

T.C.  
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SOSYAL BİLİMLER ENSTİTÜSÜ  
İKTİSAT ANABİLİM DALI  
İKTİSAT (İNGİLİZCE) BİLİM DALI

**INFLATION MEASUREMENT METHODS, CRITERIA  
AND CONSEQUENCES OF INCORRECT INDICES –  
TURKEY CASE**

Yüksek Lisans Tezi

MAHİR ERKAN

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Marmara Üniversitesi  
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## **ABSTRACT**

It has often been wondered why the officially announced inflation rates differ significantly from everyday experience. According to people's personal experiences about items that they most frequently consume, such as food and gasoline, the changes in price levels often seem to exceed the official figures.

Analysis of the inflation rate had been taken as a standard mathematical process for years. There have been various indices used for interpreting the weights of price changes. The Consumer Price Index (CPI) has been the most popular method of measuring the average change in prices over time for goods purchased by consumers in a market basket of goods and services.

The CPI, first published by the U.S. Bureau of Labor Statistics (BLS), has generated controversy throughout its history. In 1995, a commission named after its chairman M. Boskin was appointed by the United States Senate to study possible bias in the computation of the CPI. The Boskin Commission report identified four sources of bias and argued that the CPI was overstating the true level of U.S. inflation. After the report was published, many news reports and articles appeared about this previously unexplored area of economics; the findings are briefly and historically summarized in the thesis.

As the official data set and methodology for the Consumer Price Index are not fully available, research methodology focused on comparative simulations in order to underline the significance of item weights in defining the total inflation rate (overall CPI). In addition to having a theoretical analysis with a simulation-based insight, inflation measurement techniques were reviewed in order to reach a more valid indexation for price changes.

## ÖZET

Her zaman resmi olarak açıklanan enflasyon oranları ile günlük hayatta karşılaşılan enflasyon oranları arasında neden ciddi farklılıklar olduğu merak edilir. İnsanların yemek ve yakıt gibi günlük hayatta daha çok tükettikleri ürünlerle ilgili kendi kişisel deneyimlerine göre fiyat seviyelerindeki artışlar, resmi değerlerin üzerinde gerçekleşmekte.

Enflasyon oranı analizi, uzun yıllar boyunca standart bir matematiksel süreç olarak kabul edildi. Fiyat değişikliklerinin ağırlıklarına dair birçok endeks kullanıldı. Tüketici Fiyat Endeksi (TÜFE), bu endekslerin en popülerleri olarak şehirli tüketicilerin zaman içerisinde bir tüketici ürün ve hizmet sepetinin fiyatı için yaptıkları ödemedeki değişiklikleri ölçmektedir.

İlki A.B.D. İşçi İstatistikleri Bürosu (BLS) tarafından yayımlanan TÜFE, tarih boyunca bir tartışma konusu olmuştur. 1995 yılında Birleşik Devletler Senatosu, TÜFE hesaplamasındaki olası sapmaları incelemek üzere başkanı M. Boskin'in adını alan bir komisyon oluşturdu. Boskin Komisyonu, sapmaların 4 kaynağının olduğunu belirledi ve A.B.D.'deki gerçek enflasyon oranının TÜFE hesaplaması nedeniyle, açıklanan değerlerin daha altında olduğu sonucuna vardı. Rapor yayımlandıktan sonra bu tez çalışmasında incelenen ve tarihsel olarak kısaca özetlenen; önceden çok fazla üretim yapılmayan bu konu ile ilgili olarak lehte veya alehte birçok makale ve yazılar çıkmaya başladı.

Tüketici Fiyat Endeksi konusunda resmi veriler ve metodoloji tam olarak paylaşılmadığından araştırmanın sistematığı, toplam enflasyon oranını belirlemekte ürün ağırlıklarının öneminin altını çizmek için karşılaştırmalı simülasyonlar üzerinde durmak oldu. Simülasyon temelli içgörülerle desteklenen teorik bir analiz yanında fiyat değişiklikleri için daha doğru endekslemeye ulaşmadaki enflasyon ölçümleme teknikleri gözden geçirildi.

## **PREFACE**

It is a pleasure to thank the many people who made this thesis possible.

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## **CHAPTER 1: INTRODUCTION**

Inflation has been one of the most important components of economics. Although price changes are analyzed at micro levels, aggregation methodologies have led to a significant relation between inflation and many macroeconomic variables such as GDP and GNP. There is an extensive amount of literature on the shortcomings of aggregation theory as total real production depreciates or appreciates with regard to changes in single product prices. The search for real inflation measurement techniques had been a vital issue from the 15<sup>th</sup> century until the fine-tuning of the mainstream ‘basket of goods and services’ approach in the 19<sup>th</sup> century. The content of the basket and the weight of the goods within became the two prominent factors in analyzing the validity and representativeness of the inflation figures, in addition to the consumer price index technique itself.

The Bureau of Labor Statistics (BLS), the first institution to study inflation measurement was established as an agency of the U.S. government in the 1940’s. BLS developed the basket of goods and services methodology using/in the Consumer Price Index technique. The debate about the validity of the technique began in 1961 by a study on US inflation by the Stigler Commission, which proposed some recommendations about the content of inflation baskets. Until the report of the Boskin Committee in 1996 (named for its chairman Michale Boskin) , there were only sporadic/loose discussions about the methodology. During the crisis years of the mid 70s, the debates evolved around the results of the announced rates rather than the validity of the numbers. The Boskin Commission, after studying the calculation of the CPI in the United States, declared that the total computational bias for the US economy had been more than 1%, indicating an overstatement of the true level of inflation. As a result of this milestone, a massive amount of research on the validity of inflation rates began to appear among economic literature, media and national politics.

I became interested in this area as a result of my own personal shopping experiences. Over the past couple of years, I have experienced a rate of growth of prices much higher than the officially announced inflation rates. According to people's daily expenditure patterns, their own inflation rate (the overall price change of goods and services consumed) has been dramatically higher than Turkish Statistics Institute's (TurkStat) official figures. Moreover, there are debates about the validity of those figures, originating from parties at the Grand National Assembly of Turkey and in various media platforms. In addition, citizens' associations such as Confederation of Turkish Trade Unions (Turk-Is) have proposed alternative measurement techniques. Turk Is has been periodically announcing their own studies on inflation figures. That is why we need to have a closer look at this phenomenon.

Among the literature on the methodology of inflation measurement in Turkey, it is easily noticed that a permanent change of the inflation basket (the content of representative basket of goods and services) takes place at various times throughout the year. Thus I wanted to pay a close attention to the inflation basket paradigm which has been considered the default indexation methodology of consumer price changes. The Consumer Price Index (CPI) is the most dominant methodology of inflation calculation. In reviewing the literature, I also considered the historical background, types, classifications and biases of the CPI. Among all the issues surrounding the basket of goods and services, the weights assigned to product groups seem to be the key element in understanding the fragility of the CPI method. With the help of statistics from Turkish Statistics Institute (TurkStat) and studies of the Confederation of Turkish Trade Unions (Turk-Is), it was possible to make comparative simulations in order to underline the significance of item weights in defining the total inflation rate (overall CPI).

Over time, alternative approaches for inflation measurement, such as the 'true cost of living index', which also takes into account the change in the real cost of living as well as the nominal change in price levels was revived. I also gained further insights from the

literature on the ideal index methodologies, where a majority of the critiques of inflation measurement come from ‘the pluralistic view’. In addition, a dozen sources for analyzing the personal level of inflation were analyzed, in order to yield more representative approach compared to a macro level aggregate.

The aim of this study is to take a look at how inflation is crucial in the decision making process of governments’ economic policies. After a brief introduction to the term “inflation”, my focus will be on how inflation can be measured; then the biases within the content of inflation indices will be explored. The concept of the Consumer Price Index (CPI) will be the focus of this article since it is the most common indicator of inflation. One of the approaches of the CPI, namely the fixing of basket of goods and services will be investigated with a reference to another index, namely the ‘cost of living’. The alternative index theories will be studied as forming a different, ideal point of view. This examination is initiated by simulations in order to investigate the significance of ‘weights’, in addition to providing insights for the/a personal inflation calculator. Turkey will be the sample case country and the theoretical implications for real numbers will be demonstrated. In the conclusion, the on-going debates and inflation dynamics will be summarized form a broader point of view.

## **CHAPTER 2: INFLATION**

The term "inflation" usually refers to a measured rise in a broad price index that represents the overall level of prices in goods and services in the economy. The inflation rate is the percentage rate of change of a price index over time. In short, “inflation” is defined as an ongoing rise in the general level of prices quoted in units of money. In other words, it is the abundance of money supply in the system compared to the size of the supply of goods. An increase in the general level of prices implies a fall in the overall purchasing power of the monetary unit for the products. Inflation rates vary from year to year and from currency to currency. Although economies based on silver and gold

standards sometimes experience inflation, inflation rates in such economies barely exceed 1-2 percent per year, and the overall experience over the centuries had seen no inflation. Economies based on paper-money, like today's have displayed much more permanent levels of inflation depending on the structure of the economy, i.e. whether it is a free, closed or well-structured economy. It is also very common that during the transition process of liberalizing the economy, the inflation rates can alternate with significant discrepancies. Emerging countries such as Turkey got used to living with high permanent inflation rates after opening their economies to world markets.

Although the CPI is not used in the GDP calculation, there are relationships with the price deflators used in converting GDP data and growth to inflation-adjusted numbers. The more inflation is understated, the higher the inflation-adjusted rate of GDP growth that gets reported.

Inflation is detrimental to all creditors. The more prices increase, the more purchasing power of the principal and interest payments decrease. The dollar, which was loaned out had a higher purchasing ability and could provide more goods than the dollar which was paid back. In order to keep up with rising consumer prices, inflation can lead to a higher wage demand by employees or workers. People purchase consumer durables as stores of wealth in the absence of trustable alternatives as a means of getting rid of excess cash before it is devalued. High inflation increases the opportunity cost of holding cash balances and can push people to hold a greater portion of their assets in interest paying accounts. Uncertainty about future inflation may also discourage investments and savings. The harm is greater to the extent that the *actual* inflation rate differs from the *anticipated* inflation rate which is the expected rate taken for granted in all kinds of yearly contracts. When people who are responsible in signing transactions, correctly anticipate a faster decline in the purchasing power of the national currency (a higher inflation rate), the terms of contracts calling for future payments in the national currency are adjusted accordingly. Borrowers and lenders who expect higher inflation agree to a higher nominal

interest rate (money repaid over money lent) so as to preserve the real interest rate (purchasing power repaid over purchasing power lent) between them. The magnitude of inflation - the inflation rate - is usually reported as the annualized percentage growth of some broad index of money prices. In sum, while U.S. dollar prices rise, a one-dollar banknote buys less goods on inflation next year. That being said, inflation is a very important issue for the overall economy, as it affects not only the supply side but also the demand side.

## **2.1 THEORETICAL HISTORY OF INFLATION**

According to economic theory, there are essentially two causes of inflation:

-Inflation by an increase in demand, namely ‘Demand Pull Inflation’.

-Inflation by an increase in the cost of the factors of production (supply), ‘Cost Push Inflation’.

In practice, however, it is not always easy to decompose the observed inflation into its demand-pull and cost-push components. The process is dynamic, and the shocks to prices are mixed. Here we could make use of schools of economic thought to trace the development of inflation theory in history.

Classical and neoclassical economists all used the quantity theory of money (QTM) to explain inflation. QTM states that the value of all sales of goods must necessarily equal the value of all purchases. The general price level is solely an increasing function of money supply, or in other words, an excess supply in the money market causes, other things being equal, an excess demand in the goods market. This simple classical or neoclassical relationship states that inflation is only a monetary phenomenon if one ignores the possible changes in Velocity and Real Volume of Transactions. Therefore, in a classical or neoclassical economy, the money supply should be reduced to fight against inflation.

Keynes' book, *The General Theory of Employment, Interest and Money*, was based mainly on the assumption of underemployment equilibrium with a fixed general price level. As an alternative to a monetary model of inflation, Keynes develops a different demand-side model of inflation, the so called "inflation gap". Keynes describes a redistribution process in which "inflation acts like a pump that transfers income from wage earners who have a low propensity to save and a low marginal tax rate to the entrepreneurial sector with a higher propensity to save and a higher marginal tax rate". An unexpected increase in aggregate demand (inflationary gap), as in the case of a war, leads to a price increase under full employment conditions, and this, in turn, creates unanticipated profits for firms while nominal wages remain temporarily constant. Rising profits create an additional excess demand in the goods market. However, the lagged attempt of firms to satisfy the initial excess demand in the goods market creates an excess demand in the labor market. Resulting competition among entrepreneurs for fully employed labor pushes nominal wages higher until restoring real wages to their initial level. The increase in real wages induces a new demand pressure in the goods market. Prices increase again. If the wage-lag mechanism still continues to work, an inflation spiral occurs.

