4635.307
Halvah	-0.180***	3.49	5.26	1343	-0.184***	3.41	5013.956
Tompuree	-0.103***	6.38	5.34	1117	-0.103***	6.36	5177.243
Olive	-0.085***	7.8	5.02	1527	-0.086***	7.69	4608.532
Apple	-0.473***	1.08	9.4	1616	-0.480***	1.06	4710.582
Lemon	-0.291***	2.02	14.18	1548	-0.295***	1.98	4822.224
Tomato	-0.599***	0.76	9.81	1541	-0.595***	0.77	4774.79
Potato	-0.403***	1.34	6.13	1756	-0.402***	1.35	4810.109
Raisin	-0.151***	4.23	6.96	1584	-0.151***	4.23	5012.621

See notes in Table A7

Table A9: Band-TAR Estimation Results: Non-Perishables

	AR(1)		BAND_TAR				
Good	Coefficient	Half Life	c (%)	Nout	Coefficient	Half-life	LLR_{BA}
Flour	-0.176***	3.58	3.39	1421	-0.240***	2.53	6517.62
Rice	-0.141***	4.56	4.26	1645	-0.198***	3.13	7731.55
Pasta	-0.189***	3.31	3.46	1472	-0.269***	2.21	7409.01
Bulgur	-0.121***	5.37	5.8	1345	-0.183***	3.42	7069.57
Oliveoil	-0.160***	3.98	2.84	1788	-0.197***	3.16	7078.39
Jam	-0.101***	6.51	6.18	1291	-0.133***	4.87	7656.95
Honey	-0.114***	5.73	5.07	1529	-0.151***	4.22	6915.86
Ready soup	-0.163***	3.9	3.04	1766	-0.208***	2.97	6922.42
Driedbeans	-0.164***	3.87	5.14	1600	-0.218***	2.81	6719.92
Chickpeas	-0.137***	4.7	5.62	1510	-0.164***	3.86	7189
Lentil	-0.150***	4.27	5.28	1655	-0.183***	3.42	6741.15
Terilen	-0.083***	8	8.48	1620	-0.114***	5.75	6676.25
Keten	-0.070***	9.55	12.44	1671	-0.101***	6.54	6310.75
Shirt	-0.150***	4.27	11.02	1536	-0.212***	2.91	6061.18
Socks	-0.115***	5.67	13.54	1367	-0.203***	3.05	6115.91
Blanket	-0.071***	9.41	11.66	1752	-0.091***	7.27	6741.67
Lipstick	-0.100***	6.58	13.46	1396	-0.147***	4.36	6494.58
Toilet paper	-0.128***	5.06	7.26	1046	-0.186***	3.38	8747.08
Napkins	-0.139***	4.63	5.96	1243	-0.173***	3.66	9334.07
Towel	-0.069***	9.69	11.62	1562	-0.106***	6.16	6331.74
Toothpaste	-0.140***	4.6	4.53	1850	-0.199***	3.12	6471.2
Sleepers	-0.096***	6.87	12.57	1544	-0.168***	3.76	5663.58

