

DIFFERENT APPROACHES AND METHODS FOR STRONG SEASONAL ITEMS IN CONSUMER PRICE INDEX

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I. Introduction

Due to the relatively large weight of seasonal items in Turkey, it is very important to analyze the contribution of price changes in seasonal items to total consumer price indices (CPI), exactly.

In this study, we discuss the issues in calculating seasonal items in CPI, seasonal tally and unexpected volatility. One of the primary aims of this study is to calculate index values for seasonal products in CPI with the consideration of implementation of the Commission Regulation (EC) NO 330/2009 of 22 April 2009.

Indices from 2010 to 2016 are calculated and examined by using all of the selected methods for seasonal items. We study the seasonal and strict weight structures for strong seasonal items and analyze the results. Prices of fresh fruits and vegetables are derived weekly in CPI and the number and the level of prices are also examined. Estimated prices on December chained indices, imputation of missing prices and the analysis-principles of outlier prices are also studied. Because chained index is very sensitive to weights and price fluctuation, we carefully examine relevant factors/decisions (e.g., weighting sources and sampling of items). We also discuss price bouncing effects by seasonal and non-seasonal items on Turkish chained CPI and the time series analysis for fresh fruits- fresh vegetables basic headings, food and beverages main group in ECOICOP and general index.

II. Description

Seasonal items are either completely unavailable in creation periods or they display a price or quantity behavior in a period of the year. Article 2 of the Regulation describes the seasonal items as “goods and services that are not available for purchase, or are purchased in small or negligible volumes, for certain periods in atypical annual cyclical pattern.” The in-season period is meant to cover at least one month. Items that are unavailable in certain seasons are termed strong seasonal items. As indicated in article 3 in the regulation; the minimum standards shall apply to seasonal products within the fish, fruits, vegetables, clothing and footwear COICOP/HICP classes and groups. The following classes and groups are considered as seasonal in Turkish CPI;

- Fresh fruits,
- Fresh vegetables,
- Clothing,
- Footwear

Seasonal items represent approximately 10.5% of total expenditure in the Turkish CPI. The weights of the consumption group and specific items in this category are based on the percentage of the average monthly expenditure on them in the base year, out of the average monthly expenditure on the total basket. The data source is the Household Expenditure Survey (HES), conducted annually by the Turkish Statistical Institute.

III. Methods

There are three weights approach for seasonal items;

➤ **Fixed annual weights method:**

Monthly weights do not change from month to month within the same year. Prices in out-of-season months are estimated.

➤ **Class-confined seasonal weights method:**

Weights of seasonal products are fixed within the in-season periods

➤ **Variable weights method:**

Variable weights are allocated according to the consumption pattern found in the base period.

Weights at the level of COICOP/HICP divisions, groups and classes should not vary between months during the year. Nevertheless, weights at a more detailed level of COICOP/HICP might be allowed in order to reflect a seasonally varying consumption pattern.

In this study, the price collection covered 17 different fresh fruits and apple, banana and lemon prices were collected every month of the year while the other products' prices were observed only in certain months of the year. Similarly, price collection covered 22 different fresh vegetables and the prices of spinach, cauliflower, cabbage (white and red), leek and radish were not collected every month of the year while the other products' prices were observed for each month of the year. In tables below, the seasonal tally examples for fresh fruits products were displayed. In order to achieve seasonal pattern for the class confined weight structure, some month and product transitions were made. Same procedures were also done for the details of clothing and footwear groups.

Class confined in-season periods for CPI:

For fresh fruits and vegetables the class-confined application, the periods of the classes;

- Period 1 : January-February-March- October-November-December
- Period 2 : April-May-June
- Period 3 : July-August-September

For clothes and footwear the class-confined application, the periods of the classes;

- Period 1 : January-February-March-October-November-December
- Period 2 : April-May-June-July-August-September

Seasonal structure of variable weights is used in the **fixed annual weight application**.