In spite of accepting the possibility of inflationary effects originating from supply-side shocks, most Keynesian economists treated demand-side shocks as the primary cause of inflation. The Keynesian neoclassical synthesis incorporated labor market dynamics into the IS-LM model by taking into account the Phillips curve (PC) to eliminate the missing wage/price block, or inflation equation, in the system.

The observed evidence on incompatibility between the Philips Curve relationship and the co-existence of stagnation and inflation was actually predicted by monetarist economists who proposed a so-called expectations-augmented PC in the late 1960s. According to the monetarist economists, the formation of inflation expectations is backward-looking, or adaptive, in the sense that not all information is available to economic agents during their formation of price expectations.

Cost-push theories of inflation largely attribute inflation and disinflation to non-monetary, supply-side effects that change the unit-cost and profit- markup components of the prices of individual products.

The structuralist approach to inflation is one of the major versions of cost-inflation theories. The idea linking inflation to country-specific structural factors, such as the coexistence of a “progressive” (industrial) sector and a “traditional” (agricultural or export) sector modern QTM in the tradition of Friedman accepts that the inflation occurs when the rate of growth of the money supply exceeds the growth rate of the real aggregate output in the economy. According to the monetarists, the QTM implies that inflation is always, everywhere and solely a monetary and demand-side phenomenon. In their view, cost-push arguments for inflation are misleading because they are primarily based on some microeconomic observations on the supply-side. Monetarists believe in general that the firm- or industry-specific cost increases cannot be inflationary as long as they are not related to, or accommodated by, increases in the money supply. Thus, the causation runs from inflation to costs, and not vice versa.

According to rational expectations theory, people do not consistently make the same forecasting errors as suggested in the adaptive expectations idea. Economic agents form their macroeconomic expectations “rationally” based on all past and current relevant information available, and not only on past information as in the case of backwards-looking, or adaptive, price expectations. If the monetary authority announces a monetary stimulus in advance, people expect that prices will rise. In this case, the monetarists argue this fully anticipated monetary policy can not have any real effects even in the short-run. .

According to monetarist and new classical economists, the growth in the money supply stems typically from the ongoing public sector deficits that are primarily financed by the central bank. Alternative financing methods for current government deficits only

determine the timing of unavoidable inflation in the future, under the assumption that fiscal policy dominates monetary policy.

In the 1980s, the second generation of the new classical macroeconomists argued that upswings and downswings in economic activity originate from real (or aggregate supply) shocks rather than monetary (or aggregate demand) shocks. The main contribution of Real Business Cycle economists is that they call our attention to the possibility of the important role of supply shocks in explaining inflation.

According to the new Keynesians, wage and price stickiness in the short run can be explained by factors like “small menu costs” or “staggered (or non-synchronized) wage and price changes”. The new Keynesian attack on the new classical macroeconomics concentrates principally on the assumption of “continuous market-clearing”, accepting that inflation is still a monetary phenomenon in the long run.

The new generation of quantitative models of economic fluctuations was argued to have two central elements:

- (1) systematic application of intertemporal optimization behavior of firms and households, and rational expectations, and
- (2) incorporation of imperfect competition and costly short-run price adjustments into dynamic macroeconomics.

The distinguishing characteristic of the New IS-LM model is that its key behavioral relations can be derived from the underlying choice problem of households and firms and that these relations consequently involve expectations about the future in a central manner.

New political economy is the study of how the political nature of decision-making affects policy choices and, ultimately, economic outcomes. The new political economy literature provides fresh perspectives on the relations between the timing of elections,

policymaker performance, political instability, policy credibility and reputation, central bank independence and the inflation process itself.

Although there are various factors that effect inflation in text books, according to a local study in Turkey the basic factors that lead to inflation have been exchange rate, interest rate and the money supply as well as various political factors.

## **2.2 CALCULATION**

There are different approaches / indices for analyzing the inflation rate. The inflation rate is numerically measured by indices such as the Consumer Price Index (CPI) and Producer Price Index (PPI), which are reported periodically by the Statistics Bureaus due to the changes in prices of the basket of goods whose content is a result from nationwide surveys.

The Turkish Statistical Institute (TurkSat) has been collecting the individual level data by periodic surveys. The panel data is used to come up with a macro entity having the aggregate measures from the surveyors. The issues that may arise during the collection and aggregation phases could affect the validity of the whole process, since those phases are vulnerable to manual adjustments.

There are two survey groups, that constitute the data set for the analysis. One group is consistently creating the questionnaires for households and systematically visiting the sample groups to discuss their consumption patterns. A long list of items (products, services ...) is surveyed in addition to individuals wage levels. There are various parameters that affect the validity of the data set such as the surveyor's motivation (bias for the output regarding whether he/she anticipates a rise or decline of price levels), the comfort of the surveyed in revealing the correct information and the survey methodology (validity of the list and the questionnaire). The store group of surveyors collects the price

level information locally at various sources from big retail chains to local stores. The prices are collected with respect to the permanent list of items in order to have a valid time-series.

The inflation rate is most commonly measured by the percentage rise in the Consumer Price Index (CPI). The CPI is generally the best measure for adjusting payments to consumers when the intent is to allow consumers to purchase at today's prices, a market basket of goods and services equivalent to one that they could purchase in an earlier period. The systematic is managed by holding constant through each year the sample of representative goods and services. For this purpose prices are collected each month and a fixed set of weights to price changes are applied for each of the items, such that their influence on the overall index which reflects their importance in the typical household budget. In this way, changes in the CPI indices from month to month reflect only changes in prices, and do not display ongoing variations in consumer purchasing patterns.

### **CHAPTER 3: CONSUMER PRICE INDEX (CPI)**

The CPI approach is a comparative basket of goods and services approach whose list of items is evaluated from a nationwide survey. The total price of a basket of goods is evaluated through a time frame in order to find the real, average rate of inflation. Basically there are two types of CPI; *fixed basket indices* and *cost of living indices (COLI)*. The purpose of the former (also known as pure price index, a cost of goods index and inflation index) is to measure the average price change of a representative basket of goods and services, which is kept constant over time. On the other hand, the purpose of COLI is to measure the change in the minimum cost of maintaining a given level of utility, welfare over time where the quantities are allowed to vary. The content of the basket of the former is decided by government authorities through an evaluation of surveys, whereas the latter is an indicator whose content is decided by non governmental authorities.

CPI is simply made of sub-categories which are grouped for different commodity

types. The all item CPI is the aggregate index for all broad commodity groups which are made of special categories. The special categories are the aggregation of "Item Stratum"s - the lowest level of aggregation for which an index is calculated by aggregating price quotes (Boskin, 1998). The index is usually computed yearly, or quarterly in some countries, as a weighted average of sub-indices for different components of consumer expenditure, such as food, housing, clothing, each of which is in turn a weighted average of sub-indices. At the most detailed level, the elementary aggregate level, detailed weighting information is unavailable, so elementary aggregate indices are computed using an unweighted arithmetic or geometric mean of the prices of the sampled product offers. A price index as complex as the CPI is the result of successive aggregations of indices; each aggregation level has its independent weightings, with different "ages." The first stage, hereafter referred to as the "lower level", is the calculation stage that yields the highly detailed indices (often called "micro- indices") for highly disaggregated product categories ("sub-items") for a specific geographic region ("urban area"). The micro-indices are obtained from price quotations collected from sales outlets in the urban areas examined. The second stage, hereafter designated as the "intermediary level", yields the indices for product groupings from the micro-indices. In third and final stage, called the "upper level", the overall price index is calculated from the grouping indices. In each stage, a Laspeyres formula is used (or was used, as we shall see). Upper-level weightings are taken from the national accounts. Intermediate-level weightings are usually taken from public or private surveys of household expenditures, or from other sources such as private panel surveys of distributors, production and import statistics, etc. At the lower level, the lack of information has led to the convention of assigning an identical, fixed weight to each product. There are many CPI measures published by the bureaus of statistics, CPI for All Urban Consumers (CPI-U), CPI for Urban Wage Earners and Clerical Workers (CPI-W) and the Chained CPI-U (C-CPI-U). The CPI-U is the popularly followed inflation measure reported in the financial media. It was introduced in 1978 as a more broadly based version of the main CPI, which was renamed CPI-W. The CPI-W is used in calculating Social Security benefits. The C-CPI-U was introduced in the 1990's as an alternate CPI measure.

### 3.1 TYPES OF INDICES

There are various methods to find out the Consumer Price Index; however the issue is more complicated than expected. Deciding on the correct index number is a problem of decomposing the value of a well-defined set of transactions in a period of time into an aggregate price multiplied by an aggregate quantity term. Diewert summarized the problem with the equations below.

$$p^t \equiv (p_1^t, \dots, p_N^t) \text{ Price Index for } N \text{ commodities at time } t$$
$$q^t \equiv (q_1^t, \dots, q_N^t) \text{ Quantity Index for } N \text{ commodities at time } t$$
$$P^t Q^t = p^t \cdot q^t \equiv \sum_{n=1}^N p_n^t \cdot q_n^t \text{ for } t=0,1,2,\dots,T$$

In what precise sense  $P^t$  and  $Q^t$  represent the individual prices and quantities are not immediately evident and it is this ambiguity that leads to different approaches to index number theory. The simplest price index is a *fixed-basket index*. The fixed-basket price index is simply the ratio of these two values, where the prices vary but the quantities are held fixed. Two natural choices for the fixed basket are the quantities transacted in the base period, period 0, or the quantities transacted in the current period, period  $t$ . These two choices lead to the Laspeyres and Paasche price indices, respectively.

There are various approaches for measuring the changes in the cost of basket of goods and services such as:

#### 3.1.1 Laspeyres Index

The Laspeyres Index is the most common index, which basically measures the changes in the cost of a fixed basket of goods. It does not take into account the substitution due to relative price changes. This uses a basket of goods that represents the pattern of

consumption at some time in the past, and then measures what it would cost to purchase that basket of goods at present. In short, it overstates the rise in the cost of living. In other words, the Laspeyres Index is a personal consumption expenditures deflator (PCE deflator), which measures the change for a variable basket, one that changes in response to consumer spending patterns.

This index answers the question, "How much is the sales price today for the same quality house as in the base year?" The base year we are now using is 2005; its index value is set to 100.0. Quality includes not only the physical size and amenities of the house, but also its geographic location. A hypothetical calculation is made in which the base year house type is held constant over time while its selling price is calculated in current dollars.

In theory, this index may be used to determine how much of a total price increase is due to an increase in quality - changes in size, amenities, and location - and how much is due to inflation. This index keeps housing quality constant. It has been used to inflate previous years' house prices to determine housing insurance replacement costs, to update local government real estate tax abatement levels, and to update price levels in housing programs for inflation where such updates are required by law or custom. Construction contracts might have a price escalation clause tied to this index. The assumption is that inflation in existing housing or construction can be approximated by inflation in the sales prices of new one-family houses sold.

The formula of the Laspeyres Index is as below:

$$P_L = \frac{\sum(p_t \cdot q_0)}{\sum(p_0 \cdot q_0)}$$

where  $P$  is the Laspeyres Index or in other words 'change in price level',  $p_0$  is the price level at the base period (usually the first year),  $q_0$  is the quantity at the base period and  $p_t$  is the price level at the period for which the index is computed (the last year).

### 3.1.2 Paasche Index

The Paasche Index is measured by current consumption pattern and is likely to overstate substitution and understate change in cost of living. This uses a basket of goods that represents the pattern of consumption in the present, and then projects backward what it would have cost to purchase that basket of goods in the same period. Shortly, it understates the rise in the cost of living.

This index answers the question, "What is the difference in price in today's house in today's dollars versus the price for the same house in base year dollars?" Since "today" is defined as any time period in question, the quality of the house defined above is not held constant. It is newly calculated for each time period. A hypothetical calculation is made in which the numerator of the calculation is the current house priced in current dollars. The denominator is the current house priced in base year dollars. In the numerator, for each time period the size, characteristics, and geographic mixture of the houses sold reflect the activity of that time period and the prices paid. Base year prices for the same characteristics are held constant in the denominator.

