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Yilmaz, Engin and Süslü, Bora

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The Determinants of Price Frequency in Turkey

Dr. Engin YILMAZ
Specialist in Public Sector

Prof. Dr. Bora Süslü
Muğla Sıtkı Koçman University

ABSTRACT

The effect of monetary and fiscal policy on the output depends on the frequency of price changes. When the prices change infrequently or prices change slowly, monetary and fiscal policy have a real effects on the output. Developed countries generally have a rigid prices but developing countries have a relatively flexible prices. This difference is originated from the reality that the developing countries have higher average inflation than the developed countries. Economic literature focuses on the micro reasons of the frequency of price changes, on the other hand, the inflation is seen the main factor which affects the frequency of price changes in the macro perspective. This study holds down the assumption that the frequency of price changes is a function of the inflation rate in the macro perspective. In addition to this, it is also focused on the direct relationships between the frequency of price changes and the macro variables which affect the inflation rate. It is revealed the effect of macro factors on the frequency of price changes in this work. It is concluded that the determinants of the frequency of price changes in the macro perspective in Turkey are the expected inflation and the exchange rate rather than output gap. It can be said that firms' price frequency behavior directly depends on cost push factors in Turkey.

Key Words: Price Frequency, Price Rigidity, Determinants of the Price Frequency

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1. Introduction:

The inflation is highly structural matter in the Turkish economy for a long time. Turkey has achieved single-digit inflation in the last decade by means of contractionary fiscal policy, decreasing import prices and falling oil prices. However, this single-digit inflation does not mean that Turkish inflation problem is solved. When OECD average inflation rate (CPI) is %2.1 in February 2018, Turkey inflation rate (CPI) is %10.2 in February 2018. OECD statistics also show that Turkish inflation rate is higher than OECD average inflation rate from 2000 to 2017 in monthly basisⁱ.

It is no doubt that the high inflation affects firms' price setting behaviors which are the most important factor in transmission of nominal shocks. Lucas (1972) claimed that the effect of nominal shocks on output level is decreased by the highly variable demand. On the other hand, New Keynesians claimed that the real effects of nominal shocks are small when average inflation is high (Mankiw *et al*, 1988). Although two different perspective have same results, their reasons are different. Lucas (1972) focused on relative magnitudes of nominal shocks but New Keynesians focused on frequent price changes.

According to the New Keynesian approach, nominal demand shocks only have real effects on the output when the prices change infrequently or prices change slowly. How the nominal demand shocks can effect output level is based on the frequency of price changes. These aforementioned shocks can be divided as the monetary shocks and fiscal shocks. Monetary shocks are realized by Central Bank (or Money Authority). Monetary shocks succeed to affect the output only if the prices have some rigidity. On the other hand, fiscal shocks generally are driven by government tax and spending policies which government increases or decreases tax rate / spending level. Likewise monetary shocks, fiscal shocks have an impact on output level only if the prices have some rigidity. It is certain that the prices in the economy are not classified neither totally rigid nor totally flexible. Otherwise, the rigidity level is crucial factor

when nominal demand shock tries to affect the output level. New Keynesian literature comes to agreement on the argument that there is positive correlation between price stickiness and the effect of nominal demand shocks on output level. The high degree price rigidity increases the effect of nominal demand shocks on output level. It is very interesting that the nominal supply shocks rarely take places (for example, commodity price shocks) in the New Keynesian literature. Generally, oil price shocks and technology shocks can be viewed as mainly nominal supply shocks. However, for emerging countries, cost-push shocks cannot be limited with oil price shocks and technology shocks. The exchange rate shocks and the import price shocks are important cost-push factors for especially emerging countries.

The aim of this paper comes to conclusion about the macro economic factors which affect the frequency of price changes (Thereafter is called price frequency) in Turkey. This question can be came down to the following question. Why do prices change frequently in Turkey? This paper is organized as follows. The literature of price frequency is presented in the first section. It will be calculated the price frequency for Turkey and it is estimated the price frequency model for Turkey in the second section. The final section presents the conclusions.