Table 1: Seasonal structure of fresh fruits for variable weights

COICOP	FRESH FRUITS	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
01161010200	Orange	*****	*****	*****	*****	*****					*****	*****	*****
01161020100	Grape							*****	*****	*****	*****		
01161050100	Pear	*****	*****	*****				*****	*****	*****	*****	*****	*****
01161070100	Quince	*****	*****	*****							*****	*****	*****
01161100100	Strawberry				*****	*****	*****						
01161120100	Apple	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
01161130100	Plum						*****	*****	*****	*****			
01161210100	Water melon						*****	*****	*****	*****			
01161220100	Melon							*****	*****	*****	*****		
01161230100	Apricot						*****	*****	*****				
01161270100	Cherry						*****	*****	*****				
01161280100	Kiwi	*****	*****	*****	*****	*****					*****	*****	*****
01161300100	Lemon	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
01161310100	Tangarine	*****	*****	*****							*****	*****	*****
01161340100	Banana	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
01161350100	Pomegranate	*****	*****								*****	*****	*****
01161370100	Peach						*****	*****	*****	*****			

Table 2: Seasonal structure of fresh fruits for class-confined weights

COICOP	FRESH FRUITS	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP	OCT	NOV	DEC
01161010200	Orange	*****	*****	*****	*****	*****	*****				*****	*****	*****
01161020100	Grape							*****	*****	*****			
01161050100	Pear	*****	*****	*****				*****	*****	*****	*****	*****	*****
01161070100	Quince	*****	*****	*****							*****	*****	*****
01161100100	Strawberry				*****	*****	*****						
01161120100	Apple	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
01161130100	Plum							*****	*****	*****			
01161210100	Water melon							*****	*****	*****			
01161220100	Melon							*****	*****	*****			
01161280100	Kiwi	*****	*****	*****	*****	*****	*****				*****	*****	*****
01161300100	Lemon	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
01161310100	Tangarine	*****	*****	*****							*****	*****	*****
01161340100	Banana	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
01161350100	Pomegranate	*****	*****	*****							*****	*****	*****
01161370100	Peach							*****	*****	*****			

Turkey has four seasons generates strong seasonal effect. The most of the seasonal products are available only part of the year and a great volatility on prices and unusual price fluctuations can be observed. One of the most significant and ongoing problems with the methodology of CPI has been the treatment of seasonal products. In season and out-of-season periods are determined by using the three-year HES results. In Turkey, tablets are used for price collection and the price entry sections are closed in out-of-season months for seasonal items.

There are advantages and disadvantages in use of different weight approaches;

Advantages of fixed weighting;

- Index does not change due to the changes in the product weights as they are fixed during the year.
- Annual change of general CPI shows less volatility by strict weighting system.
- All indices are calculated using the same fixed weight principle

Disadvantages of fixed weighting;

- Choice of imputation method differs among groups
- Fixed weights are not representative of the monthly consumption pattern.
- Missing prices need to be estimated during the out of season period. For example, in fresh fruits, approximately 50% of the prices has to be estimated.
- Number of estimated prices in a year will be more than observed prices for some products (e.g., 9-month prices have to be estimated while only 3 months can be observed for cherry)

Advantages of seasonal weighting;

- Class confined weights approach has the advantage of minimizing the practice of price imputation.
- Prices are observed only in months where weights are above zero.
- It has lower volatility than variable weights at annual change of CPI.
- Minimum volatility is shown in fresh fruits, clothing and footwear.

Disadvantages of seasonal weighting;

- Even if prices do not change, index can change from one period to other because of the changing periodic weight system.
- There is a need for credible data sources to obtain reliable seasonal weights.
- Some products need to be excluded in order to build periodic structure.



IV. Evaluation

We studied the effect of different weights system on the annual change of especially fresh fruit and vegetables, food and clothing groups, which show a strongly seasonal pattern. We prepared a seasonal pattern for 2010-2016 to decide in which month the prices should be collected from the outlets for seasonal items. We used this pattern for determining weight and price collection structures of seasonal weight system and for decisions about the estimated prices of fixed annual system.

In our experimental seasonal weight;

- There is different basket and weight structures in each month for variable weight application, and different basket and weight structures in each period for class-confined weight application.
- Item weights in a given month or period are a reflection of expenditures associated with the items in that month or period.

In our experimental fixed annual weight;

- Estimated price in the first out-of season month is equal to average price in the previous in-season period.
- From the second out-of-season month onward, the estimated prices for out-of-season products will be used.