Since we are not concerned with new home sales or homes under construction as an output, we do not publish this index. Our use for this index is to calculate the Fisher Ideal Index as defined below. Data users who are concerned with measuring the value of today's output or production using a constant set of dollars will find this kind of index useful. By dividing today's output or value of production by this index, one can convert or deflate back to a fixed or standard set of dollars associated with the base year. This enables the data user to determine what the real value of output is for each time period.

The formula of the Paasche Index is as below:

$$P_P = \frac{\sum(p_t \cdot q_t)}{\sum(p_0 \cdot q_t)}$$

where  $P$  is the Paasche Index or in other words ‘change in price level’,  $p_0$  is the price level at the base period (usually the first year) and  $q_t$  is the quantity at the period for which the index is computed,  $p_t$  is the price level at the period for which the index is computed (the last year).

There are also some combinations of those indices such as **Superlative Index**, **Fischer Ideal Index** (the geometric average of Laspeyres and Paasche) and **Tornqvist Index**. The superlative indices (Fischer, Tornqvist) tend to avoid substitution bias because they adjust for changes in consumer expenditures. Those indices also have correlation with the Cost of Living index as well. The Laspeyres Index provides an upper bound to the Cost-of-living (COL) index based on the indifference curve of the first period and the Paasche index provides a lower bound to the COL index based on the second period. The Fischer index is generally taken as superior to the Diewert Index. The theory also shows that the Laspeyres index usually overestimates the Fisher index, while the Paasche index usually underestimates it. The mechanism behind this result is simple: the Laspeyres index overweights the products whose prices register the steepest increases, whereas, by logic, the share of these products in consumer expenditures will decline once consumers accept a degree of substitution between products while maintaining constant utility. In practice, however, a Fisher index is impossible to calculate, at least during the year and within the short deadlines required for an index such as the CPI. The reason is that the Fisher index cannot be established without the current-period weightings, which take a long time to determine. That is why all countries calculate the CPI as a Laspeyres index, that is, using fixed weightings derived from the base period.

CPI is the total of consumer expenditures on goods and services out of disposable income. Thus the index does leave non-market activities, government programs and savings aside. To have a standard benchmark, the index tracks the cost of purchasing a fixed basket of goods and services, in other words a large "basket" of goods and services is considered as the representative of the overall economy. There are weights for different commodities which derive from periodic consumer expenditure surveys. The CPI market basket is developed from detailed expenditure information provided by families and individuals on what they actually bought. There are two types of index weights used in the CPI analysis: 'fixed weight' where the consumption is not affected by the seasonality and 'floating weight' where there is a significant effect of the consumption period. The consumer price index is a fixed weight index, concurrently revised due to change in consumption of some goods in the basket based on seasonality. The contents of the CPI baskets of goods and services and their associated expenditure weights are updated annually. This is crucial in helping to avoid potential biases in consumer price indices that might otherwise occur over time. These might include the development of entirely new goods and services, or the tendency for consumers to substitute purchases away from those particular goods and services for which prices have risen relatively rapidly (Wingfield, 2008).

### **3.2 WHERE IS CPI USED?**

As there are various dynamics of inflation, setting it to an index is crucial for governments in order to establish a perfect forecast of the future. As many of the macroeconomic policies do stem from a consideration of expected level of price changes (Demand and supply adjustments occur respectively as well), CPI is a widely used as a planning tool for administrative authorities. In other words, the CPI is an indicator of the effectiveness of government fiscal and monetary policy.

Governments prefer CPI to be present in their macro level strategies in order to:

- **Track inflation:** CPI is a consistent and promising indicator for volatility. Governments need to observe the inflation trends closely due to many macroeconomic and political reasons such as international borrowings, ...
  
- **Decide on the economical policies:** The past performances of economic policies are significantly important for future government decisions. They are not only observations for effectiveness but also indication of the validity of support for the existing policies.
  
- **Make wage and price adjustments:** Governments announce the annual expectations for price rises and make revisions periodically. Companies and institutions adjust their price and wage rates accordingly. The CPI is also used to adjust key elements of the individual income tax to limit the extent to which individuals must pay higher taxes solely because of inflation. For example, the amount allowed for personal exemption, the amount of the standard deduction, and tax brackets are adjusted annually according to changes within the CPI in the US.
  
- **Provide a proof of National accounting principle:** Although there are numerous ways to analyze the national income or gross product figures, the CPI gives a rough estimation of the upcoming quarters based on the previous period's levels.
  
- **Find an indicator of price analysis:** There are slight changes in price levels over time. Governments try to find effective ways to track the changes such as Consumer price indices.
  
- **Look for opportunities in trade:** Making a cross comparison of CPIs in countries is a good alternative to find any arbitrary advantages.
  
- **Define the changes in market prices and house rents**

### **3.3 HISTORICAL BACKGROUND OF CPI**

The Consumer Price Index was initiated during the years of World War I, when rapid increases in prices (such as ship building), made an index necessary for calculating cost-of-living adjustments in (real) wages. The goal was to find eligible weighting patterns for the index, so that it would reflect the relative importance of goods and services purchased in many sectors between 1917 and 1919. Periodic collection of prices was started, and, in 1919, the Bureau of Labor Statistics began publication of separate indices for 32 cities. Regular announcement of the national index was started in 1921.

Due to the changes in people's purchasing habits, a new study was made covering expenditures in the years 1934-1936, in order to provide a reliable and recent basis for a comprehensively revised index, which was introduced in 1940. During World War II, when many commodities were scarce and goods were rationed, the index weights were adjusted temporarily to reflect these shortages, and occasionally revised up until the late 1970's when point-of-purchase surveys (POPS) were introduced (Wikipedia).

The first Consumer Price Index calculated by Turkish Statistics Institute (TurkStat) was an index using 1927 as the base year. This index was then updated to base years 1938 and 1948. Using 70 items, TurkStat continued its studies on the index by carrying out family surveys in Ankara in 1954 and 1955. As a result, the base years of the index were shifted to 1955 and 1958 and covered 137 items. Later, TurkStat calculated a new index with the base year 1968 for 11 provinces. In this index, 106 to 158 items were covered in different provinces. Between 1968 and 1982, the consumer price index of Turkey was obtained by weighting the consumer price index for 11 provinces. Percentages of population of each of the 11 provinces were used as the weights for the total population. TurkStat carried out a new Household Income and Consumption Expenditures Survey for places with a population of greater than 10 thousand in 1978-1979, and constructed a new urban area consumer price index with base year using 1978 and 1979 as the base years

based on this survey. This index, published since 1982, produced indices for 14 provinces, 5 regions and Turkey as a whole using prices compiled from 40 urban locations. Due to rapid economic, cultural and social changes in Turkey, there have been great transformations since 1978 in household consumption and income, in the consumption groups' shares in total consumption, and in the goods that are being consumed. Therefore the representativeness of 1978-1979 = 100 based urban consumer price index was criticized with regard to 1980's actual consumption patterns. Because the index's base year was old and consumption patterns had changed, a new index was called for to replace the former one. New consumer price indices covered 5 regions and 16 cities and were prepared using the results of the "Household Consumer Expenditures and Income Survey" carried out in 1987. The survey covered urban areas in 50 urban settlements with a population of more than 20 thousand. This index was constructed separately for rural and urban areas. Due to rapid economic, cultural and social changes in Turkey, there have been great transformations since 1987 in household consumption and income, in the consumption group's shares in total consumption, and in the goods consumed. Thus again the 1987 = 100 based urban consumer price index was found to be insufficient to cover actual current consumption patterns. Because the index's base years were out-of-date and consumption patterns have changed, a need for a new index arose. New consumer price indices based on the results of the "Household Consumer Expenditures and Income Survey" carried out in 1994 for urban areas in 62 urban settlement's with a population of more than 20 thousand, had been prepared for Turkey as a whole, 7 regions and 19 cities. The index was constructed separately for rural and urban areas. In 2003, a new producer price index which was developed geographical, population, expenditure, price features and set weights of index. This latest index based on 2003 was calculated by TurkStat as well. Thus, there are various separate data sets of consumer price index in Turkish history which makes things problematic in terms of a historical comparison.

The CPI represents all goods and services purchased for consumption by the reference population (U or W). Turkish data is built upon placing those expenditure items

into hundreds of subcategories, arranged into twelve major groups. Major groups and examples of categories in each are as follows:

- FOOD AND NON-ALCOHOLIC BEVERAGES ALCOHOLIC BEVERAGES AND TOBACCO
- CLOTHING AND FOOTWEAR
- HOUSING, WATER, ELECTRICITY, GAS AND OTHER FUELS
- FURNISHINGS, HOUSEHOLD EQUIPMENT, ROUTINE MAINTENANCE OF THE HOUSE
- HEALTH
- TRANSPORT
- COMMUNICATIONS
- RECREATION AND CULTURE
- EDUCATION
- HOTELS, CAFES AND RESTAURANTS
- MISCELLANEOUS GOODS AND SERVICES

There are various items that are not included in the content of the inflation basket such as:

- Expenditure of households on company related issues
- Expenditures for investment related issues (purchase of land, antiques ...)
- Savings
- Expenditures of households in foreign countries
- Income taxes and direct taxes
- Club fees and donations
- Monetary loans and gifts
- Pensions and social security fees, insurance premiums

Turkish Statistical Institute (TurkSat) has been making systematic changes in the basket of goods and services like all other bureaus in all countries. The institute has been examining the changes in consumption patterns through systematic surveys and fine-tuning the content of the basket every December. The announcements regarding the changes are communicated in January with a short list of items added and taken out. The rationale of those changes is based on whether the consumption weight of any goods and services within the total consumption preference of consumers is more than 1%. If so, they are added to the inflation basket. In addition to those permanent changes, there are periodical / seasonal changes in various items such as vegetables, wheat and fruits. TurkSat does not reveal the relevant information about those permanent and temporary changes unless there is an official request.

Here is a chronological summary of changes beginning with the year 2005 when the change of the base year in the indexation took place:

2005

Base year was changed to 2003 from 1994, in addition to a rise in the total number of items in the basket of goods from 410 to 423. There are 96 new products and services such as PVC windows, DVD players, contact lenses, sphygmomanometers, LPG auto tubes, postal fees, mobile phones, internet subscription fees, ice-cream, sim cards, ketchup and pc hardware. There are product and services items taken out of basket such as fuel oil, mixers, camcorders, sewing machines, Bafra cigarettes, jetton, thermoses and matches.

2006

There was a rise in the total number of items in the basket of goods from 423 to 442. There are many new products and services such as pudding, air conditioning systems, radiators, ultrasonography fees, mp3 players, ADSL modems, lottery games like Iddia, college fees, herbal tea, natural gas subscription fees, beds, bathrobes, gum, cream cheese

and MRI scan fees. There are also many products and services taken out of the basket such as linen, children's coats and central heating fuel.

2007

There was a rise in the total number of items in the basket of goods from 442 to 444. There are 68 new products and services such as airline tickets, long-distance calls, denim coats, sleeping sets, vcd rentals, private class fees, towelettes, skin cream, OGS fees, batteries, bottled water, diesel cars, LCD TVs and laptops. There are also 26 products and services taken out of the basket such as tobacco, sewing fees, kosher cheese, windshield wiper fluid, single door fridges and woolen items.

2008

There was a rise in the total number of items in the basket of goods from 444 to 454. There are 81 new products and services such as electrical heaters, memory cards, webcams, pomegranates, vanilla, mayonnaise, instant coffee, freezer bags, TV receivers and scooters. There are also 9 products and services taken out of the basket such as farina, bathrobes, radiators, faucets, medical shots and stretch film.

2009

There was a decline in the total number of items in the basket of goods from 454 to 449. There are many new products and services such as dried apricots. There are also 6 products and services taken out of the basket such as corduroy, women's coats, infant's jackets, cassette tapes, photo printing and VCD-DVD rentals.

After the change of 'the base year of the inflation indexation' in 2006, some lawsuits were brought by various chambers and deputies. The issue was more about the sampling biases, which I mentioned in the former section. The Turkish Statistical Institute was accused of manipulating the statistical macro economic variables for the sake of the

government's policies as the government had been aiming to keep inflation rate under pressure over a long period.