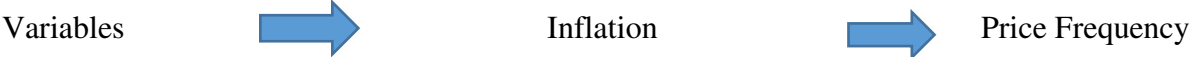
1. Literature

The periodicity with which prices are changed by firms represents a key element to characterize price-setting behavior (Álvarez and Hernando, 2004). Firms' price setting behaviors basically can be inferred from the price frequency. On the other hand, price duration is other important indicator in firms' price-setting behavior and indicates how long prices do not change in given time period. Basically, the inverse of the price frequency converges to the average price duration in the large sample. For this reason, it is used two concept (price frequency and price duration) together in this paper. The starting point is based on New Keynesian approach. New Keynesian approach claims that the price stickiness provides nominal shocks transmission to the output (Mankiw, 1988). Basically, each price

does not same response to the nominal shocks and this result in change in the output. As it is expected, the emerging countries have the low degree price stickiness and developed countries have high degree price stickiness. Nakamura and Steinsson (2008) have indicated that the price duration minimum 7 months and maximum 11 months in USA. Dhyne *et al.* (2009) have examined all Europe countries and found that the price duration is 6.6 months in Europe. On the other hand, the results of the emerging countries indicate low degree of stickiness. Gouvea (2007) has indicated that the average price frequency is 0.37 and the average price duration as 2.7 months in Brazil between in 1996-2006 period. Coricelli and Horvath (2008) have concluded that the average price frequency is 0.34 and the average price duration is 3.7 months in Slovakia in between 1997-2001. Lavín *et al* (2008) have found that the average price duration is 2.1 months in Brazil (the average price frequency is 0.50), 3.5 months in Colombia (the average price frequency is 0.39), 3.4 months in Chile (the average price frequency is 0.45) and 2 months in Mexico (the average price frequency is 0.57). Ysusi (2010) has calculated that the average price frequency is 0.35 and the average price duration is 5.5 months in México between in 2002-2009. Benkovskis and Fadejeva (2011) have indicated that the average price frequency is 0.28 and the average price duration is 3.4 months in Latvia between in 2003-2009. Edwards and Rankin (2015) have calculated that the average price frequency is 0.31 and the average price duration is 3.2 months in Lesotho between in 2002-2009. Francisca (2016) has found that the average price frequency is 0.40 and the average price duration is 1.9 months in Chile between in 1999-2008. Ruch, F. *et al* (2016) have found that the average price frequency is 0.27 and the average price duration is 3.6 months in South Africa between in 2009-2015. There are two specific study in this issue for Turkey. Özmen and Sevinç (2011) have find that the price duration is 1.8 months in Turkey and Küçükefe (2016) have concluded that the price duration is 1.3 months in Turkey.

On the other hand, there is limited study on which macro variables affect firm's price setting behavior. There is consensus about that the inflation affects the price frequency in New Keynesian literature and the empirical works are realized with basic econometric regressions on this issue (Mankiw, 1988; Gagnon, 2007; Nakamura, 2008). Aforementioned empirical works investigate the effect of inflation on the price frequency. Kaufmann (2009) has added one new variable to the aforementioned relationship and has analyzed the effect of taxes and the effect of inflation on the price frequency. This study holds down the assumption that the price frequency is a function of the inflation rate but it is also focused on the relationship between the price frequency and the macro variables which affect the inflation rate. Consequently, it will be revealed direct effect of the variables (which affect the inflation rate) on the price frequency.

This study tries to investigate how the macro variables (which determine the inflation) affect the price frequency. Normal connection can be described as the following algorithm.