See notes in Table A7

Table A10: EQ-TAR Estimation Results: Non-Perishables

	AR(1)		EQ_TAR				
Product	**Coefficient**	**Half Life**	**c (%)**	**Nout**	**Coefficient**	**Half-life**	**LLR_{EQ}**
Flour	-0.176***	3.58	3.41	1400	-0.177***	3.56	4799.58
Rice	-0.141***	4.56	4.26	1633	-0.139***	4.62	5244.02
Pasta	-0.189***	3.31	3.46	1457	-0.192***	3.24	4732.73
Bulgur	-0.121***	5.37	5.8	1330	-0.122***	5.34	4802.44
Oliveoil	-0.160***	3.98	2.84	1777	-0.161***	3.95	5790.71
Jam	-0.101***	6.51	6.18	1279	-0.105***	6.25	5452.35
Honey	-0.114***	5.73	5.07	1514	-0.113***	5.75	4626.16
Ready soup	-0.163***	3.9	3.04	1754	-0.164***	3.86	5683.53
Driedbeans	-0.164***	3.87	5.44	1522	-0.166***	3.81	4649.92
Chickpeas	-0.137***	4.7	5.62	1496	-0.136***	4.73	4607.98
Lentil	-0.150***	4.27	5.28	1639	-0.149***	4.29	4588.93
Terilen	-0.083***	8	8.48	1608	-0.084***	7.85	4894.38
Keten	-0.070***	9.55	12.54	1654	-0.070***	9.59	4918.65
Shirt	-0.150***	4.27	11.02	1529	-0.152***	4.22	5058.42
Socks	-0.115***	5.67	13.54	1357	-0.118***	5.54	4869.53
Blanket	-0.071***	9.41	14.28	1489	-0.074***	9.07	5169.61
Lipstick	-0.100***	6.58	13.46	1386	-0.101***	6.53	4996.53
Toilet paper	-0.128***	5.06	7.26	1028	-0.136***	4.74	6180.96
Napkins	-0.139***	4.63	5.87	1250	-0.144***	4.46	6086.69
Towel	-0.069***	9.69	11.23	1589	-0.069***	9.7	4604.81
Toothpaste	-0.140***	4.6	4.53	1841	-0.140***	4.58	5003.16
Sleepers	-0.096***	6.87	12.57	1531	-0.098***	6.75	4792.61

See notes in Table A7

Table A11: Band-TAR Estimation Results: Services

	AR(1)		BAND_TAR				
Product	Coefficient	Half Life	c (%)	Nout	Coefficient	Half-life	LLR_{BA}
Dentist	-0.105***	6.25	12.86	1300	-0.141***	4.56	5840.83
Hotel	-0.055***	12.25	23.89	1634	-0.069***	9.72	6809.7
Coiffeure	-0.131***	4.94	13.4	1488	-0.194***	3.22	5957.75
Barber	-0.131***	4.94	10.76	1826	-0.180***	3.49	5609.13
Doctor's fee	-0.125***	5.19	8.95	1556	-0.150***	4.28	5541.72
Glass Tea	-0.101***	6.51	12.64	1553	-0.132***	4.91	5728.7
Football field rent	-0.083***	8	14.54	1867	-0.121***	5.39	5835.32
Cleaning Services	-0.114***	5.73	12.87	1603	-0.165***	3.84	5439.96
Photo Development	-0.109***	6.01	14.3	1576	-0.146***	4.41	6022.22
Shoe Repair Men	-0.068***	9.84	20.54	1444	-0.097***	6.76	6300.03

See notes in Table A7

Table A12: EQ-TAR Estimation Results: Services

	AR(1)		EQ_TAR				
Product	Coefficient	Half Life	c (%)	Nout	Coefficient	Half-life	LLR_{EQ}
Dentist	-0.105***	6.25	12.86	1285	-0.105***	6.25	5166.15
Hotel	-0.055***	12.25	23.89	1627	-0.054***	12.48	5289.76
Coiffeure	-0.131***	4.94	13.4	1472	-0.133***	4.85	4920.47
Barber	-0.131***	4.94	10.76	1819	-0.132***	4.9	4885.25
Doctor's fee	-0.125***	5.19	8.95	1544	-0.125***	5.2	5002.38
Glass Tea	-0.101***	6.51	12.64	1539	-0.098***	6.72	4831.71
Football field rent	-0.083***	8	20.04	1448	-0.086***	7.68	4979.39
Cleaning Services	-0.114***	5.73	12.87	1589	-0.112***	5.83	4908.81
Photo Development	-0.109***	6.01	14.3	1567	-0.108***	6.08	4864.97
Shoe Repair Men	-0.068***	9.84	20.54	1430	-0.068***	9.81	4981.72