We can see from the announced list that some luxury goods and services were included such as regarding the year 2008 mayonnaise, instant coffee and OGS auto accessories, although goods that are commonly used such as tobacco and jackets, were taken out. The Turkish Grand National Assembly also objected that in 2007 long-distance calling fees and flight tickets were added to the inflation basket although they were the temporary result of competition / price wars. The issue was that those items were used as benchmarks / substitutes for main communication and transportation alternatives preferred by consumers, given the fact that majority of people have been benefiting from short-distance calls and buses. Other than that, some of the non-seasonal products such as bathrobe and VCD-DVD rentals, which were once added to the basket, were then taken out in very short terms. The consumption patterns regarding those products could not change within a couple of years. In total, it could be argued that products which satisfy 'first level needs' were seen to be underestimated compared to secondary level products whose prices went down due to market related dynamics.

Here are the analytical framework and classification methodologies for the Consumer Price Indices in Turkey with regards to the changes in base year:

### **3.3.1 1978-79 Based Consumer Price Index**

Definition: Consumer Price Index (CPI) measures the changes the current retail prices of commodities purchased by a group of consumers over a given time period. 1978-79 based CPI is aimed to calculate the inflation rate by using the change of the prices of consumption goods and services existed in the market. For this purpose, all monetary expenditures made by households for consumption of goods and services or in-kind payments as well as owner

occupied housing, expenditures from household production and expenditures from stocks are taken into account.

Classification: In determining the weights and calculating the index, Target Based Individual Consumption classification (COICOP) is used and according to this classification expenditures are organized into 7 major groups. 257 commodities are used in the compilation of the index.

#### Scope of the data

Sources of weights: 1978-79 Household Income and Consumption Expenditures Survey.

Time period of current weights: From 1 October 1978 to 30 September 1979.

Transactions coverage: In the index 40 settlements are included. 257 item prices are compiled from 6,303 outlets in a month.

Population coverage: Disposable income of the households laid between the range of 5.000 TL and 29.999 TL are covered in the index.

Geographical coverage: The geographical coverage of the index is urban settlements with the population of 10.001 and above. Prices are compiled from 40 locations.

Price Coverage: Price coverage of index is constituted of purchasing prices. The prices of goods and services included within the index are retail prices including taxes but excluding any deposits and installments.

#### Accounting Conventions

1978-79 based Consumer Price Index (CPI) is calculated by using Laspeyres type formulation.

$$I = w * ( P_i / P_o )$$

I : index

P<sub>i</sub> : current price

w : weight

P<sub>o</sub>: base year price

A simple arithmetic average is used for calculating of commodity prices from commodity types.

#### Nature of the Basic Data Sources

Sources: Household Income and Consumption Expenditures Survey.

#### Compilation Practices

Processing system: Prices of fresh fruit, vegetables, and petroleum\_products are collected once a week; other prices are collected twice a month and rent data is collected once a month.

Processing site: Turkey's Consumer Price Index data is processed only by the Turkish Statistical Institute.

Timing of recording transactions: Results of the CPI are announced to the public each month with a news bulletin.

#### Other Aspects

Seasonal adjustment: Data are not seasonally adjusted.

Geographic detail: The results are produced and announced for Turkey, 5 geographical areas and 14 selected city.

### **3.3.2 1987 Based Consumer Price Index**

Definition: Consumer Price Index (CPI) measures the changes the current retail prices of commodities purchased by a group of consumers over a given time period. The 1987 based CPI is aimed to calculate the inflation rate by using the change of the prices of consumer goods and services existed in the market. For this purpose, all monetary expenditures made by households for the consumption of goods and services or in-kind payments as well as

owner occupied housing, expenditures from household production, and expenditures from stocks are taken into account.

Classification: In determining the weights and calculating the index, Target Based Individual Consumption classification (COICOP) is used and according to this classification, expenditures are organized in 7 major groups. 347 commodities are used in the compilation of the index.

#### Scope of the data

Sources of weights: 1987 Household Income and Consumption Expenditures Survey.

Time period of current weights: From 1 January 1987 to 31 December 1987

Transactions coverage: In the index 33 settlements are included. 347 item prices are compiled from 7,735 outlets in a month.

Population coverage: Disposable income of the households laid between the range of 50.000 TL and 1.000.000 TL are covered in the index

Geographical coverage: The geographical coverage of the index is the urban settlements with a population of 20.001 and above. Prices are compiled from 33 locations.

Price Coverage: Price coverage of index is composed of purchasing prices. The prices of goods and services included within the index are retail prices including taxes but excluding any deposits and installments.

#### Accounting Conventions

1987 based Consumer Price Index (CPI) is calculated by using Laspeyres type formulation.

$$I = \sum w * ( P_i / P_o )$$

I : index

P<sub>i</sub> : current price

w : weight

P<sub>o</sub>: base year price

A simple arithmetic average is used for calculating commodity prices from commodity type.

#### Nature of the Basic Data Sources

Sources: Household Income and Consumption Expenditures Survey.

#### Compilation Practices

Processing system: Prices of fresh fruit, vegetables, and petroleum products are collected once a week; other prices are collected twice a month and rent data is are collected once a month.

Processing site: Turkey's Consumer Price Index data are processed only by the Turkish Statistical Institute.

Timing of recording transactions: Results of the CPI are announced to the public in the 4th day of each month with a news bulletin.

#### Other Aspects

Seasonal adjustment: Data are not seasonally adjusted.

Geographic detail: The results are produced and announced for Turkey, 5 geographical areas and 16 selected cities.

### **3.3.3 1994 Based Consumer Price Index**

Definition: Consumer Price Index (CPI) measures the changes the current retail prices of commodities purchased by a group of consumers over a given time period. 1994 based CPI is aimed to calculate the inflation rate by using the change of the prices of consumer goods and services existed in the market. For this purpose, all monetary expenditures made by households for the consumption of goods and services or in-kind payments as well as

owner occupied housing, expenditures from household production and expenditures from stocks are taken into account.

Classification: In determining the weights and calculating the index, Target Based Individual Consumption classification (COICOP) is used and according to this classification expenditures are organized in 33 sub-groups and 10 major groups. 410 commodities are used in the compilation of the index.

International and regional guidelines: There are no important differences between Turkey's methodology reported in the EUROSTAT and relevant international or regional standards.

#### Scope of the data

Sources of weights: 1994 Household Income and Consumption Expenditures Survey.

Time period of current weights: From 1 January 1994 to 31 December 1994

Transactions coverage: In the index 35 settlements are included. 410 item prices are compiled from 6,390 outlets in a month.

Population coverage: Disposable income of the households laid between the range of 3.198.001 TL and 78.935.000 TL are covered in the index.

Geographical coverage: The geographical coverage of the index is the urban settlements with a population of 20.001 and above.

Price Coverage: Price coverage of the index is composed of purchasing prices. The prices of goods and services included in the index are retail prices including taxes but excluding any deposits and installments.

#### Accounting Conventions

1994 based Consumer Price Index (CPI) is calculated by using Laspeyres type formulation.

$$I = w * ( P_i / P_o )$$

I : index

P<sub>i</sub> : current price

w : weight

P<sub>o</sub>: base year price

A simple arithmetic average is used for calculating the commodity prices from commodity type.

#### Nature of the Basic Data Sources

Sources: Household Income and Consumption Expenditures Survey.

#### V. Compilation Practices

Processing system: Prices of fresh fruit, vegetables, and petroleum products are collected once a week; other prices are collected twice a month and rents are collected once a month.

Processing site: Turkey's Consumer Price Index data is processed only by the Turkish Statistical Institute.

Timing of recording transactions: Results of the CPI are announced to the public in the 4th day of each month with a news bulletin.

#### Other Aspects

Seasonal adjustment: Data is not seasonally adjusted.

Geographic detail: The results are produced and announced for Turkey, 7 geographical areas and 19 selected cities.

Footnotes: 1994=100 based CPI has been extended according to rate of change of 2003=100 CPI since 2006 January.

### **3.3.4 2003 Based Consumer Price Index**

Definition: Consumer Price Index (CPI) measures the changes the current retail prices of commodities purchased by a group of consumers over a given time period. 2003 based CPI aims to calculate the inflation rate by using the change of the prices of goods and services in the market. For this purpose, expenditures of households, foreign visitors, constitutional population and all final monetary expenditures are taken into account. This concept left

owner occupied housing and expenditures from household production out of the coverage from consumption expenditures.

Classification: In determining the weights and calculating the index, Target Based Individual Consumption classification (COICOP) is used and according to this classification expenditures are organized in 44 sub-groups and 12 major groups. 447 commodities are used in the compilation of the index.

International and regional guidelines: There are no important differences between Turkey's methodology reported in the EUROSTAT and relevant international or regional standards.

#### Scope of the data

Sources of weights: Continuous Household Budget Survey conducted by the Turkish Statistical Institute (TURKSTAT) among approximately 25,000 private households of all socio-economic groups, tourism survey and constitutional population expenditure survey.

Time period of current weights: From January 2003 to December 2005 (1/3 from 2003, 1/3 from 2004, 1/3 from 2005).

Transactions coverage: In 2003=100 based CPI, all of the final monetary consumption expenditures made for the consumption of goods and services in domestic markets are taken as bases. In the index 81 city centers and 72 administrative district centers are included. 330,000 prices are compiled from 23,000 outlets in a month and 3826 renters are included in the scope of the index.

Population coverage: Index coverage of the population is the whole population of Turkey without any grouping according to income level or geographical area.

Geographical coverage: All of the final monetary consumptions of the households, foreign visitors and constitutional population are taken into account.

Price Coverage: Price coverage of the index is composed of purchasing prices. The prices of goods and services included within the index are retail prices including taxes but excluding any deposits and installments.

### Accounting Conventions

Item baskets and the weights are updated at the end of every year and chained with the Laspeyres formulation. Every year in December new goods and services are added in the basket, goods and services which lost their importance are taken out and renewed weights are used in the calculation of index. The index is calculated by dividing current prices to the prices of previous December, which is “new price reference period (po)”, and then determined / fixed by multiplying it with the index numbers of December.

$$I = w * ( P_i / P_o )$$

I : index

P<sub>i</sub> : current price

w : weight

P<sub>o</sub>: base year price

$$I_t = w^1 * ( P_{it} / P_{December(t-1)} ) * I_{December(t-1)}$$

w<sup>1</sup> : new weight

t : time

A geometric average is used for the calculations of commodity prices from commodity type.

### Nature of the Basic Data Sources

Sources: Household Budget Survey, Constitutional Population Expenditure Survey and Tourism Survey.

### Compilation Practices

Processing system: Prices of fresh fruit, vegetables, and petroleum\_products are collected once a week; other prices are collected twice a month and rent data is collected once a month.

Processing site: Turkey's Consumer Price Index data is processed only by the Turkish Statistical Institute.

Timing of recording transactions: Results of the CPI are announced to the public on the 3rd working day of the month at 17:00 with a news bulletin.

#### Other Aspects

Seasonal adjustment: Data are not seasonally adjusted.

Geographic detail: The results are produced and announced for both Turkey and 26 statistical regions.

### **3.3.5 Indicators For The Consumer Price Indices Having Specified Coverages**

Definition Core inflation is an indicator that helps to form monetary policies and to determine the tendency of inflation. It has a high degree of accuracy in estimating future inflation. Core inflation is the general increase in the prices after the elimination of all temporary influences.

Classification: In determining the weights and calculating the index, Target Based Individual Consumption classification (COICOP) is used.

International and regional guidelines: There are no important differences between Turkey's methodology reported in the EUROSTAT and relevant international or regional standards.

#### Scope of the data

Sources of weights: Continuous Household Budget Survey conducted by the Turkish Statistical Institute (TURKSTAT), tourism survey and constitutional population expenditure survey.

Time period of current weights: From January 2003 to December 2005 (1/3 from 2003, 1/3 from 2004, 1/3 from 2005).

Transactions coverage: Scope of the Core inflation:

- CPI Excluding Seasonal Items
- CPI Excluding Unprocessed Food Products
- CPI Excluding Energy
- CPI Excluding Unprocessed Food Products And Energy
- CPI Excluding Energy, Alcoholic Beverages And Tobacco Products
- CPI Excluding Energy, Alcoholic Beverages, Tobacco Products, Products With Administrated Prices And Exc. Indirect Taxes
- CPI Excluding Unprocessed Food Products, Energy, Alcoholic Beverages, Tobacco Products, Products With Administrated Prices And Exc. Indirect Taxes
- CPI Excluding Energy, Unprocessed Food Products, Alcoholic Beverages, Tobacco Products And Gold

Population coverage: Index coverage of the population is the whole population of Turkey without any grouping according to income level or geographical area.