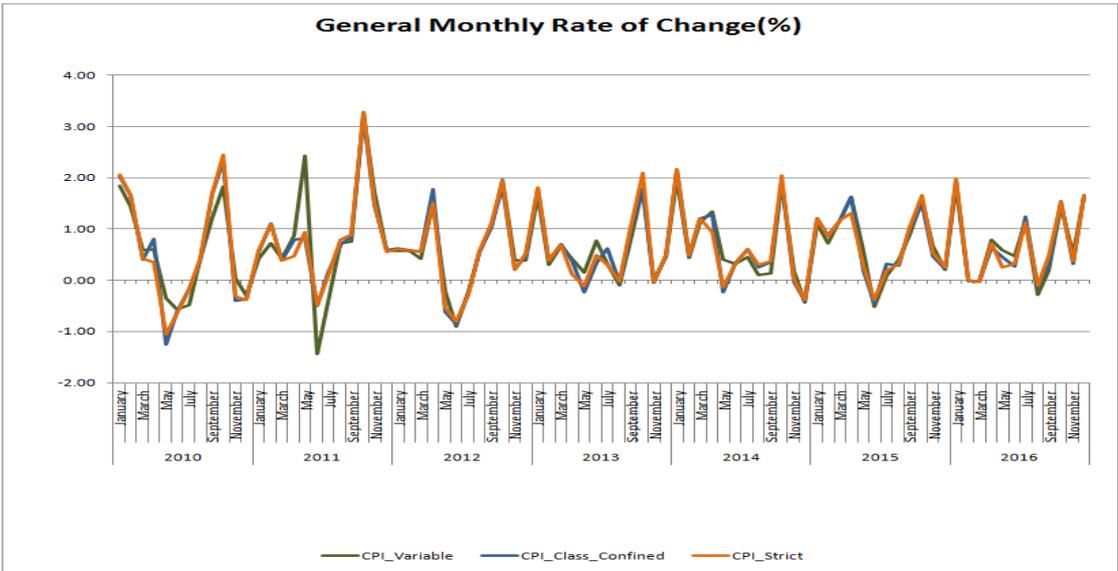
The method used for the estimation is the all-season method, using only the prices of the products which are available in both previous and current month in the same group (average price change value). In Turkey, some of the fresh fruits' seasons are very limited (cherry, apricot etc.) and it is very hard to select typical price. Because of this reason, we used the average price of in-season periods as a typical price for all of the seasonal items. In Turkish CPI, calculations are done in the basic heading (COICOP level 5) and, in this manner, they refer to all season estimation method. In our application counter season and all-season estimation gave the same results because we used the

