THE EFFECT OF INFLATION UNCERTAINTY ON PRICE COMPONENTS: THE CASE OF TURKEY

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Abstract: This study examines the relationship between inflation uncertainty and price components in general price level. It examines which price components at general price level cause inflation uncertainty, and also which price components are more affected by such uncertainty. The Turkish economy is observed with regard to the time period between January 2003 and September 2011, and inflation uncertainty is obtained by being defined as conditional variance within the inflation process, which itself is estimated according to not only a function of its past values, but also a set of data including money supply, industrial production index, exchange rate, and interest rate. The relationship between price components and inflation uncertainty is analysed, using Granger Causality Test, Impulse Response and Variance Decompositions Analysis. As per the findings, the effect of inflation uncertainty on the price components of general price level, and similarly, the effects of price components of general price level on the inflation uncertainty differ.

Keywords: Inflation Uncertainty, Price Components, Granger Causality Test, Impulse Response Analysis, Variance Decomposition, Ng-Perron Unit Root Test, Turkey.

ENFLASYON BELİRSİZLİĞİNİN FİYAT BİLEŞENLERİ ÜZERİNE ETKİSİ: TÜRKİYE ÖRNEĞİ

Özet: Bu çalışmada, enflasyon belirsizliği ile fiyatlar genel düzeyini oluşturan fiyat alt kalemleri arasındaki ilişki incelenmiştir. Enflasyon belirsizliğine, fiyatlar genel seviyesindeki hangi alt kalemlerin neden olduğunun ve belirsizliğin hangi alt kalemlerin fiyatlarını daha çok etkilediğinin ortaya çıkarılması amaçlanmıştır. 2003:01-2011:09 dönemi Türkiye ekonomisinin incelendiği çalışmada, enflasyon belirsizliği, enflasyon sürecinin koşullu varyansı olarak tanımlanarak elde edilmiştir. Enflasyon süreci sadece kendi geçmiş değerlerinin bir fonksiyonu olarak değil, para arzı (money supply), sanayi üretim endeksi(industrial production index), döviz kuru (exchange rate) ve faiz oranı (interest rate) değişkenlerinden oluşan bir bilgi kümesine bağlı olarak kestirilmiştir. Granger causality testi, Impulse Response ve Variance Decompositions Analysis kullanılarak fiyat alt kalemleri ile enflasyon belirsizliği arasındaki ilişkiler araştırılmıştır. Bulgulara göre, enflasyon belirsizliğinin, fiyatlar genel seviyesini oluşturan fiyat alt kalemleri üzerindeki etkisi ve benzer şekilde fiyatlar genel seviyesini oluşturan fiyat alt kalemlerinin de enflasyon belirsizliğine etkisi farklılık göstermektedir.

Anahtar Kelimeler: Enflasyon Belirsizliği, Fiyat Bileşenleri, Granger Nedensllik Testi, Etki Tepki Fonksiyonları, Varyans Ayrıştırması, Ng-Perron Birim Kök Testi, Türkiye.

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I. Introduction

With increasing inflation rates After World War II, researches began to focus more inflation and it impacts on economic variables. While the effects of the anticipated inflation on the real variables are very little or almost none, unanticipated inflation has been accepted to have an impact on such variables - at least in the short term. This is because unanticipated inflation there is uncertainty. In turn, uncertainty has its own effects on individuals' behaviors and the economy itself. In multivariate structures, including uncertainty, any unexpected event is probable to happen at any time.

One of the most important causes of inflation is the inflation uncertainty, which can be created by itself. Inflation uncertainty causes both a reduction and consumer welfare and resource allocative efficiency by influencing the consumer's savings and companies' investment decisions in a negative manner.

The costs incurred by inflation uncertainty reveal the truth that the relationship between inflation and uncertainty should be studied in more detail. In recent years, measuring inflation uncertainty and the causality between inflation and uncertainty have been among the most popular subjects under study. Thanks to many researches, the one-way or two-way interaction of inflation and inflation uncertainty have been brought into a better spot light. However, inflation uncertainty may not affect the price components of general price level in the same way. Similarly, some price components may create inflation uncertainty more than the others. In the fight against inflation, it is very important to know which price components cost more than the others. In this way, policy-makers can only focus on reducing the uncertainty created by the price components which trigger inflation, instead of focusing on all price components.

The aim of this study is to observe the link between inflation uncertainty and price components of general price level. Thus, it is intended to find out which price components of general price level cause inflation uncertainty and which components are affected more by uncertainty.

The study focuses on the Turkish economy, using the monthly data for the January 2003 to September 2011 period. For this purpose, primarily, inflation uncertainty is obtained by being defined as the conditional variance of the inflation process. The inflation process is estimated according to not only a function of its past values, but also a set of information including money supply, industrial production index, exchange rate, and interest rate. Afterwards, the causality between inflation uncertainty and the price components of general price level is analysed using Granger Causality Test. Also, the dynamic relations between these two elements are investigated with the help of Impulse Response and Variance Decomposition Analysis.