See notes in Table A7

Table A13: Summary Statistics of relative prices for the sub-period 1995-1999

	Mean Standard Deviation				
Product	**Mean**	**Std. Dev.**	**Min**	**Max**	**Mean Absolute Price Differantials**
Flodough	0.09	0.03	0.04	0.15	0.08
Mutton	0.07	0.03	0.03	0.12	0.06
Veal	0.07	0.02	0.04	0.12	0.05
Chicken	0.07	0.02	0.03	0.15	0.06
Sucuk	0.06	0.03	0.03	0.15	0.05
Sausage	0.04	0.02	0.02	0.11	0.03
Salami	0.04	0.01	0.02	0.07	0.03
Kasari	0.07	0.02	0.04	0.13	0.06
Feta	0.06	0.02	0.03	0.11	0.05
Egg	0.05	0.02	0.02	0.11	0.04
Margarin	0.03	0.01	0.01	0.05	0.02
Halvah	0.07	0.03	0.04	0.16	0.05
Tompuree	0.06	0.04	0.03	0.22	0.04
Olive	0.06	0.02	0.02	0.11	0.05
Apple	0.15	0.03	0.10	0.21	0.11
Lemon	0.19	0.05	0.12	0.29	0.15
Tomato	0.16	0.04	0.09	0.23	0.12
Potato	0.10	0.03	0.05	0.18	0.07
Raisin	0.09	0.03	0.05	0.16	0.07
Flour	0.04	0.02	0.02	0.08	0.03
Rice	0.05	0.02	0.03	0.08	0.04
Pasta	0.04	0.01	0.02	0.07	0.03
Bulgur	0.06	0.02	0.03	0.09	0.05
Oliveoil	0.06	0.03	0.03	0.13	0.04
Jam	0.07	0.04	0.03	0.21	0.05
Honey	0.07	0.03	0.03	0.15	0.05
Readysoup	0.05	0.02	0.02	0.12	0.04
Driedbeans	0.07	0.03	0.03	0.13	0.05
Chickpeas	0.07	0.03	0.04	0.15	0.06
Lentil	0.07	0.03	0.04	0.15	0.05
Terilen	0.11	0.06	0.04	0.31	0.09
Keten	0.18	0.07	0.09	0.44	0.14
Shirt	0.13	0.05	0.07	0.29	0.10
Socks	0.14	0.05	0.07	0.26	0.11
Blanket	0.14	0.08	0.08	0.45	0.12
Lipstick	0.13	0.04	0.06	0.22	0.10
Toilet paper	0.06	0.03	0.03	0.15	0.05
Napkins	0.05	0.02	0.02	0.11	0.04
Towel	0.12	0.05	0.05	0.28	0.10
Toothpaste	0.07	0.02	0.04	0.13	0.05
Sleepers	0.15	0.04	0.06	0.22	0.12
Dentist	0.15	0.07	0.06	0.34	0.12
Hotel	0.29	0.15	0.13	0.65	0.24
Coiffeure	0.16	0.04	0.11	0.22	0.13
Barber	0.19	0.06	0.07	0.31	0.15
Doctor's fee	0.12	0.07	0.06	0.36	0.10
Glass Tea	0.17	0.08	0.08	0.41	0.14
Football field rental fee	0.22	0.09	0.13	0.54	0.18
Cleaning Services	0.19	0.08	0.08	0.41	0.15
Photo Development	0.17	0.07	0.10	0.34	0.13
Shoe Repair Men	0.21	0.10	0.08	0.58	0.18