Geographical coverage: All of the final monetary consumptions of households, foreign visitors and constitutional population are taken into account.

Price Coverage: Price coverage of the index is composed of purchasing prices. The prices of goods and services included within the index are retail prices including taxes but excluding any deposits and installments.

#### Accounting Conventions

Item baskets and the weights are updated at the end of every year and fixed by the Laspeyres formulation. Every year in December new goods and services are added to the basket, goods and services which lost their importance are taken out and renewed weights are used in the calculation of the index. Index is calculated by dividing current prices to the prices of the previous December, which is the “new price reference period (po)”, and then fixed by multiplying it with the index numbers of December.

$$I = w * ( P_i / P_o )$$

I : index

P<sub>i</sub> : current price

w : weight

P<sub>o</sub>: base year price

$$I_t = w^1 * ( P_{it} / P_{December(t-1)}) * I_{December(t-1)}$$

w<sup>1</sup> : new weight

t : time

A geometric average is used for the calculations of commodity prices from commodity type.

#### Nature of the Basic Data Sources

Sources: Household Budget Survey, Constitutional Population Expenditure Survey and Tourism Survey.

#### Compilation Practices

Processing system: Prices of fresh fruit, vegetables, and petroleum products are collected once a week; other prices are collected twice a month and rents are collected once a month.

Processing site: Turkey's Consumer Price Index data are processed only by the Turkish Statistical Institute.

Timing of recording transactions: Results of the CPI are announced to the public on the 3rd working day of the month at 17:00 with a news bulletin.

#### Other Aspects

Seasonal adjustment: Data are not seasonally adjusted.

Geographic detail: The results are produced only for Turkey.

### 3.4 CPI IN NUMBERS

Inflation rate or CPI is one of the key macro level indicators of a government's success. It is correlated with many micro and macro parameters from employment contracts to gross domestic product (GDP) calculations. Governments usually prioritize keeping the price level changes under control in relation to the historical trend of the economy . High-Inflation countries are those whose inflation rate exceeds 10% annually. This rate sky-rockets for countries in times of economic crisis, causing the collapse of market conditions and 'hyperinflation'. On the other hand, the governments of low-inflation countries tend to stabilize their performance and stick to single digit inflation percentages. That is why multi dimensional trends in consumer price indices are crucial in terms of establishing a strong national economy.

Statistical bureaus announce Consumer Price Indices with all of the measures periodically with respect to the purpose of the analysis. Statistics could become more significant if they were seasonally adjusted at local levels. Turkish Statistics Institute (TurkStat) periodically announces online monthly inflation rates with a CPI approach upon based years. Here are the CPI trends from the key measurements Consumer Price Index Numbers, Monthly Rate of Change (%), Rate of Change on December of the Previous Year (%), Annual Rate of Change (%) and Rate of Change in Twelve Months Moving Averages (%).

**Table 3.1:** 2003 Based Consumer Price Index Numbers

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
<b>2003</b>	94.77	96.23	98.12	99.09	100.04	100.12	99.93	100.09	101.44	102.38	103.68	104.12
<b>2004</b>	104.81	105.35	106.36	106.89	107.35	107.21	107.72	108.54	109.57	112.03	113.50	113.86
<b>2005</b>	114.49	114.51	114.81	115.63	116.69	116.81	116.14	117.13	118.33	120.45	122.14	122.65
<b>2006</b>	123.57	123.84	124.18	125.84	128.20	128.63	129.72	129.15	130.81	132.47	134.18	134.49
<b>2007</b>	135.84	136.42	137.67	139.33	140.03	139.69	138.67	138.70	140.13	142.67	145.45	145.77
<b>2008</b>	146.94	148.84	150.27	152.79	155.07	154.51	155.40	155.02	155.72	159.77	161.10	160.44
<b>2009</b>	160.90	160.35	162.12	162.15	163.19	163.37	163.78	163.29	163.93	167.88	170.01	170.91
<b>2010</b>	174.07	176.59	177.62	178.68	178.04							

**Table 3.2: Monthly Rate of Change in CPI (%)**

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2003		1.54	1.96	0.99	0.96	0.08	-0.19	0.16	1.35	0.92	1.27	0.43
2004	0.66	0.52	0.96	0.49	0.44	-0.14	0.47	0.77	0.94	2.24	1.32	0.32
2005	0.55	0.02	0.26	0.71	0.92	0.10	-0.57	0.85	1.02	1.79	1.40	0.42
2006	0.75	0.22	0.27	1.34	1.88	0.34	0.85	-0.44	1.29	1.27	1.29	0.23
2007	1.00	0.43	0.92	1.21	0.50	-0.24	-0.73	0.02	1.03	1.81	1.95	0.22
2008	0.80	1.29	0.96	1.68	1.49	-0.36	0.58	-0.24	0.45	2.60	0.83	-0.41
2009	0.29	-0.34	1.10	0.02	0.64	0.11	0.25	-0.30	0.39	2.41	1.27	0.53
2010	1.85	1.45	0.58	0.60	-0.36							

**Table 3.3: Annual Rate of Change (%) - Compared to the Same Month of the Previous Year**

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2004	10.59	9.48	8.40	7.87	7.31	7.08	7.79	8.45	8.01	9.43	9.48	9.35
2005	9.23	8.69	7.94	8.18	8.70	8.95	7.82	7.91	7.99	7.52	7.61	7.72
2006	7.93	8.15	8.16	8.83	9.86	10.12	11.69	10.26	10.55	9.98	9.86	9.65
2007	9.93	10.16	10.86	10.72	9.23	8.60	6.90	7.39	7.12	7.70	8.40	8.39
2008	8.17	9.10	9.15	9.66	10.74	10.61	12.06	11.77	11.13	11.99	10.76	10.06
2009	9.50	7.73	7.89	6.13	5.24	5.73	5.39	5.33	5.27	5.08	5.53	6.53
2010	8.19	10.13	9.56	10.19	9.10							

**Table 3.4: Rate of Change in Twelve Months Moving Averages (%)**

	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2004												8.60
2005	8.50	8.44	8.40	8.42	8.53	8.69	8.68	8.64	8.63	8.47	8.31	8.18
2006	8.07	8.03	8.05	8.11	8.21	8.32	8.64	8.84	9.05	9.25	9.44	9.60
2007	9.76	9.92	10.15	10.30	10.24	10.11	9.70	9.46	9.17	8.98	8.86	8.76
2008	8.61	8.53	8.40	8.33	8.47	8.64	9.07	9.43	9.76	10.12	10.31	10.44
2009	10.54	10.41	10.29	9.98	9.49	9.08	8.52	7.99	7.52	6.95	6.53	6.25
2010	6.16	6.38	6.53	6.87	7.20							

You could find a historical trend of the CPI in Turkey at the appendix, and observe the time series where the price level changes are severe.

## CHAPTER 4: COST-OF-LIVING INDEX

The Consumer Price Index is an approximation of changes in prices. In other words it is a standardized way of measuring price shifts over time. It does not have a say about quality of living or product quality. Cost of living, on the other hand has been used as a representative parameter to interpret changes in living standards. That is why Substitution Bias is adjusted through time to display the real change in cost of living. There are various levels of heterogeneity in individual tastes and incomes, in wealth and income risks and in market participation respectively. And the comparison is a complex issue from that individual model (Blundell & Stoker, 2005). Cost of Living is a good measure of comparing the outcomes of a given income. It provides a benchmark for evaluating the value of different products in different time periods. It is also useful for determining consumer preferences and indicators for consumption pattern changes over time (Diewert, 1998).

Konüs (1939) mentioned the measurement of consumer prices; when firstly mentioning the comparison indices, he stated that true cost of living index (COL index or COLI) for a single household is defined as the ratio of the minimum cost of achieving a certain reference utility level in a base period, given the prices prevailing at that time, and a later current period, given whatever changes in prices had occurred in the interval. He was the first to speak about a theory of the true index of the cost of living (Triplett, 1992). Frisch (1930) was the first academic who used the cost-of-living index theory. Polak (1981) defined the social cost of living index as the ratio of the total minimum cost or expenditure required to enable each of the households present in the two periods to attain their reference utility levels in both time periods.

Another concept, the Minimum Living Level (MLL) denotes the minimum financial requirements of members of a household. Martins & Maritz created this notion to upgrade the CPI theory with concepts of health and hygiene and clothing. The MLL is the lowest

sum possible on which a specific household size can live in our existing social set-up. The sum estimated for the MLL is at best a theoretical minimum (Martins & Maritz, 2001). There is a certain commonality between the MLL and the Poverty Line. The MLL establishes the determinants for minimum salary/wage levels, while the Poverty Line is the level below which a household may be considered to live in poverty. However, there are two major differences. First, the CPI does not give actual values in monetary terms while the MLL does. Second, the basket of consumer items in the CPI is obtained by means of five-year surveys amongst households, while the basket of goods and services used for the MLL is a theoretical compilation (Martins, J.H.). Conceptually, a COL index is supposed to be an idealized price index as it measures the increased expenditures needed to offset the effects of increases in the prices paid by consumers but not the increased expenditures needed to offset a deterioration in their well-being resulting from other factors such as increased pollution, crime, ... In addition to that, COL index covers the new goods and services even though there are no prices for them in the first period. The cost of living theory, which stems from the Standard of Living concept, has some internal shortcomings as well. Amartya Sen accepted that one can see the living standard in terms of commodity possession and opulence (real income). Here the comparison between people is realized by the term “objective minimum conditions in terms of commodity possessions”.<sup>1</sup> Sen argues that concentration on the possession of vital commodities seems fair enough. Despite the fact that the standard of living is *inter alia* influenced by opulence, it is not a standard of opulence. According to him the main point is that the standard of living is really a matter of functioning and capabilities, and not a matter directly of opulence, commodities or utilities. After the contributions of Petty, Lavoisier and Lagrange other types of statistics in addition to national accounting<sup>2</sup> became important in defining the standard of living. Because the living standard is not just a matter of opulence and the way of characterizing opulence may not be useful for other purposes which national accounting also has to cater for. These issues led the emergence of the so-called ‘basic needs’ approach and the search which was done by writers on ‘social indicators’ (Sen, 1998).

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<sup>1</sup> Pigue (1952:759) ‘The minimum includes some defined quantity and quality of house accommodation, of

The Cost-of-Living Index (COL) measures the change in consumptions costs required to maintain a constant standard of living (by holding the consumer's tastes constant over the interval of the comparison). The term CPI is not only used as a substitute for a measure of general inflation but also for many issues as compensation index, cost of living index and consumption deflator (Triplett, 2001). However we need to separate the Consumer Price Index and Cost-of-living parameters. Although CPI is a good and simple measure of the cost-of-living, it does not cover many non-income and social security tax issues within. Price index is the measure of changes in the cost of the same market basket from month to month and year to year. The Cost of Living Index measures the change in the cost of maintaining the same or an equivalent standard of living from one time to another, or from one place to another. COL is concerned with the validity of the CPI regarding coverage of the index (how representative the basket), problems of pricing (how substitution and quality issues are considered) and inclusion of taxes (how limitations affect the index). In a nutshell, CPI overstates the cost of living because index is based on a fixed market basket and does not reflect changes in consumer buying habits (Norwood, 1980). It does not consider the information of non-economics communities as having a more accurate index setting by incorporating variables other than price changes (Boskin & Griliches, 1998). Wordhaus (1998) proposed an upgrade of the index as Augmented Cost of Living Index (ACOLI) where he took into account the fringe benefits when talking about real wages. According to him, consumers enjoy certain goods and services that are paid for by firms in wage lowering fringe benefits or lay governments through indirect taxes (social insurance).