The rest of paper is organised as follows: Section 2 and section 3 overview the literature of the causal relationship between inflation and inflation uncertainty, as well as the measurement of inflation uncertainty. In section 4, the model used for measuring uncertainty is presented. The Empirical analysis takes place in section 5, and the conclusion section summarizes the findings.

II. The causality between inflation and inflation uncertainty

The relationship between inflation and inflation uncertainty has been a commonly observed subject in the literature. The motivation behind such interest among economists concerning this relationship has been to explain the costs brought about by inflation. Generally, the cost of anticipated inflation is very low, but if inflation causes uncertainty, significant costs can occur (Ball, 1990:16).

The link between these two elements was first studied by Okun (1971). According to Okun, high inflation creates high and variable inflation expectations among individuals. Unexpected inflation shocks which may occur in the future also cause inflation uncertainty (Okun, 1971:490). The relationship between inflation and inflation uncertainty was placed on a theoretical basis by Friedman (1977) according to whom, high inflation firstly causes uncertainty as a result of unstable politics and, then, increasing inflation uncertainty will causes a negative effect on output by reducing the effect of price mechanism on an effective allocation of resources (Bredin and Fountas, 2005:60-61). The argument by Friedman was formulated using a game-theorical model by Ball (1992), and the statement “high inflation creates higher inflation uncertainty” appeared in the literature as the “Friedman – Ball hypothesis”.

One other hypothesis, “Pourgerami and Maskus Hypothesis”, claims that an increase in the inflation rate decreases inflation uncertainty. According to this hypothesis, economic agents spend more when inflation increases in order to forecast the future inflation, thus making inflation more predictable. In this way, uncertainty can be reduced (Pourgerami and Markus, 1987:287-290). As long as high inflation rates can be forecast, they don’t cause inflation variability (Ungar and Zilberfarb, 1993:709).

Besides these two hypotheses, which establish the direction of the relationship between inflation and inflation uncertainty to be from the former to the latter, there have also been other opinions defining this causality to be vice versa; these are: Cukierman and Meltzer (1986) and Holland (1995) hypotheses. The first one postulates that of raise in inflation uncertainty has the same effect in inflation and, since inflation uncertainty increases the output and employment, policy-makers try to raise uncertainty by creating unexpected inflation. Nevertheless, growing uncertainty causes the inflation rate to get higher. On the other hand, the Holland hypothesis claims that growing inflation uncertainty causes inflation to decline and that policy-makers try to decrease inflation by reducing the growing ratio of money supply in order to avoid the cost of inflation uncertainty caused by the spike in inflation.

The causality between inflation and inflation uncertainty has been the subject of many studies as well. Mostly contains results supporting the Friedman – Ball Hypothesis (see, for example, Evans, 1991; Brunner and Hess, 1993; Baillie et al., 1996; Fountas, 2001; Kontonikas, 2004; Thornton, 2006); the studies pertaining to some countries studies have had the results supporting the Cukierman-Meltzer Hypothesis (for example, Grier and Perry, 1998 and Conrad and Karanasos, 2005); this is while some other country studies have favoured the Holland Hypothesis (such as Fountas et al., 2004; Berument and Dinçer, 2005). A number of studies, though, could not find any relationship between inflation and inflation uncertainty (Fischer, 1981; Cosimano and Jansen, 1988).

III. Methods of Measuring Inflation Uncertainty

In order to do empirical analysis of the relationships between inflation and inflation uncertainty, firstly inflation uncertainty should be measured. In doing so, many proxies have been used for inflation uncertainty; these are horizontal sectional variability of expected inflation rates, estimate of inflation rates variability, and variability of inflation forecast errors. In this context, within the literature, the approaches measuring inflation uncertainty according to the method used can be grouped under three headings.

In the first of these, *the survey-based approach*, the distribution of the variability of inflation expectations rates obtained by the expectation surveys are used for measuring the uncertainty. The uncertainty is stated as the variability of inflation expectations rates' distribution. A high variance in the value of individuals' forecasts means a lack of confidence in their forecasts. For this reason, inflation uncertainty is accepted as the deviation of individuals' inflation forecasts. This method has been preferred by many authors, such as Cukierman and Wachtel (1979), Levi and Makin (1980), Cukierman and Wachtel (1982), Hafer (1985), Davis and Kanago (1996), Johnson (2002).

Bomberger (1996), Zarnowitz and Lambros (1987) and Mankiw et al. (2003) claim that the distribution of survey forecasts measure inflation disagreements instead of uncertainty. Bomberger (1996), Zarnowitz and Lambros (1987) and Mankiw et al. (2003) postulate that distribution of survey forecasts measure inflation disagreements instead of uncertainty.

Similarly, Grier and Perry (2000) how suggested that survey-based measurements are spreads of disagreements among forecasters at a point of time, and that they do not provide any information regarding individuals' uncertainty of forecastors. They state that, even though there are many uncertainties for all forecastors for the future, similar point estimations can be exhibited by all forecastors (Grier and Perry, 2000:47).