See notes in Table A3

Table A14: Summary Statistics for relative prices for the sub-period 2002-2004

	Mean Standard Deviation				
Product	**Mean**	**Std. Dev.**	**Min**	**Max**	**Mean Absolute Price Differantials**
Flodough	0.06	0.03	0.03	0.11	0.05
Mutton	0.05	0.02	0.02	0.11	0.04
Veal	0.04	0.02	0.02	0.09	0.03
Chicken	0.07	0.02	0.03	0.11	0.05
Sucuk	0.04	0.02	0.02	0.08	0.03
Sausage	0.04	0.02	0.01	0.09	0.03
Salami	0.03	0.03	0.01	0.18	0.03
Kasari	0.04	0.03	0.02	0.12	0.03
Feta	0.04	0.02	0.01	0.08	0.03
Egg	0.05	0.02	0.02	0.11	0.04
Margarin	0.03	0.01	0.01	0.06	0.03
Halvah	0.03	0.01	0.01	0.06	0.02
Tompuree	0.03	0.01	0.02	0.07	0.02
Olive	0.04	0.01	0.02	0.07	0.03
Apple	0.12	0.03	0.08	0.19	0.10
Lemon	0.16	0.05	0.10	0.25	0.13
Tomato	0.13	0.03	0.09	0.19	0.10
Potato	0.09	0.03	0.05	0.17	0.07
Raisin	0.07	0.03	0.02	0.13	0.05
Flour	0.03	0.01	0.02	0.04	0.02
Rice	0.03	0.01	0.01	0.05	0.02
Pasta	0.03	0.01	0.01	0.05	0.03
Bulgur	0.03	0.01	0.01	0.06	0.02
Oliveoil	0.03	0.02	0.01	0.07	0.02
Jam	0.04	0.02	0.02	0.10	0.03
Honey	0.04	0.02	0.02	0.11	0.03
Readysoup	0.02	0.01	0.01	0.05	0.02
Driedbeans	0.07	0.03	0.02	0.13	0.05
Chickpeas	0.06	0.02	0.02	0.11	0.05
Lentil	0.06	0.04	0.03	0.21	0.05
Terilen	0.07	0.04	0.02	0.19	0.06
Keten	0.08	0.03	0.03	0.14	0.06
Shirt	0.08	0.03	0.03	0.19	0.06
Socks	0.08	0.03	0.04	0.13	0.06
Blanket	0.10	0.07	0.04	0.32	0.09
Lipstick	0.08	0.05	0.03	0.26	0.07
Toilet paper	0.03	0.01	0.02	0.06	0.03
Napkins	0.04	0.02	0.02	0.11	0.03
Towel	0.07	0.05	0.02	0.24	0.06
Toothpaste	0.06	0.03	0.02	0.12	0.05
Sleepers	0.09	0.04	0.04	0.19	0.07
Dentist	0.09	0.07	0.04	0.38	0.07
Hotel	0.16	0.10	0.06	0.48	0.13
Coiffeure	0.10	0.05	0.04	0.28	0.08
Barber	0.13	0.05	0.05	0.29	0.10
Doctor's fee	0.07	0.02	0.04	0.13	0.06
Glass Tea	0.08	0.03	0.03	0.17	0.06
Football field rental fee	0.11	0.06	0.04	0.28	0.10
Cleaning Services	0.09	0.04	0.04	0.18	0.07
Photo Development	0.12	0.06	0.04	0.29	0.10
Shoe Repair Men	0.11	0.04	0.05	0.18	0.09

See notes in Table A3

Table A15: EQ-TAR Estimation Results: Perishables (1995:01-1999:12)

	AR(1)		EQ_TAR				
Product	**Coefficient**	**Half Life**	**c (%)**	**Nout**	**Coefficient**	**Half-life**	**LLR_{EQ}**
Flodough	-0.260***	2.31	6.19	763	-0.260***	2.3	2117.2
Mutton	-0.281***	2.1	4.82	699	-0.283***	2.09	2161.6
Veal	-0.263***	2.27	4.24	735	-0.262***	2.28	2189.5
Chicken	-0.400***	1.36	4.56	724	-0.402***	1.35	2165.0
Sucuk	-0.150***	4.25	3.48	808	-0.152***	4.22	2174.2
Sausage	-0.270***	2.21	2.49	667	-0.268***	2.22	2368.4
Salami	-0.331***	1.73	2.22	728	-0.336***	1.69	2214.0
Kasari	-0.171***	3.69	4.57	760	-0.171***	3.7	2078.3
Feta	-0.166***	3.82	3.77	744	-0.166***	3.82	2108.3
Egg	-0.562***	0.84	3.63	608	-0.550***	0.87	2241.7
Margarin	-0.287***	2.05	1.47	767	-0.291***	2.01	2170.7
Halvah	-0.220***	2.79	3.38	871	-0.223***	2.75	2258.2
Tompuree	-0.188***	3.33	3.24	724	-0.191***	3.27	2739.3
Olive	-0.146***	4.4	3.95	688	-0.143***	4.48	2151.0
Apple	-0.545***	0.88	9.18	736	-0.550***	0.87	2184.1
Lemon	-0.360***	1.55	14.85	665	-0.363***	1.54	2200.6
Tomato	-0.613***	0.73	9.09	752	-0.605***	0.75	2231.1
Potato	-0.605***	0.75	6.30	695	-0.606***	0.75	2180.5
Raisin	-0.227***	2.69	6.38	711	-0.226***	2.7	2108.1