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medical care, of education, of food, of leisure... and so on'

<sup>2</sup> Real income estimations with income and expenditure methods, accurate measurements

## CHAPTER 5: BIASES OF CONSUMER PRICE INDEX

The CPI index lacks of some significant issues compared to the content of the basket itself. By considering those limitations, we could have a more reliable analysis from the CPI approach. Here we will be going deeply into the biases one by one. First of all there is a *substitution bias* in CPI, which occurs when consumers substitute between types of goods and services when relative prices change. A fixed market basket measure like the CPI assumes that, contrary to standard economic theory, consumers do not substitute Big Macs for Whoppers when the price of one rises relative to the other. In another words the CPI is predicted on the purchase of the same market basket in the same proportion (weights), month after month. Getting over the substitution bias by combining new informative parameters in the index is not sufficient itself. Because although in economic theory the consumer does not change the indifference curve where his total utility stays constant, the substitution represented the rate of inflation in terms of maintaining a declining ‘standard of living’ with a reference to Amartya Sen. The substitution shifts him to another position where the best outcome under the given conditions is satisfied, simultaneously degrading his ‘standard of living’ as his preference order has changed.

There are three kinds of substitutions elementary index level, commodity level and sales market (outlet) level, respectively. Secondly, *quality adjustment* is a good measure for terms of evaluating the difference in quality between original and the replacement items. Through the years products evolve in terms of technological capacity making the comparison much more problematic. Thirdly *new products* which are added to the basket or substituted with the fashioned items, could lead to a disruption in the analysis. No adjustment is made for the difference in quality between an item that is no longer sold and its replacement. For example, computers were not incorporated until 1987, and cellular phones were not added until 1998. According to Hausman, those biases are of two types, (first order and second order biases) as the substitution occurs alongside the change of other

dynamics. New goods, quality changes and outlet biases are active factors that alter price levels (Hausman, 2003).

The critiques of the CPI Index are mainly derived from the topics above with the issues below:

**Consumer substitution behavior:** In time people gave up consuming one type of goods in favor of others. For example when meat prices rise, people tend to shift to buying chicken. Their preferences are affected by income and market dynamics, moving them along their indifference curve. The problem is that the changes in purchasing biases could only be understood annually due to the surveys, whereas prices change instantly. That is why it is not easy to differentiate substitution biases. (Abraham, 1998) Lebow & Rudd (2003) separated the substitution biases into two as ‘upper level’ and ‘lower level’, indicating substitution across the CPI’s item-area strata and substitution within the CPI item-area strata respectively.

**Change in the quality of products:** Within the CPI approach no adjustments are made for the difference in quality between an item that is no longer sold and its replacement. Those relative prices between vanished and replacement goods reflect relative quality differentials (Nordhaus, 1998).

**Appearance of new categories of stores:** As the denominators dissolve, it becomes even harder to compare different indicators with different product groups.

**New channels of product distribution:** E-commerce and other emerging channels have also provided a significant opportunity to create niche business models / companies.

**Rapid technological changes:** ICT Products are difficult to measure because they are undergoing rapid changes. They are also intangible inputs for other industries.

**Introduction of new types of goods and services:** Internet and communication evolution has changed our world significantly. In addition to entertainment and education, many purchasing habits change accordingly. The CPI approach is not sufficient to ensure that the content of the baskets and the weights for different products and services are up to date. To give an example the mobile phones were luxury items in past, however today they are basic and compulsory devices for communication, entertainment and many other purposes such as shopping and socializing... (Greenlees, 2008)

## **CHAPTER 6: RELIABILITY OF CPI**

The CPI is a simplified version of analyzing the rise in general level of prices. There are various shortcomings of this approach. Limitations in measurement methodology can be mainly grouped into two types:

### **6.1 SAMPLING RELATED BIASES**

The CPI measures price changes based on a sample of items, therefore the published indices differ from what the results would be if actual records of all retail purchases by everyone in the index population could be used to compile the index. These estimating or sampling errors are limitations on the accuracy of the index, not mistakes in calculating the index. The CPI approach / program developed measurements of sampling error, which needs to be updated and published annually. The CPI sample design allocates the sample in a way that maximizes the accuracy of the index, given the funds / data set available.

The famous analysis regarding the biases conducted by the *Boskin Commission*, formally called the "Advisory Commission to Study the Consumer Price Index", was appointed by the United States Senate in 1995 to study possible bias in the computation of

the CPI in the United States. The chairman of the committee was Prof. Michael Boskin who was simultaneously serving as the head of President Bush's Council of Economic Advisors. Its final report titled "Toward a More Accurate Measure of the Cost Of Living" was issued on December 4, 1996. The Boskin Commission report identified four distinct sources of bias in the CPI which I mentioned before as; consumption substitution, retail outlet substitution, product quality and new goods biases. Within this very famous report, the total bias for the US economy was reported to be 1.1%, overstating the true level of inflation. The CPI commission found in their study that the index overestimated the cost of living by a value between 0.8 to 1.6 percentage points (Boskin, 1998). Many price indices (such as Laspeyres) tend to be biased as changes in the cost of living have also received much publicity as a result of the Boskin Report.

The commission presented estimates of quality and new goods bias for 27 different areas of CPI. On the other hand, according to Baker (1998) CPI may currently over adjust for quality and thus understates the true rate of inflation by around 0.44% annually. If all the different types of probable bias are added up, the analysis concludes that the CPI may slightly understate inflation.

The report was important because inflation, as calculated by the Bureau of Labor Statistics, is used to index the annual payment increases in Social Security and other retirement and compensation programs. This implied that the federal budget had increased by more than it should have, and that projections of future budget deficits were too large. The original report calculated that the overstatement of inflation would add \$148 billion to the deficit and \$691 billion to the national debt by 2006.

According to the Boskin Commission's findings, there have been many studies on the validity of the CPI with respect to the change in Cost of Living. Lebow & Roberts (1994) estimated the bias between 0.4% and 1.5% and Shapiro & Wilcox (1996) also found out the bias as 0.6% to 1.5%; all were saying that the changes in CPI overstated the rate of

increase in cost of living. Lebow & Rudd (2003) also indicated that CPI was prospectively overstating the true rate of change in the cost of living by about 0.9% annually. According to them CPIs weights which are derived from expenditure estimates from the consumer expenditure survey, may be inaccurate in a matter that systematically overstates the true rate of change in the cost of living. To decide which formula to apply for calculation of CPI, the purpose of the index, target index and the data at hand need to be evaluated carefully.

The Boskin Commission argued that there is little reason to believe that groups such as the elderly or poor experience more rapid rates of inflation. However, research from the U.S. Bureau of Labor Statistics (BLS) underlined that the elderly may experience a higher rate of inflation than the overall population. In other words, no single CPI can meet everyone's preferences.

One group of the main opponents of the Boskin Commission argues that with this new perception, 'cost of living' was being replaced by the cost of survival. That being said, you cannot compare white bread with apple pie in terms of leisure and standard of living.

One of the most significant components of the biases in CPI is related to political economics. Government authorities implement macroeconomic policies in order to make overall production and income grow sustainably. On the other hand, their secondary interest or aim is to preserve their authority like the board of directors of a standard firm. Muelbauer (1976) indicates that since keeping down inflation is such an important policy goal for governments, it is natural that any government should be very sensitive to the effects of policy change on the official CPI. This incentive could correspond to a motive of a Board of Directors of any company whose priority is to provide solid growth and profitability to its stock owners. Governments could also manipulate the whole reporting system in order to understate the inflation rate in order to envisage a better / polished picture of the economy.

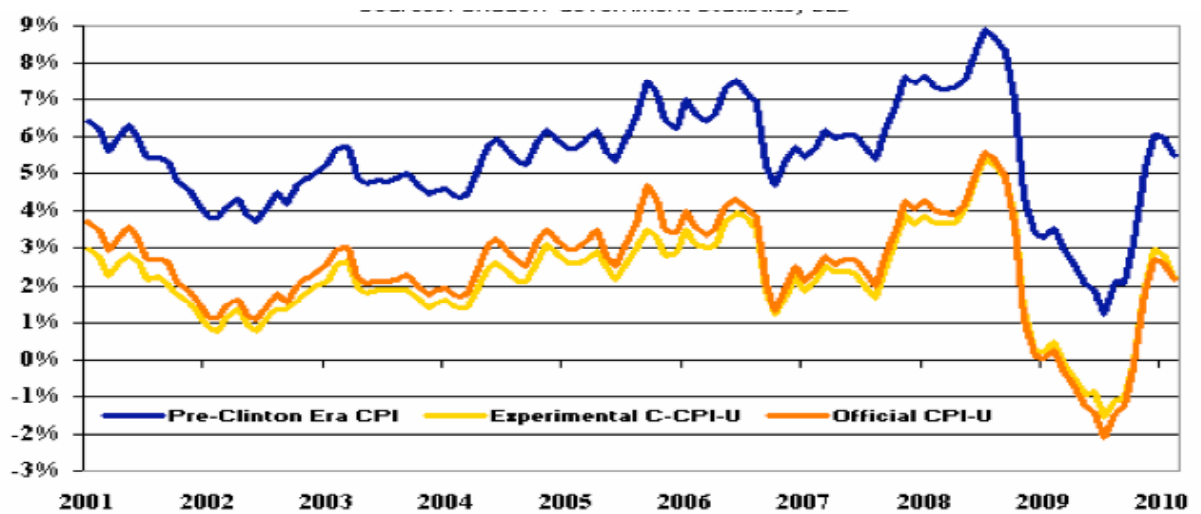
Manipulation could be imposed via the content of basket by getting rid of the items whose prices rose and adding items that are more stable for the time being. All around the world, the authorities (Bureaus of Statistics) occasionally change the items in the basket due to feedback from periodic consumer surveys. In most of the cases those survey results are not announced publicly and the analysis is processed internally. However the key point is the decision part - how Bureaus decide which items need to be taken out. In most countries, the Bureaus of Statistics report to the government directly. Thus, the priority of those authorities could be biased towards the effectiveness of an existing government's policies. The CPI could understate or overstate the recent situation in reality. As they are being placed in the basket due to the preference order of standard consumers, the weights need to be adjusted as well. Thus, there appear two distinct problems, regarding the selection of products and weight of the products within the basket.

John Williams has been providing U.S. government statistics data as an alternative to the official figures, under the name "shadow statistics" [www.shadowstats.com](http://www.shadowstats.com). His analysis has been revealing a significant discrepancy between the actual / reported figures and his interpreted series at this website. He suggests a different way of measuring inflation since according to him the weighting methods imposed by the Statistical Bureaus - a division of existing governments may automatically give a lower weighting to CPI components that were rising in price, and a higher weighting to those items dropping in price.

According to him, the CPI was designed to help businesses, individuals and the governments adjust their financial planning and considerations for the impact of inflation. The CPI worked reasonably well for those purposes into the early-1980s. In recent decades however, the reporting system increasingly encountered failures due to pressures from miscreant politicians, who were and are intent upon stealing income from social security recipients, without ever taking the issue of reduced entitlement payments before the public or Congress for approval.

In particular, changes made in CPI methodology during the Clinton Administration understated inflation significantly, and, through a cumulative effect with earlier changes that began in the late-Carter and early Reagan Administrations, current social security payments have been reduced by roughly half from where they would have been otherwise. That means Social Security checks today would be about double had the various changes not been made. In like manner, anyone involved in commerce, which relies on receiving payments adjusted for the CPI, has been similarly damaged.

**Figure 6.1:** CPI, Year-to-Year Change, Not Seasonally Adjusted



Source: Shadow Government Statistics, BLS

### 6.1.1 Representativeness Of CPI

Any given observer could feel that the CPI does not represent his or her experiences. Unless the income distribution is concentrated at one level, *or* all households have the same expenditure patterns regardless of income levels, then almost nobody will feel the CPI is representative of the changing prices facing them. The more unequally income is distributed, or the more expenditure shares vary by income level, the more strongly this perception will held.

Prais (1958) showed that the standard CPI calculated by most statistical agencies can be interpreted as a weighted average of household price indices, where the weight of each household is determined by its total expenditures rather than quantities. The gap between the CPI weighted by expenditures (so that higher income households will naturally get a greater weight) and the CPI weighted by the average over households, irrespective of each household's total expenditures, is termed as the "plutocratic gap" (Ley, 2005). What should the typical weights *at any given instant in time* pertain to? The expenditure weights that pertain to *all* the households aggregated in the economy or the expenditure weights that pertain to the "typical" household? Kokoski (2003) introduced a solid distinction between the two as follows: "...in the democratic index, the expenditure pattern of each household counts in equal measure in determining the population index; in essence, it is a case of "one household--one vote". In the plutocratic case, the contribution of each household's expenditure pattern is positively related to the total expenditure of that household relative to other households- in essence - one dollar, one vote". According to Broda & Romalis, lower income households have actually benefitted from globalization to a much greater degree than typically thought because they have consumption patterns skewed toward goods that have decreased in price over the past decade. Their research about Chinese imports found that inflation for households in the lowest tenth percentile of income had been 6 percentage points smaller than inflation for the upper tenth percentile over this period. Because the poor consume a higher share of non-durable goods whose prices have fallen relative to

services over this period, the prices of the set of non-durable goods consumed by the poor has fallen relative to that of the rich and a higher proportion of the new goods are purchased by the poor.