In the second group, studies using the *variable-based method* accept inflation variability as the proxy of inflation uncertainty. Katsimbris (1985), Froyen and Waud (1987), Ball and Ceccehetti (1990) are among these works.

The third approach is measuring the inflation uncertainty using the conditional variance distributions of inflation residuals. This has been the most preferred method in recent years. In the studies circling around this method, many conditional variance models have been applied including Autoregressive Conditional Heteroskedasticity (ARCH), Generalized Autoregressive Conditional Heteroskedasticity (GARCH), (Autoregressive Fractionally Integrated Moving Average - Generalized Autoregressive Conditional Heteroskedasticity (ARFIMA-GARCH). For measuring inflation uncertainty, the ARCH model was first used by Engle (1982), and latter the GARCH model was adapted by Bollerslev (1986). Generally, the ARCH and GARCH models and their families estimate the change in the conditional variance of inflation in the course of time.

Evans (1991) developed a time-varying ARCH model, while Evans and Wachtel (1993) measured uncertainty by their conditional variance model, which also reflects the probable regime changes within the process. Except these, the Barro and Gordon (1983) model, which was modified in many ways was used for measuring inflation uncertainty. Ball (1992), Cukierman and Meltzer (1986) and Devereux (1989) are the other examples in this category.

IV. Measuring Inflation Uncertainty

The survey-based or variable-based methods used for measuring the inflation uncertainty consists of simply calculated variability measurement by previous outputs or disagreement among forecastors. However, as Evans (1991) also stated, not all inflation variability measurements signify uncertainty. Because, even if inflation has a little variability, if individuals have insufficient information the future will be uncertain for them. Similarly, even if so much variability in inflation is observed, if individuals have the information regarding changes in the money policies in advance, inflation will be more predictable for them. Therefore, the standard deviation of the inflation calculated by using the ex-post inflation rates or another variability criterion of the inflation would not be a promising indicator of the variability that individuals perceive. Furthermore, individuals benefit from the existing information when deciding on their future expectations (Hasanov, 2008:197).

Considering the relationship between inflation uncertainty and inflation variability, the necessity remains as to define inflation expectations and variability based on a given set of information. In this context, within the present work, inflation uncertainty is defined as the conditional variance of the inflation process and similar to Telatar (1996), Grier and Perry (1998), Fountas et al. (2004), Akyazı and Artan (2004), Özer and Türkyılmaz (2005) and

Hasanov (2008). Not only from a function of its own past values, inflation process is projected from a variable group consisting of money supply, industrial production index, exchange rate and interest rate. The conditional variance of this inflation process is defined as “inflation uncertainty”.

As inflation ratio is π_t, an ARCH model is defined for inflation as below;

$$\pi_t = \alpha_0 + \sum_{i=1}^{m} \alpha_i \pi_{t-i} + \sum_{i=0}^{n} \beta_i m_{t-i} + \sum_{i=0}^{p} \gamma_i r_{t-i} + \sum_{i=0}^{k} \delta_i y_{t-i} + \sum_{i=0}^{r} \varphi_i e_{t-i} + \varepsilon_t \quad (1)$$

$$\varepsilon_t \mid \Omega_t \sim N(0, h_t^2) \quad (2)$$

$$h_t^2 = \phi_0 + \sum_{i=1}^{p} \phi_i \varepsilon_{t-i}^2 \quad (3)$$

where m is the money supply ; y is the Industrial Production Index; e is the exchange rate; r is the interest rate, and ε is the unestimated inflation shocks based on the Ω information set at t time . ε is assumed to be ≈N(0, σ^2), and h_t^2 is the conditional variance.

V. Empirical Analysis

In this section, the relation between inflation uncertainty and price components is analysed estimated firstly by the ARCH model to generate time-varying estimates of inflation uncertainty. Then these uncertainty figures are used to test the relation between inflation uncertainty and price components by Granger causality tests, impulse-response functions, and variance decomposition.

A. Estimating ARCH variance series

Inflation data and their characteristics

The monthly data for the period between January 2003 and September 2011 is obtained from the Central Bank of the Republic of Turkey as well as Turkish Statistical Institute. For estimating the inflation equation, money supply, interest rates, industrial production index, and exchange rate values are used and, as for the inflation ratio, the monthly change ratios within the consumer price index is considered. As commonly used in econometrics, the natural logarithm of exchange rate, money supply and production variables are also taken.

As it is known, the probability theories built for the time–series analysis are only valid for stationary ones. Therefore, the stationarities of the variables are initially analyzed. The Ng-Perron unit root test results of the variables, which were used in the estimation of inflation equation, are shown in Table 1.