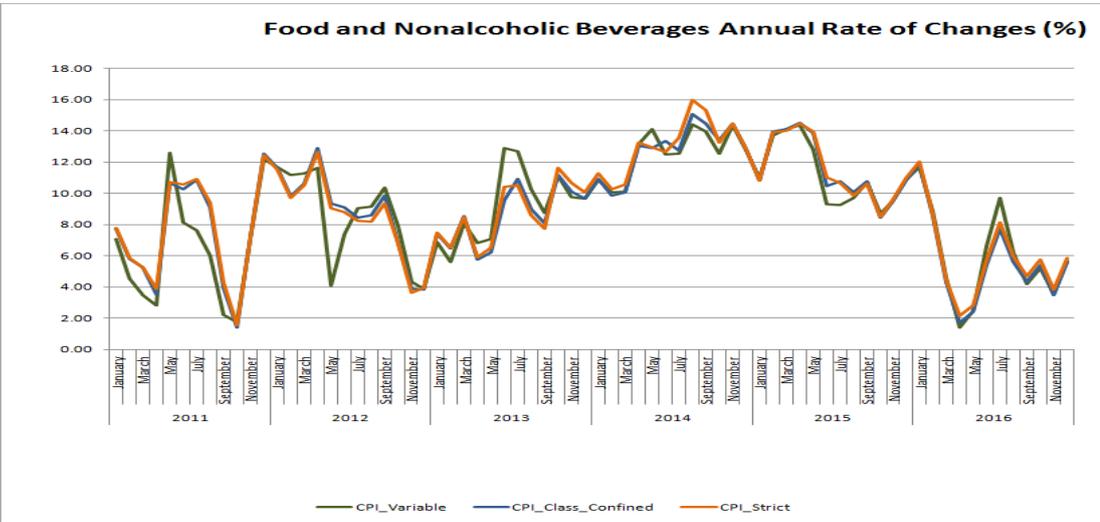
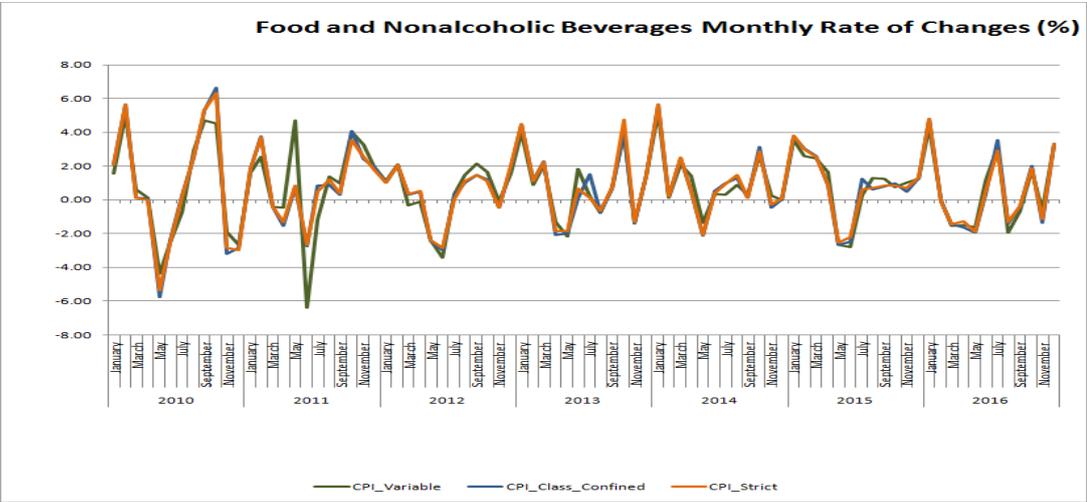
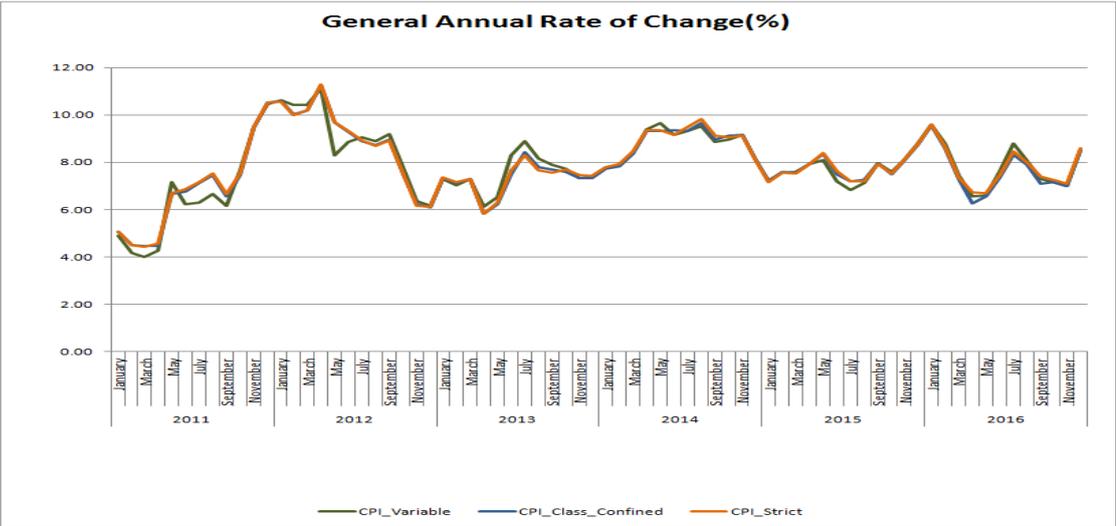
COICOP 5 level. In the calculations, data collection procedures and the rules did not change for any of the methods, only the data processing systems and the seasonal tally were modified according to the different methods.