See notes in Table A7

Table A16: EQ-TAR Estimation Results: Non-Perishables (1995:01-1999:12)

	AR(1)		EQ_TAR				
Product	**Coefficient**	**Half Life**	**c (%)**	**Nout**	**Coefficient**	**Half-life**	**LLR_{EQ}**
Flour	-0.222***	2.76	2.74	696	-0.219***	2.81	2181.5
Rice	-0.199***	3.12	3.14	718	-0.197***	3.15	2179.0
Pasta	-0.210***	2.95	2.76	673	-0.208***	2.97	2169.5
Bulgur	-0.216***	2.85	4.37	660	-0.216***	2.84	2358.8
Oliveoil	-0.183***	3.43	3.96	654	-0.190***	3.29	2632.9
Jam	-0.143***	4.5	4.40	698	-0.146***	4.39	2202.1
Honey	-0.173***	3.64	4.21	710	-0.172***	3.68	2220.3
Ready soup	-0.169***	3.75	2.85	812	-0.168***	3.77	2180.7
Driedbeans	-0.203***	3.06	4.62	710	-0.209***	2.95	2378.6
Chickpeas	-0.197***	3.16	4.91	675	-0.196***	3.18	2233.6
Lentil	-0.267***	2.24	4.71	657	-0.270***	2.21	2155.0
Terilen	-0.127***	5.12	7.08	701	-0.126***	5.13	2434.0
Keten	-0.098***	6.72	12.63	728	-0.097***	6.77	2200.0
Shirt	-0.188***	3.33	8.79	739	-0.187***	3.35	2183.2
Socks	-0.221***	2.78	8.86	764	-0.224***	2.74	2499.7
Blanket	-0.118***	5.55	12.21	584	-0.123***	5.29	2370.9
Lipstick	-0.173***	3.65	7.68	775	-0.174***	3.64	2261.3
Toilet paper	-0.116***	5.64	3.93	739	-0.110***	5.92	2141.6
Napkins	-0.149***	4.28	3.50	701	-0.146***	4.4	2162.9
Towel	-0.129***	5.03	7.79	754	-0.131***	4.96	2164.2
Toothpaste	-0.191***	3.26	5.12	615	-0.194***	3.21	2346.3
Sleepers	-0.142***	4.52	10.91	746	-0.140***	4.59	2080.0

See notes in Table A7

Table A17: EQ-TAR Estimation Results: Services (1995:01-1999:12)

	AR(1)		EQ_TAR				
Product	**Coefficient**	**Half Life**	**c (%)**	**Nout**	**Coefficient**	**Half-life**	**LLR_{EQ}**
Dentist	-0.195***	3.19	9.93	690	-0.198***	3.14	2415.2
Hotel	-0.098***	6.7	20.42	714	-0.100***	6.56	2408.1
Coiffeure	-0.226***	2.7	10.26	797	-0.230***	2.65	2191.7
Barber	-0.184***	3.42	11.04	816	-0.180***	3.49	2209.0
Doctor's fee	-0.229***	2.67	7.58	731	-0.229***	2.67	2155.6
Glass Tea	-0.152***	4.19	11.09	759	-0.153***	4.18	2221.7
Football field rent	-0.128***	5.08	17.87	661	-0.126***	5.15	2296.2
Cleaning Services	-0.165***	3.84	13.63	713	-0.163***	3.89	2164.3
Photo Development	-0.195***	3.2	13.34	640	-0.199***	3.12	2308.6
Shoe Repair Men	-0.111***	5.87	17.79	623	-0.109***	5.98	2292.3