Table 1: Ng and Perron Unit Root Test Results

Variables	No trend				With trend			
	MZa	MZt	MSB	MPT	MZa	MZt	MSB	MPT
Inflation rate	-28.472* (0.849)	-3.658* (0.849)	0.128* (0.849)	1.225* (0.849)	-40.437* (0.862)	-4.289* (0.862)	0.107* (0.862)	3.347* (0.862)
Exchange rate	-4.802 (4.67)	-1.504 (4.67)	0.313* (4.67)	5.208 (4.67)	-5.746 (4.49)	-1.530 (4.49)	0.266 (4.49)	15.583 (4.49)
D (Exchange rate)	-45.928* (1.86)	-4.787* (1.86)	0.104* (1.86)	0.548* (1.86)	-52.549* (1.85)	-5.101* (1.85)	0.098* (1.85)	1.856* (1.85)
Production	-4.460 (4.05)	-1.297 (4.05)	0.291* (4.05)	5.841 (4.05)	-27.587* (2.55)	-3.714* (2.55)	0.135* (2.55)	3.303* (2.55)
T (Production)	-22.393* (2.54)	-3.325* (2.54)	0.149* (2.54)	1.168* (2.54)	-27.587* (2.55)	-3.714* (2.55)	0.135* (2.55)	3.303* (2.55)
Money supply	1.621 (3.15)	4.571 (3.15)	2.820 (3.15)	575.370 (3.15)	-2.663 (2.69)	-1.121 (2.69)	0.421 (2.69)	33.110 (2.69)
D (Money supply)	-27.989* (0.404)	-3.734* (0.404)	0.133 * (0.404)	0.898* (0.404)	-31.307* (1.14)	-3.954* (1.14)	0.127* (1.14)	2.927* (1.14)
Interest rate	0.501 (5.38)	0.609 (5.38)	1.215* (5.38)	89.496 (5.38)	-1.567 (5.4)	-0.790 (5.4)	0.504 (5.4)	49.236 (5.4)
D (Interest rate)	-10.248* (0.0806)	-2.121* (0.0806)	0.207* (0.0806)	2.944* (0.0806)	-38.111* (0.945)	-4.366* (0.945)	0.115* (0.945)	2.392* (0.945)

Notes: The lag lengths were calculated by the Andrew Bandwidth and Bartlett Kernel to be used for the estimation method. The values in the paranthesis show the calculated bandwidth values. The critical values belonging to the unit root test were taken from Ng and Perron (2001) Table 1.
*Implies no unit root at 5% level

As seen in Table 1, only the inflation rate is stationary on level. The exchange rate, money supply, and the interest rate -stabilized by taking the first differences of the variables- are stationary variables on difference. The Industrial Production Index is a trend-stationary variable and was used in the analysis after the de-trending.

Estimating Inflation Model

In order for the ARCH Model to be applied, first of all, inflation equation should be estimated, and whether or not its variance is unstable should be tested. The optimal lag lengths of explanatory variables were identified according to the Akaike information criteria (AIC). In this context, ordinary least squares (OLS) results and the ARCH LM test results of equation (1) is shown in Table 2.

Table 2: *OLS estimates of inflation model (2003:02–2011:09)*

variable	**coefficient**	**t-ratio**
α_0	0.99	6.41***
α_1	0.19	1.88*
α_2	-0.18	-1.80*
α_3	-0.15	-1.45
α_4	-0.24	-2.40**
δ_1	0.79	0.93
β_1	-5.65	-2.51**
γ_1	-0.06	-0.88
φ_1	3.86	2.01**
R^2	0.24	
F-statistic	3.50(0.001)	
ARCH LM	4.07(0.04)	

Note: The numbers in parentheses indicate probabilities.
*Significance at 10% level
** Significance at 5% level
*** Significance at 1% level

As is appears in Table 2, the money supply and exchange rate variables in the estimated equation are significant. While the exchange rate value is positive (as expected), the money supply has a negative value. Except for the third lagged value of inflation, the relationship between current inflation and the previous inflation values are significant. The F statistical value of inflation equation is significant at 1% .

The ARCH LM test values, as seen in Table 2, indicate that the hypothesis of no ARCH effects in the standardized residuals can be rejected. The conditional variance equation for inflation shows that the ARCH term is significant at 5% , indicating that past information on squared errors are useful in predicting the conditional variance.

Estimation Results of the ARCH Model for Inflation

These results appear in Table 3 and have been obtained by using Maximum Likelihood Method. According to Table 3, the money supply and exchange rate variables in the estimated equation are significant. While the exchange rate value is positive (as expected), the money supply displays a negative value. The first and the fourth lagged values of inflation are also significant, and the inflation model is statistically significant at 1% (the F-stat is 2.96).

Table 3: *Estimates of the ARCH model of inflation (1970–2007)*

Variable	**Coefficient**	**t-ratio**
α_0	0.98	6.37***
α_1	0.20	1.70*
α_2	-0.15	-1.25
α_3	-0.17	-1.31
α_4	-0.25	-2.37**
β_1	-5.77	-2.36**
γ_1	-0.08	-1.15
δ_1	0.92	1.16
φ_1	4.23	2.77**
Variance Equation		
ϕ_0	0.35	4.43***
ϕ_1	0.21	2.10**
R^2	0.24	
F-statistic	2.69(0.006)	

Note: The numbers in parentheses indicate probabilities.
*Significance at 10%
** Significance at 5%
*** Significance at 1%

The coefficients in the conditional variance equation are statistically significant and positive. In addition, except for the stationary term, sum of all the parameters is less than 1, implying that all the assumptions of the ARCH model have been fulfilled. By using this model, the uncertainty series of inflation is obtained and used in the following analysis.