More basically, the macro variables affect the inflation rate and inflation rate affects the price frequency. In this paper, it is analyzed alternative (directly) connection between the macro variables (which determine the inflation) and the price frequency. Alternative connection can be described as following algorithm.



The aim of this paper is to reveal the main determinants of the price frequency in the macroeconomic perspective for Turkey.

2. a. Price Frequency Calculation for Turkey

2. a. a. Data

The original dataset is collected from Turkish Statistical Institute (TUİK) with monthly frequency. This dataset contains 414 different items in 12 group category from 2005 to 2017ⁱⁱ. Also, dataset has 63.342 individual price quotes from these collected products and price quotes are collected generally at monthly frequency by TUİKⁱⁱⁱ.

Table 1: The Number of Items in the Groups and Weights of Groups (%) in the Consumer Price Index (2003=100) for 2017 (Turkey)

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12	Group Total
N.o.I	125	5	61	12	61	16	30	8	42	6	16	32	414
W.o.G	21.7	5.8	7.3	14.8	7.7	2.6	16.3	4.1	3.6	2.6	8	5	100

Source: TUİK Consumer Price Index (CPI) Statistical Tables in the Official Web Site (Groups' names are presented in the end note 2)

The groups' weights in CPI (Consumer Price Index) and item numbers in groups are presented in Table 1. N.o.I represents the number of items in the groups and W.o.G represents the weights of groups in consumer price index. The weight of Food and Non-Alcoholic Beverages (Group 1), the weight of Transport (Group 7) and the weight of Water, Electricity, Gas and Other Fuels (Group 4) cover the great part of the consumer price index.

2. a. b. Model

The original dataset has the important problems for calculating the price frequency (duration) in Turkey. One of the problem is that some items do not have the price data in periodically. These items are concentrated on Food and Non-Alcoholic Beverages (Group 1) and Clothing (Group 3).

Table 2: The Number of Items [Missing Data] and Weights of Items [Missing Data] (%) in the Consumer Price Index (2003=100) for 2017 (Turkey)

	Group 1	Group 3	Total
N.o.M	24	20	46
W.o.M	1.41	1.78	3.19

Source: TÜİK Consumer Price Index (CPI) Statistical Tables in the Official Web Site (Groups' names are presented in the end note 2)

It is seen the number of items which have missing data (N.o.M) and the weights of these items in Consumer Price Index (W.o.M) in the Table 2. The number of items which have missing data is very big when it is compared to the number of total data but the weight of these items are small when it is compared to the weight of total data. Second problem is that some items were updated in the period which is investigated. This work calls these items as “Updated Items”.

Table 3: The Number of Items [Updated] and Weights of Items [Updated] (%) in the Consumer Price Index (2003=100) for 2017 (Turkey)

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12	Total
N.o.U	11	1	3	1	6	2	3	0	7	1	3	3	41
W.o.U	0.47	5.48	0.45	0.02	0.59	0.08	3.52	0	0.57	0.59	0.73	0.30	12.8

Source: TÜİK Consumer Price Index (CPI) Statistical Tables in the Official Web Site (Groups' names are presented in the end note 2)

It is seen the number of items which were updated (N.o.U) and the weights of these items in Consumer Price Index (W.o.U) in the Table 3. The number of items which were updated is very great when it is compared to the number of total data, but also the weight of these items are great when it is compared to the weight of total data.

It is analyzed two different data set in this paper. One of them (Model I) does not include neither missing items nor updated items and other one (Model II) includes the updated items. The reason of the analyzing two different data is that obtaining more sound and reliable

results for understanding price frequency (duration) framework in Turkey. First data set is called Model I and second data set (includes updated items) is called Model II.