The recommendations for improving the representativeness of the CPI are listed among the findings of Boskin Commission:

- Changing from fixed-weight formulas to mathematical formulas
- Reweighting the consumption basket more frequently
- Increasing the pace of sampling
- Hedonic statistical methods to adjust for quality change

In August 2002, the U.S. Bureau of Labor Statistics (BLS) began publishing a new index of consumer price change called the Chained Consumer Price Index (C-CPI-U) for All Urban Consumers. By utilizing a *superlative* price index aggregator across items, the C-CPI-U is designed to be a closer approximation to a “cost-of-living” index (COLI).

## **6.2 NON-SAMPLING RELATED BIASES**

These errors occur from a variety of sources. Unlike sampling errors, they can cause persistent bias in measurements of the index. Non-sampling errors are caused by problems of price data collection, logistical lags in conducting surveys, difficulties in defining basic concepts and their operational implementation, and difficulties in handling the problems of quality change. Non-sampling errors can be far more hazardous to the accuracy of a price index than sampling errors. Hence, the statistical bureaus expend much effort to minimize these errors. The analysts ensure the comparability of quality of items from period to period; collection procedures need to be extensively documented and recurring audits need to be conducted.

The CPI is an ongoing research and evaluation program, which identifies and implement improvements in the index. Technological improvement, namely the *scanner data*, in collecting the accurate real time data at the point of sale was one of the milestones in minimizing the effect of non sampling errors (Hawkes, 1997)<sup>3</sup>. As there are two basic types of data are needed to construct the CPI: price data and weighting data, the weighting data are estimates of the shares of the different types of expenditure as fractions of the total expenditure covered by the index. These weights are usually based upon expenditure data obtained for sampled decades from a sample of households. Although some of the sampling is done using a sampling frame and probabilistic sampling methods, much is done in a commonsense way that does not permit estimation of confidence intervals. Therefore, the sampling variance is normally ignored, since a single estimate is required in most of the purposes for which the index is used. And elementary aggregate indices are computed using an unweighted arithmetic or geometric mean of the prices of the sampled product offers. (That is what the growing use of “scanner data” gradually making weighting information available even at the most detailed level indicates.) These indices compare prices each month with prices in the price-reference month. The weights used to combine them into the higher-level aggregates, and then into the overall index, relate to the estimated expenditures during a preceding whole year of the consumers covered by the index on the products within its scope in the area covered. Thus the index is a fixed-weight index, but rarely a true Laspeyres index, since the weight-reference period of a year and the price-reference period, usually a more recent single month, do not coincide. It takes time to assemble and process the information used for weighting which, in addition to household expenditure surveys, may include trade and tax data. Ideally, the weights would relate to the composition of expenditure during the time between the price-reference month and the current month. In addition to those, in many countries the collection of prices of a sample of products items for a number of representative items in selection of outlets is through the use of judgmental as opposed to random methods. In other words, there is a problem of representativeness of the sample set.

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<sup>3</sup> Consumers spending could also be analyzed and monitored by using credit and debit card data, with a new index of

Theoretically, the micro variables that constitute the macro variables need to be examined in order to minimize the loss and ultimately decide which variables could be aggregated to have a valid outcome. This problem is also known as ‘the problem of finding an optimal aggregation scheme’ (Venezia, 1978). Aggregation structure was also discussed with reference to total and partial consistency between elements in the micro system and macro system (Ijiri, 1971). He said a relation holds for a corresponding set of elements in the macro system whether a relation holds at the micro level or not. While the analysis of CPI is done within a scope of the whole year or a quarterly period, the micro item prices are collected with a reference of that month. Then, they are combined and weighted at the higher-level aggregates into an overall index. The ‘aggregation’ of CPI is a multi time-dimensional process combining micro level monthly variables to create a yearly weighted overall index.

## **CHAPTER 7: KEY ELEMENT: WEIGHTS OF BASKET OF GOODS**

The official CPI has a main product and service grouping which consists of a majority of expenditure types that households reveal to have at periodical surveys. Furthermore, the weights assigned to those items are decided by those surveys as well. However as mentioned in the previous chapter, there are some concerns about the representativeness of the basket itself. Personal expenditure patterns differ significantly with respect to the income, location and consumption forms.

Not only the products and services but also the weights assigned to them are also revised periodically in Turkey. TurkStat argues that those changes are due to the preference order changes indicated by periodical nationwide surveys, however it does not reveal the

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‘effective consumption demand’ (namely e.t.t.e.). The current consumption indices are mainly based on the collection of specific large-scale firms’ sales data, whereas the new index, could be based on credit and debit card transactions, which belong to large numbers of firms spread globally. In other words, it is based on consumers’ effective consumption demand. The new index could be perceived as a composite index covering four indicators, namely average daily credit and debit card volume per transaction, per card, per merchant, and per pos terminal (Turkan, 2008).

survey results to the public. The announcement regarding the changes in the inflation basket covered the changes in weights for product categories in general. For example the weights for main groups of (2003=100 Based) Consumer Price Index of 'clothing and footwear' declined from 8.07 to 7.22 and the weight of 'housing' went up from 16.60 to 18.63. The housing costs are expected to be declining in 2009 due to the effects of the housing crisis . Thus, the decline in rental prices would have a significant negative impact on the overall since the weight assigned to that variable has increased dramatically.

After the findings of Boskin Commission, the BLS did not institute a new CPI measurement using a variable basket of goods that allowed substitution of hamburger for steak, but rather tried to approximate the effect by changing the weighting of goods in the CPI fixed basket. Over a period of several years, straight arithmetic weighting of the CPI components was shifted to geometric weighting. The Boskin benefit of a geometric weighting was that it automatically gave a lower weighting to CPI components that were rising in price, and a higher weighting to those items dropping in price. However there are no surveys for checking the validity of the preferences of individuals. All the analysis for substitution effect- switching to hamburger when steak becomes expensive, is a theoretical approach with no evidence of a move on the same indifference curve of consumers' utility functions.

This study is not an attempt to discuss the rationale of the changes in basket or weights of product groupings. This study provides a room to analyze the significance of weights in overall inflation rate.

There are three simulations in this study to evaluate the significances of 'weights' in inflation measurement: comparative weighting analysis across countries at a time period, across different income groups at a time period and across time periods of Turkey.

Table 7.1 is a pure comparison of the weights of the main expenditure groups of different countries with different levels of economic development.

**Table 7.1:** Weights of the Main Expenditure Groups in General Index

	Turkey _ Weights of Expenditure Groups _ 2010	UK _ Weights of Expenditure Groups _ 2010	Germany _ Weights of Expenditure Groups _ 2009
TOTAL	100.00	100.00	100.00
FOOD AND NON-ALCOHOLIC BEVERAGES	27.60	10.80	10.35
ALCOHOLIC BEVERAGES AND TOBACCO	5.31	4.00	3.89
CLOTHING AND FOOTWEAR	7.30	5.60	4.89
HOUSING, WATER, ELECTRICITY, GAS AND OTHER FUELS FURNISHINGS, HOUSEHOLD EQUIPMENT, ROUTINE MAINTENANCE OF THE HOUSE	16.83	12.90	30.80
HEALTH	6.78	6.40	5.59
HEALTH	2.55	2.20	4.03
TRANSPORT	13.90	16.40	13.19
COMMUNICATIONS	4.94	2.50	3.10
RECREATION AND CULTURE	2.83	15.00	11.57
EDUCATION	2.48	1.90	0.74
HOTELS, CAFES AND RESTAURANTS	5.51	12.60	4.40
MISCELLANEOUS GOODS AND SERVICES	3.97	9.70	7.45

**Source:** Statistical Bureaus of Turkey, UK and Germany

It is easy to see that there are tremendous differences in between those countries due to the expenditure patterns. This issue also holds at a national level. The weights have an important effect on the total inflation rate, as they carry the impact of product level price changes to the overall price level. In other words, the effect of price change of a product group is more significant for those countries, locations, income groups or individuals who consume more of that product comparatively. Thus, the weights assigned to the goods and services need to be analyzed seriously and optimally.

To give an example, we could discuss the effect of changes of the product weights by TurkStat in 2008. The annual price changes of product levels between 2007-2008 were announced. TurkStat also announced the weights for 2007 and 2008 in past. For further information, the official statistics only consist of the previous month's figures. The changes

in weights are not stored online. As a straight methodology, we could keep the weights of year 2007 and compare the total inflation (change in total CPI) with the official figures by 2008 weights. For this simulation although there are minor changes among the weights, the overall price level shifts significantly.

In order to understand the effects of changes of ‘weights’ of main expenditure groups, the weights of year 2007 were substituted for the weights of year 2008 among price level change data of TurkStat. That was a Laspeyres based approach for interpreting the weights rather than the data itself.

**Table 7.2:** Simulation of Changes of Weights of the Main Expenditure Groups As Keeping Former Levels

	Annual Change of Prices	REAL BASKET WEIGHTS		REAL EFFECT ON INFLATION	
	Between 2007-2008	2007	2008	With 2007 Weights	With 2008 Weights
FOOD AND NON-ALCOHOLIC BEVERAGES	13.96	28.47	28.63	3.97	4.00
ALCOHOLIC BEVERAGES AND TOBACCO	6.84	5.06	5.00	0.35	0.34
CLOTHING AND FOOTWEAR	2.86	7.86	8.07	0.22	0.23
HOUSING AND EXPENSES	16.3	16.62	16.6	2.71	2.71
HOUSEHOLD EQUIPMENT	6.22	7.22	7.42	0.45	0.46
HEALTH	-0.41	2.66	2.54	-0.01	-0.01
TRANSPORT	11.64	11.6	12.59	1.35	1.47
COMMUNICATIONS	-1.27	4.41	4.3	-0.06	-0.05
RECREATION AND CULTURE	2.04	3.16	2.81	0.06	0.06
EDUCATION	6.86	2.15	2.24	0.15	0.15
HOTELS, CAFES AND RESTAURANTS	14.32	6.4	5.64	0.92	0.81
MISCELLANEOUS GOODS AND SERVICES	10.61	4.39	4.16	0.47	0.44
TOTAL				10.58	10.60

Source: TurkStat

This comparative simulation shows that the weights have significant effects in determining the total inflation rate within the same country (same consumption habits).

The further simulation for understanding effects of weights is a study across different income groups within Turkey. This is an attempt to investigate the effect of ‘weights’ on a more pluralistic view, analyzing the representativeness of official inflation rate among different income levels.

According to the consumption expenditure statistics of TurkStat, for the latest research in year 2008; the total population’s lowest 20% by income, has a share of 33.71% for food and beverages, compared to a share of 18.6% for the upper 17.17%. If the inflation scenario is simulated for those two groups, the output also verifies the significance of weights on the overall inflation rate. The two income groups, compared to the overall CPI change, perceived the price changes of product groups more significantly.

**Table 7.3:** Simulation of Changes of Weights of the Main Expenditure Groups According to Income Levels

	Annual Change of Prices	SIMULATION 1 (Highest Income 20% by 2008 Survey)		SIMULATION 2 (Lowest Income 20% by 2008 Survey)	
	Between 2007-2008	Basket Weights	Real Effect on Inflation	Basket Weights	Real Effect on Inflation
FOOD AND NON-ALCOHOLIC BEVERAGES	13.96	17.17	2.40	33.71	4.71
ALCOHOLIC BEVERAGES AND TOBACCO	6.84	3.04	0.21	5.19	0.36
CLOTHING AND FOOTWEAR	2.86	6.33	0.18	4.48	0.13
HOUSING AND EXPENSES	16.3	26.23	4.28	30.71	5.01
HOUSEHOLD EQUIPMENT	6.22	5.88	0.37	5.20	0.32
HEALTH	-0.41	2.11	-0.01	1.80	-0.01
TRANSPORT	11.64	18.26	2.13	7.62	0.89
COMMUNICATIONS	-1.27	4.46	-0.06	3.66	-0.05
RECREATION AND CULTURE	2.04	3.20	0.07	1.23	0.03
EDUCATION	6.86	3.02	0.21	0.70	0.05
HOTELS, CAFES AND RESTAURANTS	14.32	5.10	0.73	2.74	0.39
MISCELLANEOUS GOODS AND SERVICES	10.61	2.94	0.31	2.94	0.31
TOTAL			10.80		12.13

Source: TurkStat

## **7.1 PERSONAL INFLATION CALCULATOR**

The U.K. Office for National Statistics made up an online simulation of an individual level price index calculator. The Personal Inflation Calculator is a web-based tool that allows users to calculate an inflation rate based on their personal expenditure patterns, rather than the averages used in published statistics. It does this by weighting together price indices from the RPI to arrive at a personal inflation rate. The personal calculator is designed to allow users to understand more about inflation and how it affects them, and also to contribute to the debate about inflation.