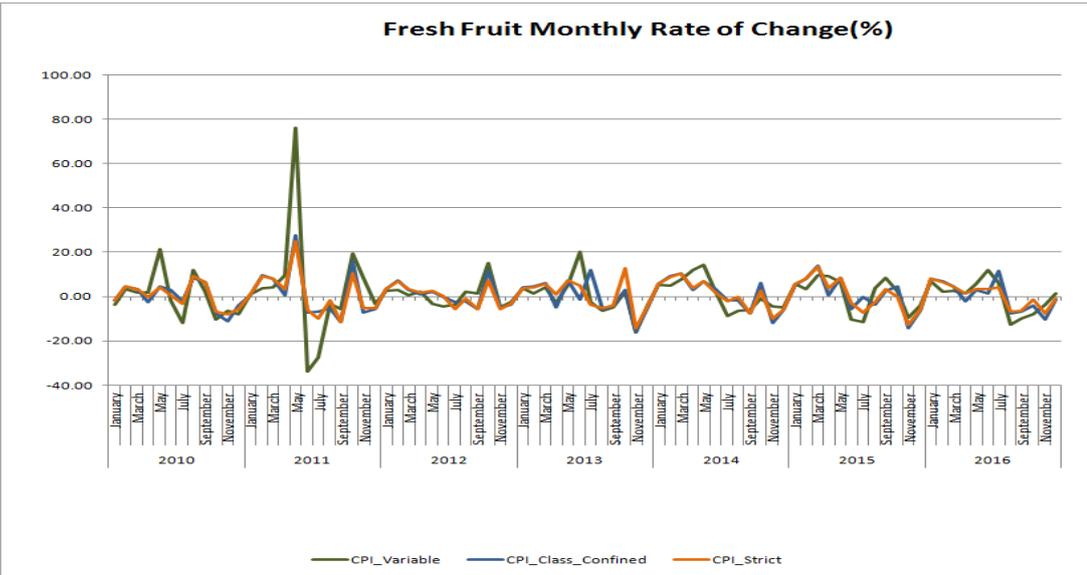
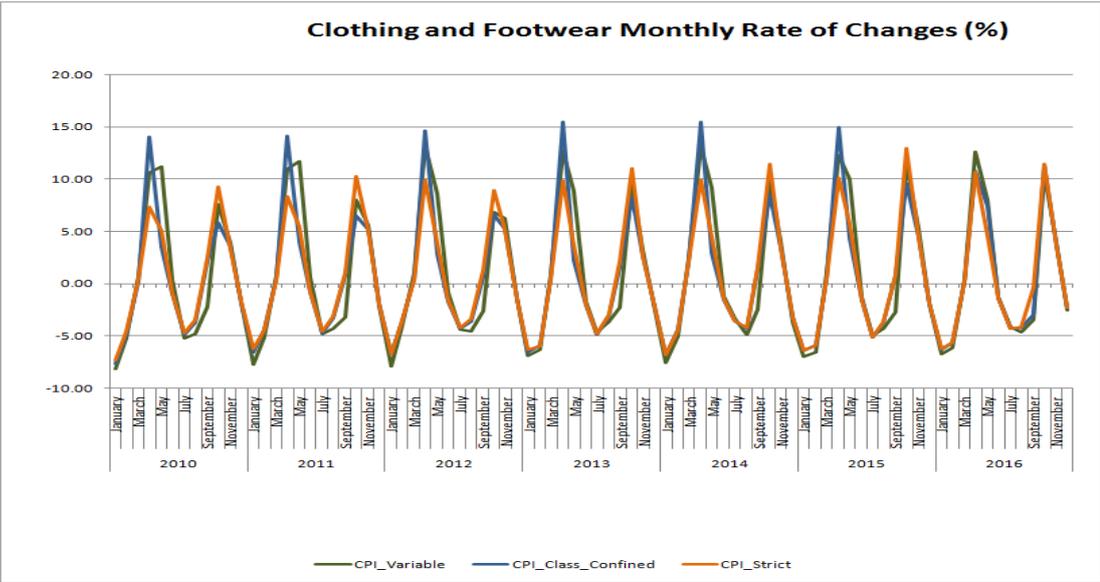
In total, two indices were compiled, one of them using fixed weights approach and two others using seasonal weights approach.