Table 4: The Number of Items of Model I and Weights of Items of Model I (%) in the Consumer Price Index (2003=100) for 2017 (Turkey)

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12	Total
N.o.I	90	4	38	11	55	14	27	8	35	5	13	29	329
W.o.I	19.8	0.3	5	14.6	7.1	2.5	12.7	4.1	3	2.1	7.3	4.7	83.4

Source: TÜİK Consumer Price Index (CPI) Statistical Tables in the Official Web Site (Groups' names are presented in the end note 2)

N.o.I represents the number of items of Model I in the Consumer Price Index and W.o.I presents the weights of items of Model I in the Consumer Price Index in Table 4. This model does not include neither missing items nor updated items, for this reason it provides to investigate the uninterrupted price behaviors from 2005 to 2017^{iv}.

Table 5: The Number of Items of Model II and Weights of Items of Model II (%) in the Consumer Price Index (2003=100) for 2017 (Turkey)

	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Group 11	Group 12	Total
N.o.I	101	5	41	12	61	16	30	8	42	6	16	32	370
W.o.I	20.2	5.8	5.6	14.8	7.7	2.6	16.3	4.1	3.6	2.6	8	5	96.3

Source: TÜİK Consumer Price Index (CPI) Statistical Tables in the Official Web Site (Groups' names are presented in the end note 2)

In the Table 5, it is seen the number of items of Model II in the Consumer Price Index and the weights of items of Model II in the Consumer Price Index. Model II is constituted from Model I and 41 updated items and its' weight in the CPI is %96.3. This model includes the updated items and these updated items are important part of CPI basket.

2. a. c. Methodology

Price items are presented in the data set of TÜİK with 5 decimal places. In this paper, price change is determined as maximum 2 decimal places' shift between two months^v. On the other hand, the shift in the other decimals (third, fourth and fifth) are not classified as price change. For calculating the price frequency/duration for each group in CPI is used the following method. Firstly, it is created the indicator variable for price changes as following.

$$I_i = 1 \text{ if } P_{i,t} \neq P_{i,t-1} \quad (1)$$

I represents the indicator variable, i represents the price item, P represents the price and t represents time in the equation 1.

$$F_g = \left(\sum_{n=1}^{n=g} \frac{I_n}{T} * W_n \right) / W_q \quad (2)$$

In the equation 2, it is calculated the weighted price frequency ratio for each main group in CPI data set. F represents the weighted price frequency for group, T represents the number of observation for each price item, g represents the number of item in group, W represents the weight of price item in CPI and W_q represents the weight of group in CPI. The price frequency of every price item is calculated as the proportion of price changes in the total observation. The weighted price frequency for each group are calculated in two step. In the first step, each price frequency ratio multiplies its' weight in CPI. In the second step, the sum of these results divides the weight of group in CPI.

$$D_g = \frac{1}{F_g} \quad (3)$$

In the equation 3, D_g represents the average price duration of group. Baudry *et al.* (2004) assumed that price changes are stationary and price changes have homogeneity, the inverse of price frequency converges to the average price duration in the large sample. These calculations which are explained in the methodology is realized with R programming codes^{vi}.

2. a. d. Results

The average price frequency (duration) of each group in Model I are presented in the Table 6. Generally speaking, it can be said that the average price durations are very short for every group in the Model I.

Table 6: Model I: The Average Price Durations of Groups (Months) in the Consumer Price Index (2003=100) for 2017 (Turkey)

	Group	Group	Group	Group	Group	Group	Group	Group	Group	Group	Group	Group
	1	2	3	4	5	6	7	8	9	10	11	12
Dg	1.09	1.65	1.01	1.38	1.09	1.26	1.11	1.87	1.27	1.21	1.14	1.01
Fr	0.92	0.61	0.99	0.72	0.92	0.79	0.90	0.53	0.79	0.83	0.88	0.89

Source: TÜİK Consumer Price Index (CPI) Statistical Tables in the Official Web Site (Groups' names are presented in the end note 2) (Authors' calculations)

Dg represents the price duration and Fr represents the price frequency in the Model I. It is shown that the minimum price duration is 1.01 months and the maximum price frequency is 0.99 in the Model I. The maximum price duration is 1.87 months and the minimum price frequency is 0.53 in the Model I. This model covers less price item when it is compared to the Model II. Nevertheless, this model gives chance to see the price (frequency) duration framework of uninterrupted series. It can be inferred that the average price duration of uninterrupted series in CPI is very short.