B. Relationship between inflation uncertainty and price components

This section determines whether there is a relationship between inflation uncertainty and price components. As the items of general price level, the following indices are considered; monthly change rates in the cost of food, clothing, household, health, personal care, transportation and communication, cultural, educational and entertainment, and dwelling expenses indices are used. The data appear in the electronic data delivery system of CBRT under the title of the "Cost of Living Indices for Wage Earners".

Granger causality tests

In determination of the causality between the price components and inflation uncertainty, the Granger causality analysis is used as first developed by Granger in 1969. According to his view, if the addition of the x variable's information into the model contributes to the prediction of the y variable, then the x variable is the cause of y (Granger, 1969:428).

Granger's causality, which investigates the direction of the causality between x and y variables, can be stated as;

$$x_t = \sum_{i=1}^{p} \alpha_i y_{t-i} + \sum_{j=1}^{p} \beta_j x_{t-j} + u_{1t} \tag{4}$$

$$y_t = \sum_{i=1}^{p} \lambda_i y_{t-i} + \sum_{j=1}^{p} \delta_j x_{t-j} + u_{2t} \tag{5}$$

where u_{1t} and u_{2t} are the error terms with no correlation in between.

The test results are presented in Table 4 for different lag periods. Accordingly, the causality between the household prices and inflation uncertainty is bilateral and, once inflation uncertainty is the cause of household prices, household prices in turn bring about inflation uncertainty. The other price components that cause inflation uncertainty are the clothing and health prices. Besides, inflation uncertainty is the cause of household, food, and dwelling prices.

Table 4 : *Granger Causality Test Results*

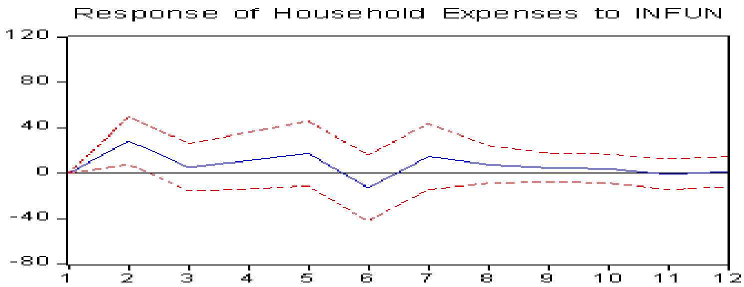
Direction of causality	**F-stat**
$Household \rightarrow INFUN$	2.65** [6]
$INFUN \rightarrow Household$	2.09* [6]
$Food \rightarrow INFUN$	0.14 [3]
$INFUN \rightarrow Food$	2.48* [3]
$Clothing \rightarrow INFUN$	2.34*[3]
$INFUN \rightarrow Clothing$	1.29[3]
$Dwelling \rightarrow INFUN$	1.01[8]
$INFUN \rightarrow Dwelling$	1.92*[8]
$Culture \rightarrow INFUN$	1.73[3]
$INFUN \rightarrow Culture$	0.57[3]
$Health \rightarrow INFUN$	5.58***[5]
$INFUN \rightarrow Health$	0.69[5]
$Transportation \rightarrow INFUN$	1.52[8]
$INFUN \rightarrow Transportation$	0.56[8]

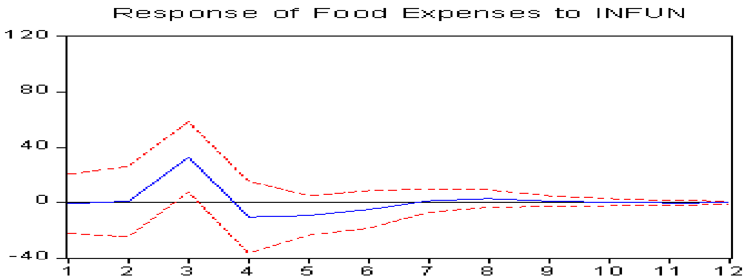
Notes: (a) INFUN means Inflation Uncertainty. (b) $Household \rightarrow INFUN$ implies that household expenses causes inflation uncertainty. (c) the numbers in each cell are the F-statistics associated with the null hypothesis followed by ***,** and *. (d) the optimal lag length is determined by the Akaike information criteria, and indicated in parenthesis.
*Significance at 10%
** Significance at 5%
*** Significance at 1%