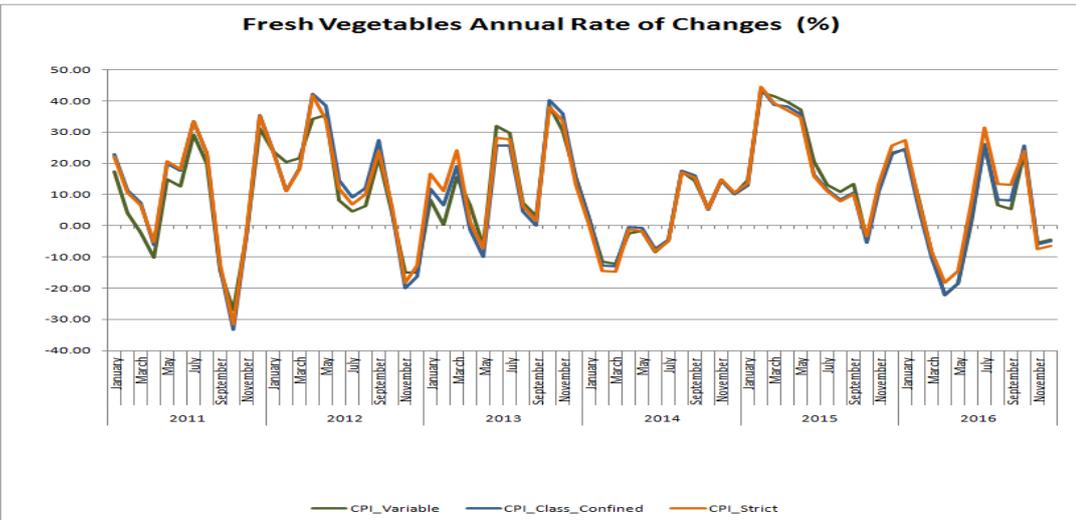
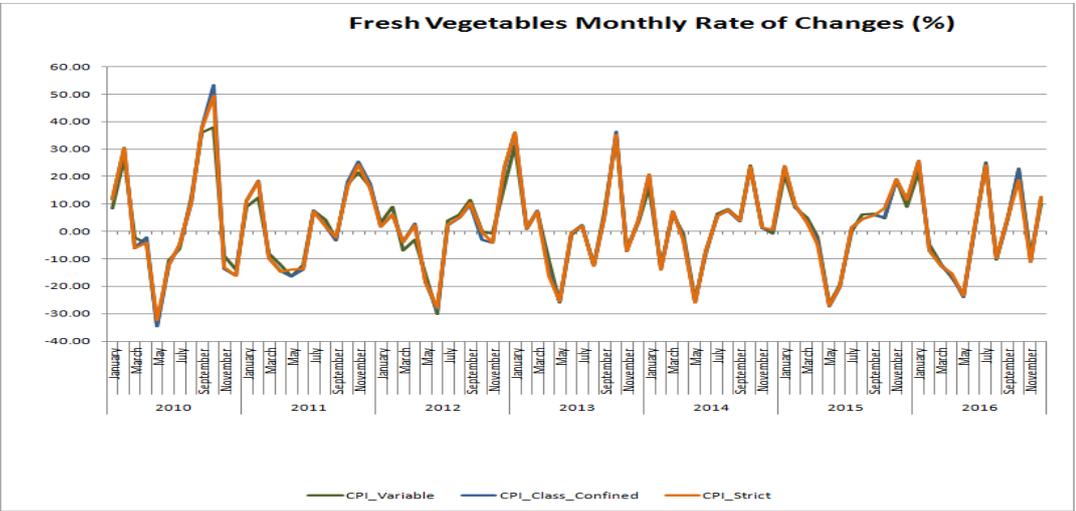
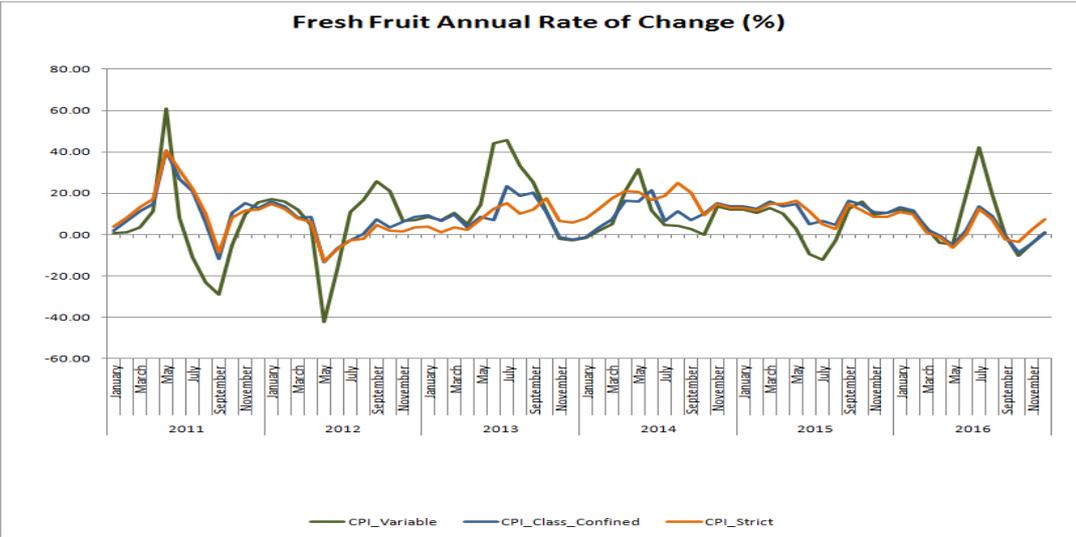
V. Results