Table 7: Model II: The Average Price Durations of Groups (Months) in the Consumer Price Index (2003=100) for 2017 (Turkey)

	Group	Group	Group	Group	Group	Group	Group	Group	Group	Group	Group	Group
	1	2	3	4	5	6	7	8	9	10	11	12
Dg	1.09	2.45	1.01	1.38	1.09	1.25	1.08	1.87	1.29	1.40	1.14	1.04
Fr	0.92	0.40	0.98	0.72	0.91	0.80	0.92	0.53	0.77	0.71	0.87	0.96

Source: TÜİK Consumer Price Index (CPI) Statistical Tables in the Official Web Site (Groups' names are presented in the end note 2) (Authors' calculations)

The average price durations of each group in Model II are presented in Table 7. There is no significant change when it is compared with Model I. One important change is observed in the Group 2. This results from the new price item which is added to the Model II and it has important weight in the group^{vii}. It is calculated that the average price frequency is 0.78 and the average price duration is nearly 1.4 months from Model II for Turkey^{viii}. The emerging countries' results (Gouvea, 2007; Coricelli and Horvath, 2008; Creamer and Rankin, 2008; Lavín and Tejada, 2008; Ysusi, 2010; Benkovskis and Fadejeva, 2011; Reiff and Várhegyi, 2013; Edwards and Rankin, 2015; Francisca, 2016) are higher than these results. On the other hand, the results of the specific workings on price durations in Turkey (Özmen and Sevinç, 2011 and Küçükefe, 2016) are consistent with these results.

2. b. Price Frequency Model for Turkey

2. b. a. Data

In this part, it will be examined relationship between the average price frequency and macro variables with the help of econometric time series method. Macro variables are the exchange rate, the expected inflation and the output gap. The exchange rate and the expected inflation can be classified as cost-push factors. The output gap can be classified as demand side factor. It will be shown the difference between the effect of cost-push factors on the price frequency and the effect of demand factor on the price frequency. The exchange rate (USD/TL) are collected from Central Bank of the Republic of Turkey (CBRT) with 2005:3–2017:9 monthly period. The expected inflation is collected from Central Bank of the Republic of Turkey (CBRT) with 2004:3–2016:9 monthly period^{ix}. The nominal GDP data is collected from Central Bank of the Republic of Turkey (CBRT) with 2005: I–2017: III quarterly period. The price frequency data is obtained from Model II with 2005:3–2017:9 monthly period. It is seen period unconformity in the variables. This problem is solved by converting monthly data to

quarterly data^x for the exchange rate (USD/TL), expected inflation and the price frequency. The output gap is the difference between the nominal GDP and the potential output. The potential output is estimated with Hodrick-Prescott filter^{xi}.

2. b. b. Methodology

VAR methodology (Unrestricted VAR and VECM) is used to examine long term co-integration relationship between the price frequency and other variables. Johansen's (1998) technique is preferred for determining "co-integration relationship" among the variables. Co-integration relations give short and long run relationship between two or more series (Lütkepohl, 2004; Lütkepohl, 2005). It is chosen directly Lütkepohl (2004, 2005) the representation of unrestricted VAR process in this paper. This process can be described as following.

$$y_t = v + A_1 y_{t-1} + \dots + A_p y_{t-p} + u_t \quad t = 0, \bar{1}, \bar{2} \dots \dots \dots \quad (4)$$

Where $y_t = (y_{1t}, \dots, y_{kt})'$ is a (K*1) random vector, the A are fixed (K*K) coefficient matrices, $v = (v_1, \dots, v_k)'$ is a fixed (K*1) vector of intercept terms allowing for the possibility of a nonzero mean $E(y_t)$. Finally $u_t = (u_{1t}, \dots, u_{kt})'$ is a K dimensional white noise or innovation process, that is, $E(u_t) = 0$, $E(u_t u_t') = \Sigma_u$ and $E(u_t u_s') = 0$ for $s \neq t$. The covariance matrix Σ_u is assumed to be nonsingular if not otherwise stated (Lütkepohl, 2004).