See notes in Table A7

Table A18 : EQ-TAR Estimation Results: Perishables (2002:01-2004:12)

	AR(1)		EQ-TAR				
Product	**Coefficient**	**Half Life**	**c (%)**	**Nout**	**Coefficient**	**Half-life**	**LLR_{EQ}**
Flodough	-0.133***	4.88	-0.04	397	-0.136***	4.74	1335.2
Mutton	-0.228***	2.67	0.04	423	-0.228***	2.68	1310.5
Veal	-0.279***	2.12	-0.03	399	-0.280***	2.11	1342.3
Chicken	-0.388***	1.41	-0.05	385	-0.401***	1.35	1456.3
Sucuk	-0.190***	3.28	0.03	456	-0.192***	3.25	1301.0
Sausage	-0.135***	4.79	0.02	460	-0.136***	4.75	1380.2
Salami	-0.102***	6.46	0.02	465	-0.098***	6.7	1440.0
Kasari	-0.129***	5.01	-0.03	390	-0.128***	5.06	1417.5
Feta	-0.128***	5.06	0.02	426	-0.123***	5.28	1335.6
Egg	-0.455***	1.14	-0.03	439	-0.450***	1.16	1299.8
Margarin	-0.279***	2.12	0.02	381	-0.287***	2.05	1372.2
Halvah	-0.183***	3.43	0.02	427	-0.186***	3.37	1331.5
Tompuree	-0.221***	2.77	-0.02	401	-0.226***	2.7	1372.3
Olive	-0.124***	5.25	0.02	456	-0.118***	5.53	1391.4
Apple	-0.523***	0.94	-0.08	419	-0.515***	0.96	1261.9
Lemon	-0.356***	1.58	-0.11	422	-0.372***	1.49	1318.9
Tomato	-0.816***	0.41	0.08	427	-0.807***	0.42	1254.7
Potato	-0.565***	0.83	-0.06	450	-0.581***	0.8	1274.4
Raisin	-0.261***	2.29	0.05	378	-0.273***	2.17	1514.7

See notes in Table A7

Table A19: EQ-TAR Estimation Results: Non-Perishables (2002:01-2004:12)

	AR(1)		EQ_TAR				
Product	Coefficient	Half Life	c (%)	Nout	Coefficient	Half-life	LLR_{EQ}
Flour	-0.206***	3.01	-0.02	432	-0.212***	2.91	1286.8
Rice	-0.190***	3.28	-0.02	405	-0.179***	3.51	1278.6
Pasta	-0.164***	3.86	-0.02	456	-0.174***	3.62	1328.0
Bulgur	-0.200***	3.1	-0.02	402	-0.203***	3.05	1265.8
Oliveoil	-0.142***	4.53	0.02	375	-0.144***	4.46	1367.4
Jam	-0.186***	3.38	0.02	455	-0.193***	3.23	1363.5
Honey	-0.156***	4.08	0.03	450	-0.162***	3.91	1249.9
Ready soup	-0.227***	2.69	-0.02	438	-0.226***	2.7	1274.7
Driedbeans	-0.194***	3.21	-0.03	532	-0.195***	3.19	1469.4
Chickpeas	-0.199***	3.13	0.03	477	-0.198***	3.14	1363.5
Lentil	-0.160***	3.99	0.04	412	-0.155***	4.13	1370.8
Terilen	-0.117***	5.55	0.05	427	-0.114***	5.74	1500.6
Keten	-0.172***	3.67	-0.05	478	-0.173***	3.65	1341.5
Shirt	-0.284***	2.08	0.06	421	-0.290***	2.02	1411.9
Socks	-0.172***	3.67	0.04	491	-0.174***	3.62	1545.6
Blanket	-0.123***	5.28	0.08	387	-0.123***	5.28	1374.8
Lipstick	-0.145***	4.42	0.06	399	-0.150***	4.27	1306.3
Toilet paper	-0.179***	3.51	-0.02	460	-0.185***	3.38	1296.0
Napkins	-0.142***	4.53	0.03	354	-0.145***	4.41	1561.5
Towel	-0.147***	4.35	0.04	449	-0.149***	4.29	1383.1
Toothpaste	-0.124***	5.25	0.04	378	-0.129***	5.03	1503.2
Sleepers	-0.176***	3.59	-0.06	444	-0.183***	3.43	1390.0