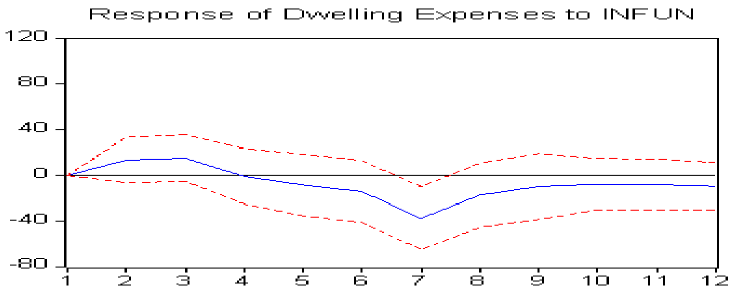
Impulse response analysis

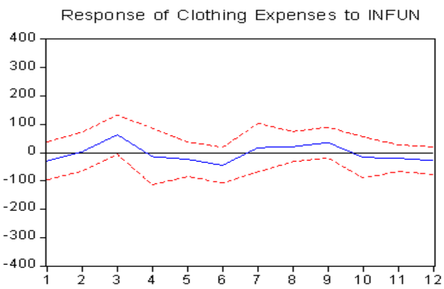
In order to study the dynamic relationships between price components and inflation volatility, impulse response analyses are employed whose functions (IRF) for each price component and inflation uncertainty are estimated separately by employing VAR (Vector Auto-Regression). The lag length of the VAR specification is set as the AIC (Akaike Information Criterion). Figures 1 and 2 show all the results for 12 terms. Dashed lines indicate two standart error (SE) bands representing a 95% level of confidence.

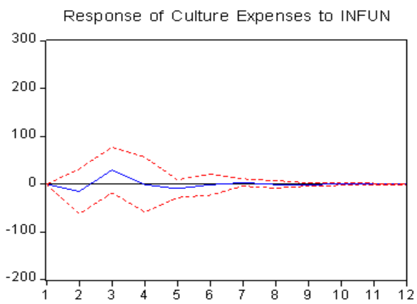
Figure 1 shows the movements of price components when there is one deviation innovation in the inflation uncertainty. As seen in the first diagram of Figure 1, inflation uncertainty affects the household prices positively and significantly until the middle of the second term and, then, it regains its initial level. The effect of inflation uncertainty on food prices appears in the third term and, after increasing the prices in the third term in statistically significant fashion, its effect disappears. Similarly, its effect on dwelling prices can only be seen significant in the 7th term. Contrary to the others, inflation uncertainty causes a negative effect on the dwelling prices. No effect can be seen of the inflation uncertainty shock on health, transportation, clothing, and cultural prices, thus supporting the Granger causality test results.











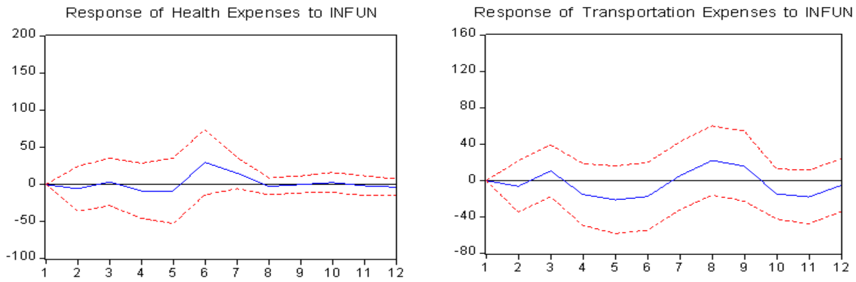
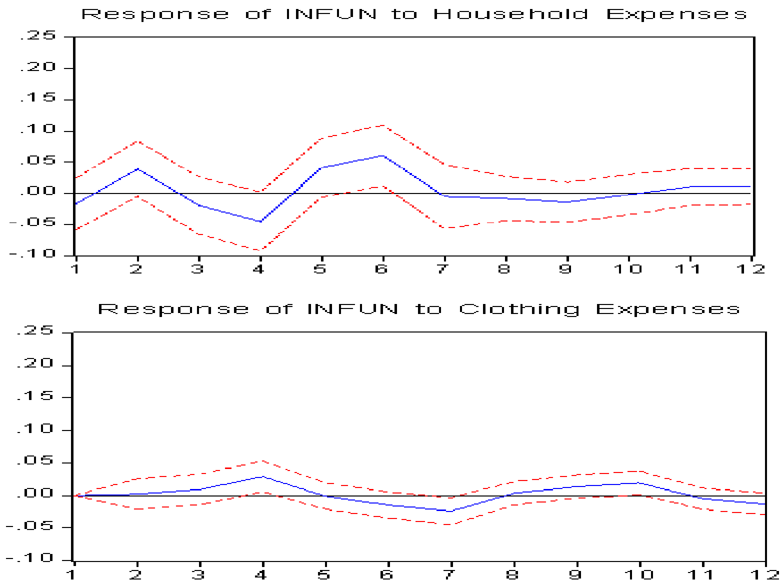


Figure 1: *Generalized Impulse Response Functions: response of price components to inflation uncertainty (Note: response to generalized one standard deviations* ± 2 *SE)*

Figure 2 shows the movements of inflation uncertainty when there is one standard deviation innovation in the price components. There is a bilateral interaction between the inflation uncertainty and household prices. When household prices reacted positively to the shock caused by inflation uncertainty for the first two terms, inflation uncertainty reacted positively to the shock on household prices in the 6th term. Inflation uncertainty reacted to health prices between the 5^{th} and 7^{th} terms. In this period, the shock on health prices caused a significant and positive reaction on inflation uncertainty. When inflation uncertainty reacts with a minor significance to the shock which appears on clothing prices in the 4th period, it is not affected significantly by the shocks that appear on food, transportation, cultural, and dwelling prices.