It will determine whether all variables are suitable for VAR analysis. This means that all variables could be same level for realizing VAR analysis. If all the variables are the same level, it will analyze optimal VAR (p) order/lag. It is chosen AIC and FPE criteria's in the selecting optimal order/lag number. In small samples, AIC and FPE may have better properties than HQ and SC (Lütkepohl, 2004). To check the model adequacy, the autocorrelation and normality tests also will be realized. Johansen (1998) trace test will be

executed to find the number of co-integration vector. VECM process is executed to see long term relationship between the price frequency and other variables.

VECM model (Lütkepohl, 2004; Lütkepohl, 2005) can be described as following.

$$\Delta y_t = \Gamma_1 \Delta y_{t-1} + \dots + \Gamma_{p-1} \Delta y_{t-p+1} + \Pi y_{t-p} + u_t \quad (5)$$

Δy_{t-1} and other difference variables are of the short-run parameters which can be considered “noise” in the co-integration relationship (Sørensen, 2005). Π estimator gives asymptotically efficient estimates of the cointegrating vectors and of the adjustment parameters (Sørensen, 2005). It is tried to find the co-integrating relationship between the price frequency and macro variables.

2. b. c. Results

It is determined that all variables are suitable for VAR analysis from the point of non-stationary in level and stationary at the first differences. It is seen the ADF (Augmented Dickey–Fuller Test) results of the variables in the Table 8.

Table 8: ADF Test Results for Price Frequency, Exchange Rate, Expected Inflation and Output Gap

Variable	ADF Test	P-Value
PC	-2.86	0.18
Δ PC	-4.74	0.00
OGap	-2.64	0.26
Δ OGap	-3.44	0.05 [^]
Exinf	-1.81	0.67
Δ Exinf	-4.78	0.00
ExRate	-0.08	0.99
Δ ExRate	-4.90	0.00

** significant at 5%; Trend +Intercept.
[^]A OutputGap is stationary in none and intercept options and nearly stationary in trend+intercept option.
PC: Price Frequency, OGAP: Output Gap, Exinf: Expected Inflation and ExRate: Exchange Rate.
Eviews 8 Calculations.

It is showed the results of the optimal lag numbers for different criterion in Table 9. The optimal number of lags is found to be two quarters lag for Unrestricted VAR model and Unrestricted VAR model is estimated with two quarters lag^{xii}.

Table 9: Optimal Lag Results for Unrestricted VAR Model

Lag	FPE	AIC	SC	HQ
1	0.855300	11.19355	11.82339	11.43057
2	0.403325*	10.43011*	11.68979*	10.90414*
3	0.512145	10.63616	12.52567	11.34719
4	0.492759	10.53059	13.04994	11.47864

FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion and HQ: Hannan-Quinn information criterion (Eviews 8 Calculations)

The estimation of VAR (2) model is included constant, trend and seasonal dummies. It is added one dummy variable (2008 third quarter) because Turkey nominal GDP is affected seriously from 2008 world financial crisis. There is no serious problem in the diagnostic tests which cover the autocorrelation and normality test in the Unrestricted VAR(2) model and it is concluded that Unrestricted VAR(2) model is stable. To find the number of the co-integration vector/s is used Johansen co-integration method (Johannsen, 1988) and this method found that there is one co-integration vector^{xiii}. In the last phase, VECM is estimated (is included constant, trend and seasonal dummies) and the co-integration relationship is found as following representation.

$$PC = 2.48 (Exinf) + 2.38 (ExRate) - 0.19 (OGap) + u_t \quad (6)$$

There is positive relationship between expected inflation and the price frequency and the coefficient of this relationship is 2.48. Therefore, 1 unit change in the expected inflation result in 2.48 unit change in the price frequency. This conclusion reveals that the effect of inflation expectations on the price frequency is important. There is positive relationship between exchange rate and the price frequency and the coefficient of this relationship is 2.38.