See notes in Table A7

Table A20 : EQ-TAR Estimation Results: Services (2002:01-2004:12)

	AR(1)		EQ_TAR				
Product	**Coefficient**	**Half Life**	**c (%)**	**Nout**	**Coefficient**	**Half-life**	**LLR_{EQ}**
Dentist	-0.214***	2.88	5.58	422	-0.214***	2.88	2003.5
Hotel	-0.099***	6.63	12.50	358	-0.097***	6.81	1436.8
Coiffeure	-0.157***	4.05	7.10	418	-0.160***	3.97	1342.8
Barber	-0.172***	3.68	11.53	354	-0.187***	3.35	1804.9
Doctor's fee	-0.181***	3.47	5.18	469	-0.183***	3.43	1282.2
Glass Tea	-0.165***	3.85	5.45	428	-0.176***	3.59	1533.9
Football field rent	-0.142***	4.54	10.82	339	-0.145***	4.41	1776.7
Cleaning Services	-0.190***	3.3	7.19	382	-0.204***	3.05	1480.3
Photo Development	-0.123***	5.26	12.20	322	-0.125***	5.17	1417.8
Shoe Repair Men	-0.144***	4.47	7.03	483	-0.150***	4.26	1364.5

See notes in Table A7

Figure A1: Aggregate inflation in Turkey between 1994:01 and 2004:12

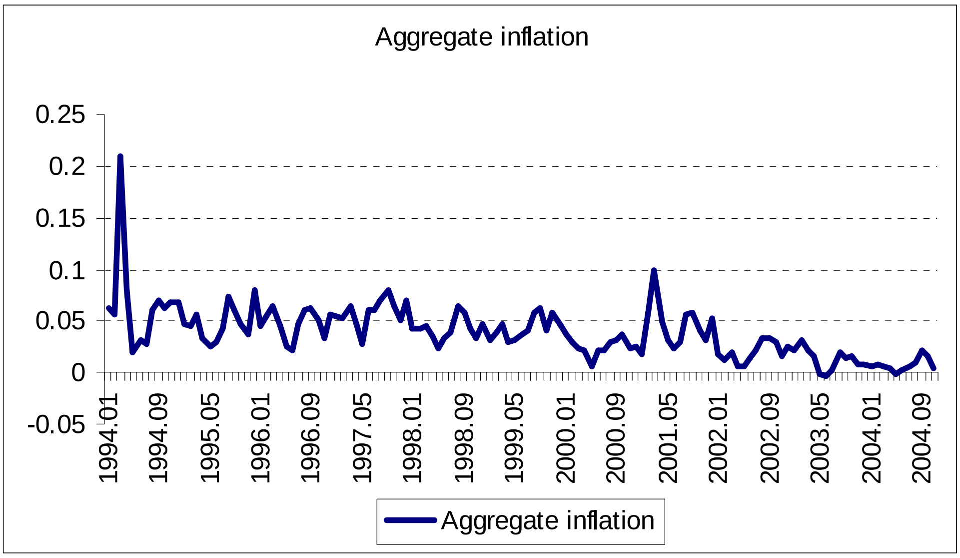
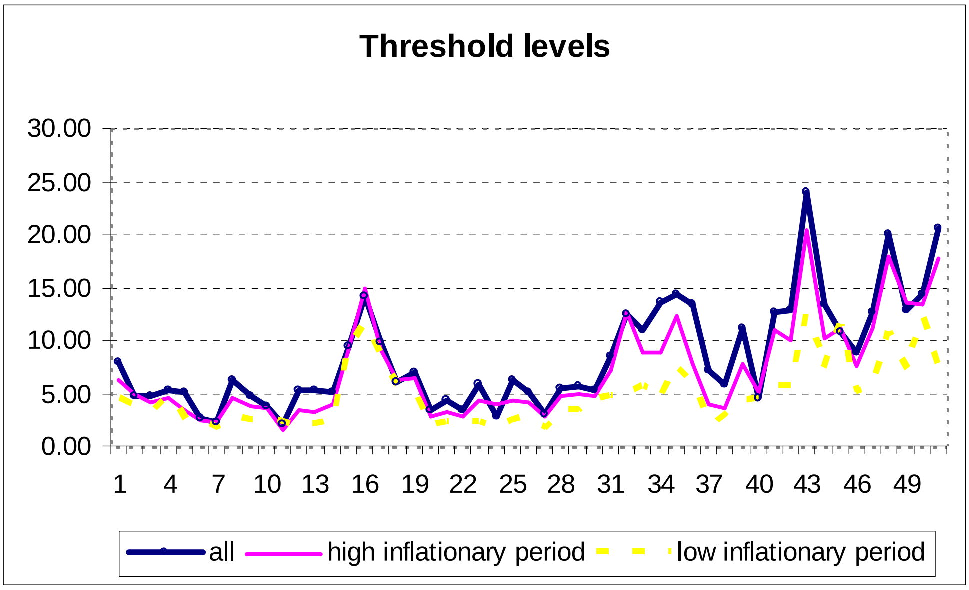
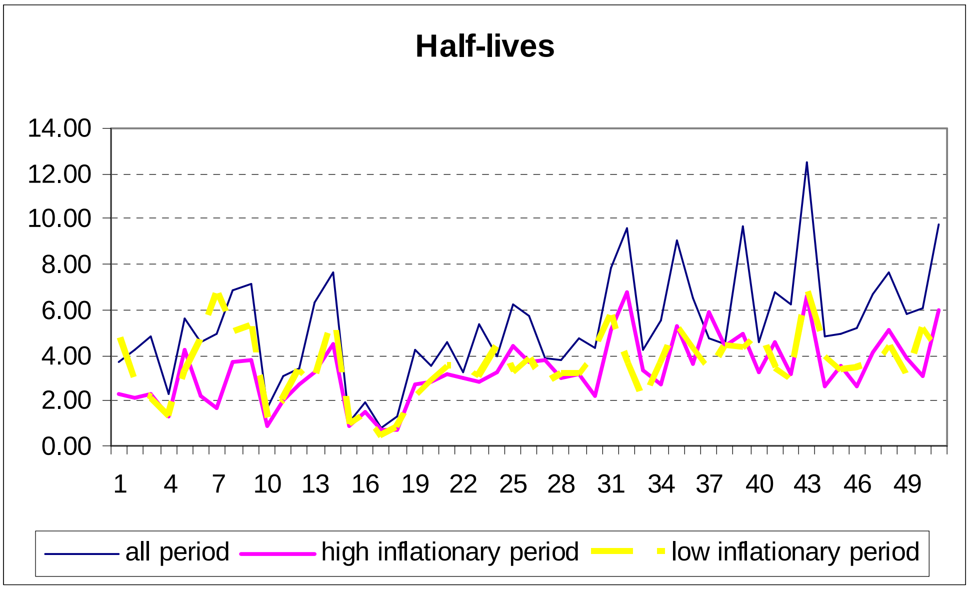


Figure A2: Percentage threshold levels obtained from EQ-TAR Model



NOTE: All represents the period between 1994:01 and 2004:12. High inflationary period is the period between 1995:01 and 1999:12. Low inflationary period consists of the period between 2002:01 and 2004:12.

Figure A3: Half-lives obtained from EQ-TAR model



See notes in Figure A2

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