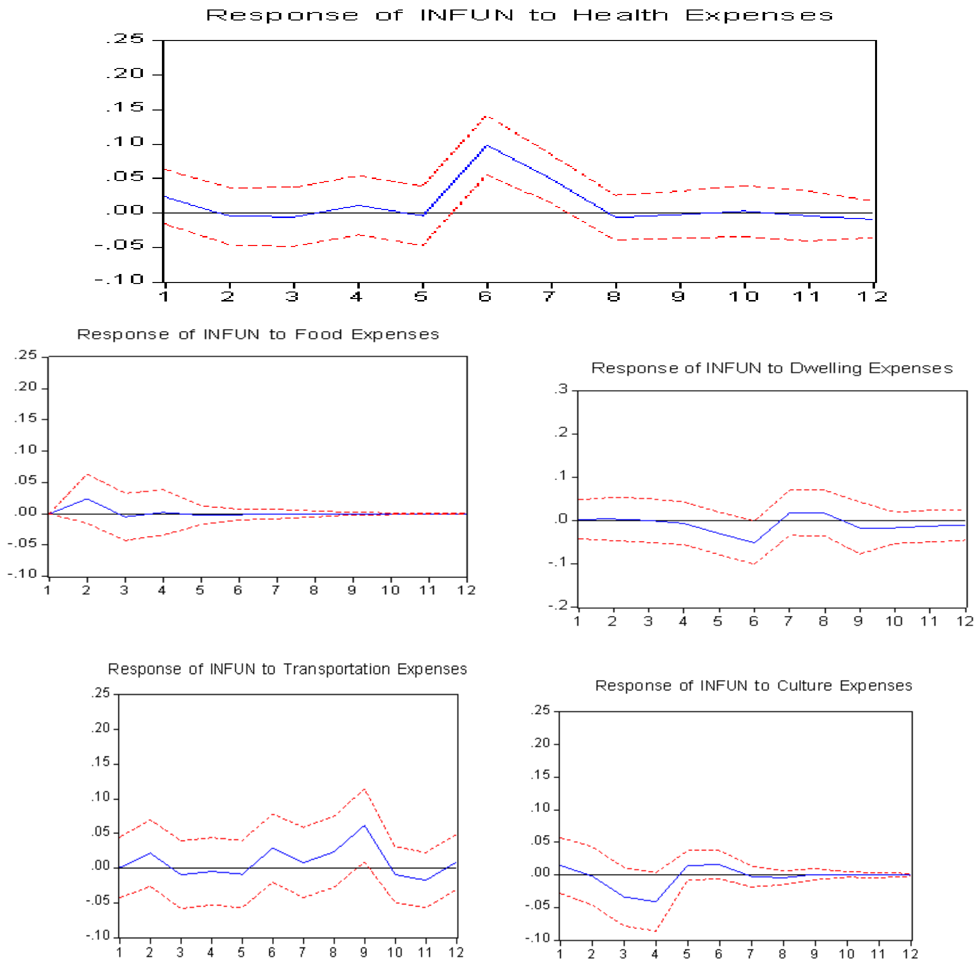


Figure 2: *Generalized Impulse Response Functions: response of inflation uncertainty to price components (Note: response to generalized one standard deviations* ± 2 *SE)*

According to the results, the price components which inflation uncertainty affects, and is affected by, differ. There is also, no bilateral interaction between transportation and cultural prices, and inflation uncertainty.

Variance Decomposition

Variance decomposition analysis determines how much of the forecast error variance of each of the variables can be explained by exogenous shocks to the other variables (Brooks, 2004: 342). The results of this analysis for 12 terms are shown in Table 6.

Table 6 : *Forecast Error Variance Decompositions*

Variance Decomposition of INFUN								
	Food	INFUN	Household	Clothing	Dwelling	Cultural	Health	Transpor-tation
1	4.719871	95.28013	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	4.900664	91.37550	1.114342	0.403850	0.235715	0.313562	1.434890	0.221479
3	5.482989	89.70948	1.140621	0.867522	0.259912	0.329542	1.986436	0.223495
4	5.292913	89.59011	0.990127	1.633776	0.206147	0.470347	1.598953	0.217628
5	4.540175	89.06313	1.181243	1.771684	0.249050	0.654618	2.333145	0.206952
6	4.922993	88.60804	1.095354	1.695429	0.234115	0.824964	2.386106	0.233001
7	5.455977	88.68602	0.985137	1.523847	0.241552	0.751737	2.142695	0.213036
8	5.270370	89.03142	0.916525	1.481877	0.248420	0.679460	2.167518	0.204408
9	5.270022	88.51333	0.943296	1.759040	0.231318	0.649740	2.443414	0.189838
10	5.320580	88.26717	0.933499	2.026635	0.215002	0.605092	2.454897	0.177126
11	5.167189	88.53434	0.892450	2.000034	0.227547	0.573036	2.436952	0.168447
12	5.146467	88.65932	0.849407	1.906212	0.219080	0.604978	2.443525	0.171009