Therefore, 1 unit change in the exchange rate leads to 2.38 unit change in the price frequency. It is concluded that the exchange rate is other important variable which affects the price frequency. There is negative relationship between output gap and price frequency and the coefficient of this relationship is -0.19. This coefficient indicates negative and low level relationship between the output gap and the price frequency. It is expected that this coefficient would be positive without considering its magnitude and evaluated that the effect of this coefficient on the price frequency is unclear. It can be said that cost push factors (expected inflation and exchange rate) are important factors which affect the price frequency in Turkey. The effect of demand factor on the price frequency is uncertain in Turkey and this uncertainty needs to be examined in future works.

3. Conclusion:

Turkey lives with high inflation rate when it is compared the developed and some developing countries. This structural matter affects the price setting behavior of firms in Turkey. Firms change frequently their prices and this decreases the effect of nominal demand shocks on the output. In this sense, it is important to understand the macro factors which affect the price frequency setting behavior in Turkey. This study hold down the assumption that the price frequency is a function of the inflation rate and is examined the effect of macro factors on the price frequency. It is focused on directly macroeconomic factors which affect the price frequency in Turkey. It is calculated that the average price frequency is 0.78 and price duration is nearly 1.4 months in Turkey. It is showed that the cost push factors (expected inflation and exchange rate) positive affect the price frequency in Turkey. Also, it is concluded that the effect of demand factor on the price frequency is unclear. These findings are consistent with truth that Turkey is one of the countries which have the highest inflation rate in OECD.

End Notes:

ⁱ OECD (2018), CPI Statistics online page, <https://data.oecd.org/price/inflation-cpi.htm>, (15.03.2018)

ⁱⁱ 1-Food and Non-Alcoholic Beverages,2-Alcoholic Beverages and Tobacco,3-Clothing, Footwear and Housing, ,4-Water, Electricity, Gas and Other Fuels,5-Furnishings, Household Equipment, Routine Maintenance of the House,6-Health,7-Transport,8-Communications, 9-Recreation and Culture,10-Education,11-Hotels, Cafes and Restaurants,12-Miscellaneous Goods and Services. (TUIK) 2005:1-2017:9

ⁱⁱⁱ Prices of fresh fruit, vegetables, fee paid for watching sport games (football), LPG, tube gas, jewelry (gold) and 15 specific items are collected once a week; other prices are collected twice a month Rents and 66 items which have little change in monthly price are collected once a month. Prices of diesel and petrol products are collected on daily basis. (TUIK)

^{iv} Readers can compare this model statistics with Table 1 (CPI basket) statistics.

^v It can be said that there is minimum limit in price increases which are realized by government or private. This limit can be expressed as minimum 2 decimal' shift in the prices. This can be observed in prices shifts which affect ordinary citizen in Turkey.

^{vi} Readers can download from following link. https://www.researchgate.net/profile/Engin_Yilmaz6

^{vii} Group 2 in the Model I includes four item. Group 2 in the Model II includes only one new item when it is compared to the Model I, but the weight of this new item (cigarettes) is equals to %5.44.

^{viii} The average of 12 groups.

^{ix} (Arithmetic Mean) Expected CPI Over The Next Twelve Months (%) from Survey of Expectations Descriptive Statistics-Central Bank of Turkey.

^x Arithmetic Average Method is used for converting the variables from monthly to quarterly.

^{xi} Eviews 8 is used with lambda 1600 value.

^{xii} VAR Estimation, VECM Estimation and Johansen Trace Test are realized in JMulti.

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