Seasonal items create some significant problems in Consumer Price Index (CPI) calculations. Most common approaches to the treatment of seasonal items are fixed and seasonal weights approaches. Both approaches have their own advantages and disadvantages and they need additional and careful analysis before implementation. We undertook pilot studies with historical data between the years 2010-2016 before making a decision on which approach to use. General, food and non-alcoholic beverages, clothing and footwear, fresh fruit and fresh vegetables were analyzed on a monthly and yearly change basis. In addition to graphs, below are the tables that illustrate the monthly and annual rate of change in coefficient of variation (CV).

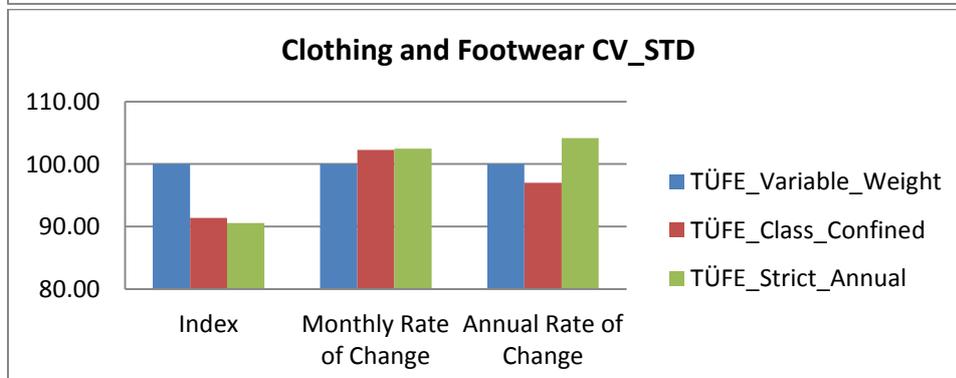
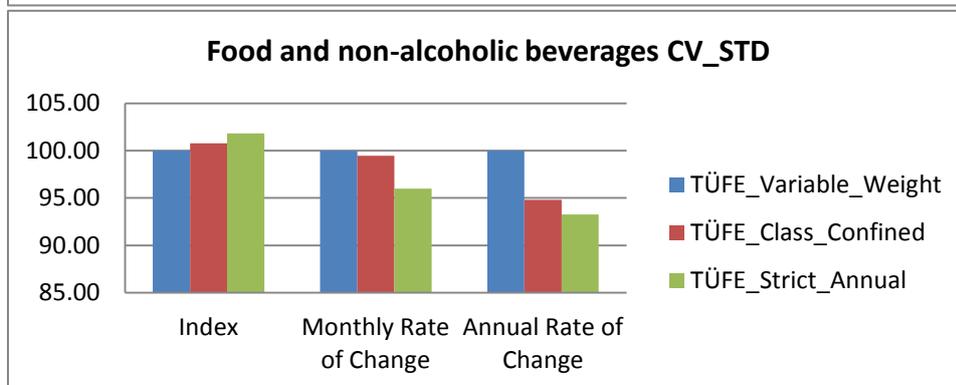
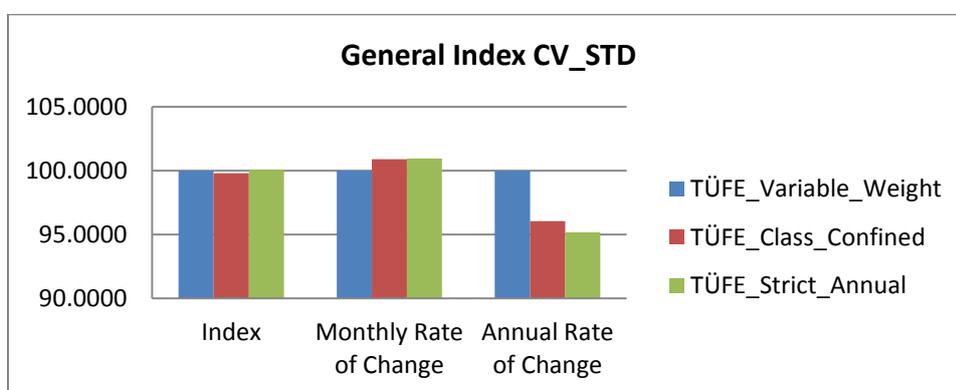