Variance Decomposition of Price Components							
	Food	Household	Clothing	Dwelling	Cultural	Health	Transpor tation
	INFUN						
1	0.000000	0.240646	0.932608	2.785955	1.129906	0.007095	2.454184
2	0.187833	5.775510	0.833956	2.307214	1.107423	0.641160	2.879477
3	2.484807	4.248520	2.572383	2.303666	1.966804	0.552963	2.555601
4	2.000069	3.946588	1.922118	2.344349	1.720460	0.455177	2.476406
5	1.649229	5.610522	2.780293	2.153815	1.594602	0.518181	2.498179
6	2.177160	5.032897	2.696719	1.907097	1.832195	0.455923	2.184379
7	2.115289	4.970018	2.177456	1.768224	1.783859	0.413304	2.136995
8	1.909133	5.314757	2.077620	1.708760	1.627444	0.465582	2.056558
9	1.870019	5.137389	2.030867	1.572329	1.572251	0.443314	1.937933
10	1.767901	5.021142	1.810008	1.482530	1.566486	0.419175	1.843783
11	1.663804	5.041968	1.977663	1.421496	1.485333	0.405330	1.769373
12	1.655834	5.034338	1.946474	1.355017	1.423341	0.387271	1.731539

In the top portion of the table, the forecast error variance decompositions that analyze the contribution of inflation uncertainty and price components to the volatility of inflation uncertainty are shown. The largest fraction of the forecast error variance of inflation uncertainty is explained by itself and along both short -and long- term. As it can be seen, the explanatory ratio of inflation uncertainty by price components is low, while the price component explaining the uncertainty with the highest ratio is the food prices with an average of 5% for both short -and long- terms. When health prices explain the uncertainty as a ratio of 1.5% by the second month, this value reaches to 2.5% by the end of the year. The clothing prices have an impact on uncertainty by the 4th month, and explain such uncertainty as a ratio of 2% for the long-term. While clothing prices, in explaining the forecast error variance of inflation uncertainty, have an average of 1%, dwelling, transportation and cultural prices are less than 1%.

In the second portion of the table, showing the percentage of the forecast error variance of price components explained by inflation uncertainty, it can be seen that such variance ratios are low as well. The price component which is explained more by inflation uncertainty in comparison with the others is the household prices, explained by the inflation uncertainty with a ratio of 5% from the beginning of the second term. When inflation uncertainty explains the transportation and dwelling prices with a ratio of 2.5%, its effect decreases for the long-term. The inflation uncertainty that explains the clothing and food prices with an average ratio of 2% by the beginning of the second term is almost non-explanatory on the cultural and health prices.

VI. Conclusions

In this study, the relationship between inflation uncertainty and the price components of general price level in the Turkish economy is examined for the 2003:01-2011:09 period. Inflation uncertainty is considered here as the conditional variance within the inflation process. The relationships between these two are examined using the Granger causality Test, impulse response analysis, as well as variance decomposition analysis. According to the findings, the effects of inflation uncertainty differ on the price components of general price level. Similarly, the effects of price components of general price level on inflation uncertainty are not the same.

Household prices and inflation uncertainty are the Granger causes for each other, and the results of impulse- response functions seem to support this finding. When household prices react positively for the first two terms to the shock occured in inflation uncertainty, inflation uncertainty reacts positively in the 6th term to the shock on household prices. Furthermore, the forecast error variance for household prices is most explained by the inflation uncertainty of all price components. The other price components which cause inflation uncertainty are clothing and health prices. Inflation uncertainty reacts positively and significantly in between the 5th and 7th terms to the shock on health prices. The clothing prices explain the forecast error variance of inflation uncertainty as 2% in the long-term. However, inflation uncertainty is the Granger cause for food and dwelling prices. While the food prices react positively in the 3rd term to the shock caused by inflation uncertainty, the dwelling prices react to the same shock negatively in the 7th term. The highest explanatory price component of uncertainty is the food prices with a ratio of 5% in short-and long-terms. Inflation uncertainty shock has no effect on health, transportation, clothing and cultural prices, and supporting the Granger causality test. Moreover, inflation uncertainty is not affected significantly by the shocks which occur in food, transportation, cultural and dwelling prices. These variables are only minimally non-explanatory with regards to inflation uncertainty. Consequently, in the fight against inflation, it can be stated that policy-makers should focus on the above stated price components - mainly household prices - instead of whole price components.

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