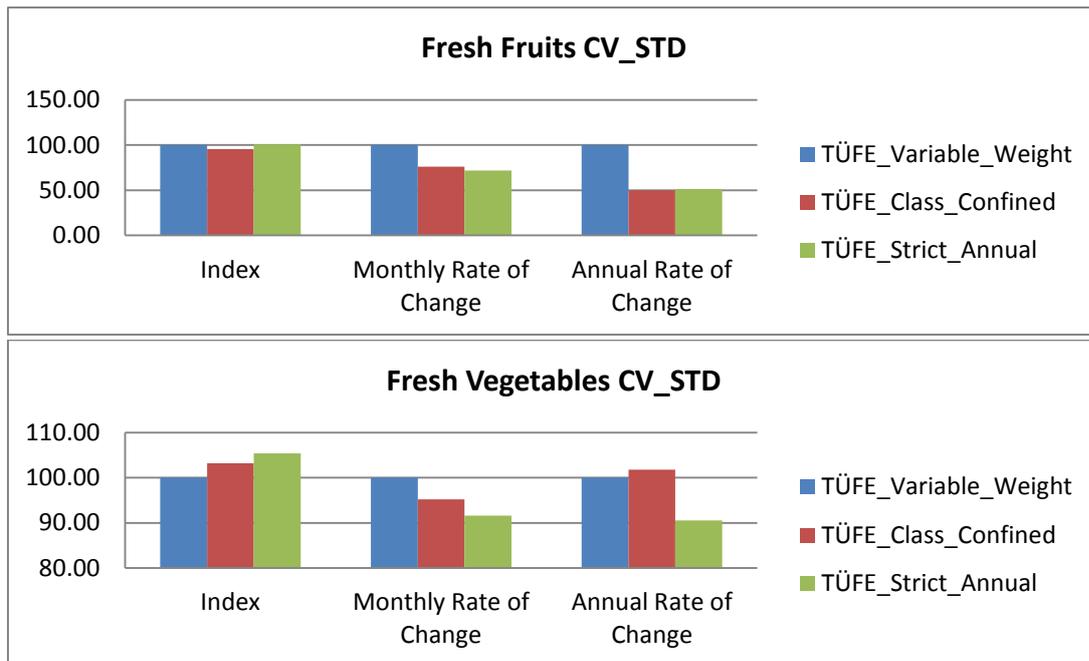






COICOP	Products	Total Observation	In-season	Out of season
01.161	Fresh Fruit	204	107	97
01.171	Fresh Vegetables	264	207	57
03.121	Men's Clothing	240	210	30
03.122	Women's Clothing	264	242	22
03.123	Children's Clothing	204	190	14
03.2	Footwear	156	140	16





Annual change of CPI with strict weight has the minimum volatility in fresh fruits and vegetables group. On the other hand, annual change of CPI with strict weight shows minimum volatility in other seasonal group and general CPI.

Both strict and class confined weights show less volatility than variable weight in annual change of CPI at most of the lower levels of index.

All weighting systems have very close volatility in general CPI monthly. However, strict weights method has the least volatility in general CPI annually.

VI. Conclusion

It must be recognized that there is no completely satisfactory way to deal with strong seasonal commodities. They may need special treatment to overcome volatility in the CPI. The comparison of different approaches to the treatment of strong seasonal items shows that both fixed and seasonal weights indices display the same overall tendency and behavior. However, the class confined and variable weights approaches seem to yield more volatile results than fixed weight approach. Using strict annual weight application provides more predictable results both for monthly and annual rate due to less volatile results and, as such, appears to be the better choice for measurement of pure price changes.

Most of the European countries especially in the Mediterranean side have started to use strict annual weight application for strong seasonal items and EuroStat offers to use this system in the CPI calculations.

VII. Sources

UNECE (2009), Practical Guide to Producing Consumer Price Indices

EuroStat (2009), Commission Regulation (EC) No 330/2009 of 22 April 2009