The personal inflation calculator is based on the RPI, the long-standing and familiar domestic measure of inflation, whose uses include indexation of pension payments, state benefits and private contracts. The RPI covers the full range of goods and services bought by the vast majority of households. This includes the essentials, such as food, housing and heating, as well as discretionary purchases, such as audio-visual equipment and holidays. It covers daily purchases, such as newspapers, as well as very infrequent purchases such as cars and washing machines. The RPI measures the changing price, on a month-by-month basis, of a 'representative basket' of about 650 goods and services or 'items'— the exact number varies from year to year. The index is calculated as a weighted average of the price indices for each of these items. The weights are calculated to represent the average expenditure pattern of all UK households, except some pensioner and high-income households. No two individuals are the same and very few will totally conform to an average profile. Indeed there would be no reason for using averages if we were all uniformly the same. This is just as true of our expenditure patterns as it is about other behavioral characteristics. It means that most people's spending patterns will differ from the average used to compile the RPI weights, in some cases significantly so. In consequence, it is almost certain that personal inflation rates will differ from those calculated using average spending patterns. This effect can be examined by combining the price changes of components of the RPI in a way which gets closer to an individual's

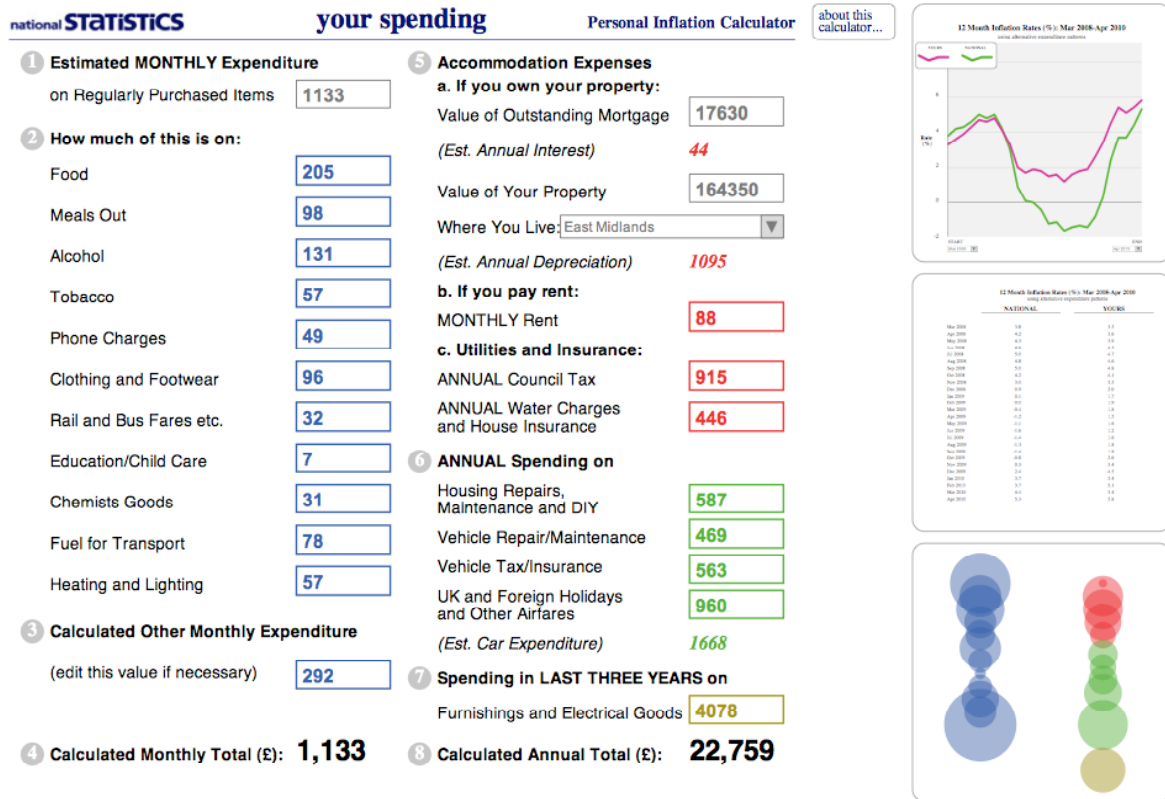
expenditure pattern than the national averages used in the published RPI. The Office for National Statistics (ONS) has made available on the National Statistics website, a personal inflation calculator which allows users to do this. It is based on the RPI although the principles apply equally to the consumer prices index (CPI). There are many other personal inflation calculators, which are provided by other countries' national statistical bureaus, such as Germany.

It is never possible to replicate exactly an individual's personal inflation rate as this would require detailed knowledge of where they shop, the precise purchases they make and the prices they pay. It is, however, possible to reassemble the price indices used to calculate the RPI to reflect something closer to their personal expenditure patterns. This is the approach adopted for the personal inflation calculator. The expenditure groups in the calculator have been chosen to balance users' ability to make meaningful estimates with the level of detail needed to identify differences in price movements. In most cases, users are asked to estimate monthly expenditure but, for categories where purchases tend to be relatively infrequent, total expenditure in the last year or last three years is requested. These estimates are then scaled so that they can be compared with average monthly expenditure.<sup>4</sup>

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<sup>4</sup> There are also projects for establishing alternative CPI data based on users inputting and tracking their personal CPI such as <http://mycpi.info/>

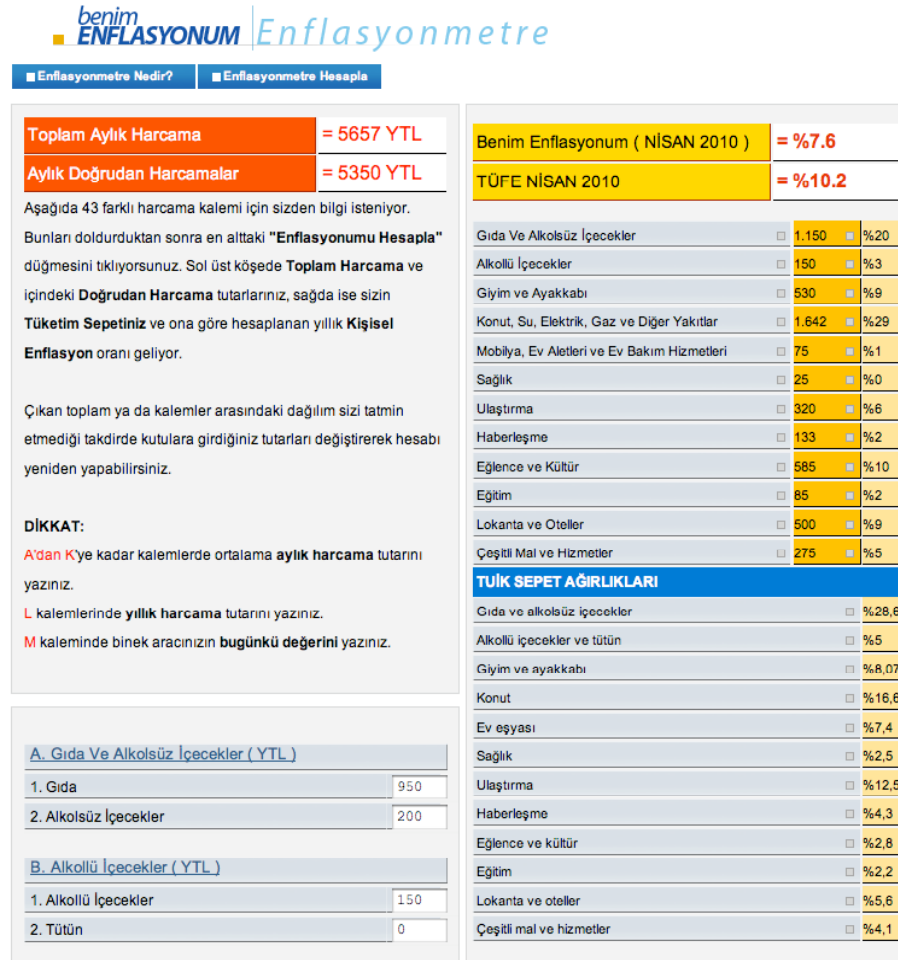
**Figure 7.1:** Personal Inflation Calculator, U.K. Office for National Statistics



Source: <http://www.statistics.gov.uk/PIC/>

Istanbul Bilgi University also created a very practical online personal inflation calculator, namely ‘Enflasyonmetre’ It is comparably simpler than the one created by the U.K. Office for National Statistics’. The chairman Prof. Asaf Savas Akat has argued that this is an attempt to realistically compare the official figures to individuals’ own practices, as a simulation-wise attempt to get rid of sampling related biases inherent in the mainstream CPI approach. For a given list of 43 items under 13 categories, the online calculator provides an estimate for the previous month.

**Figure 7.2:** Enflasyonmetre, Personal Inflation Calculator, Istanbul Bilgi University



Source: [http://akat.bilgi.edu.tr/pages\\_beno2.asp](http://akat.bilgi.edu.tr/pages_beno2.asp)

This simplified version of the inflation calculator provides an insight into comparing the personal weights and official numbers. It is a good demonstration of how personal level consumption patterns could differentiate the effect of price changes than the official inflation figures.

## CHAPTER 8: IDEAL INFLATION INDEX

Until this point I aimed to explain all the details about the mainstream inflation indexation methodology, namely the consumer price index with references to its shortcomings (biases). There are alternative estimates of CPI that could stem from those technological developments in data collection as well as other approaches to indexation methodology.

The most dominant approach is the Plutocratic vs. Democratic Index. It is known since Prais (1958) that the CPI computed by statistical agencies can be interpreted as a weighted average of household price indices. The weight of each household is given by its total expenditure, hence the term ‘plutocratic index.’ Alternatively, the democratically-weighted index – the so called ‘democratic index’ is where each household weights the same (Ley, 2002). When prices behave in an anti-poor way (plutocratic index is negative), then public spending is adjusted negatively, below what it would have been if a democratic index had been used (Izquierdo, 2003). In other words, the standard methodology is built on a representative ‘virtual’ individual whose preferences are the weighted average of a large group of people. Thus the average hardly corresponds to any group members’ own preferences.

There are other problems which economists have been working on regarding the measurement of the prices of fundamental characteristic services such as travel and automotive products and the relative prices between vanished and replacement goods. The characteristic of technology could be perceived as permanently experiencing ‘tectonic shifts’.

The CPI is a fixed weighting index methodology, which only takes the recent consumption figures into consideration. It does not have a say on whether people have a

sufficient level of income to satisfy their nutrition, accommodation and transportation needs. As a majority of consumers have a limit on their expenditure patterns due to their salaries, the goods and services that are paid affect a bias towards the essential levels. The Consumer Price Index (CPI) as a methodology is inadequate for explaining the real effect of the price changes on ideal levels of consumption for all product and service groups. The categories that an average household primarily keeps constant are housing, food and beverages, apparel and transportation.

According to the data set of the Bureau of Labor Statistics, the relative importance (ratio) of expenditure categories for the year 2009 are Apparel 3.70%, Food and Beverages 14.80%, Housing 41.96% and Transportation 16.69% respectively. The primary categories have a total share of approx. 74% in USA. On the other hand the statistics announced by Turkish Statistics Institute (TurkStat), do not resemble to the US figures. According to 2010 figures, Apparel 7.30%, Food and Beverages 27.60%, Housing 16.83% and Transportation 13.90% respectively. The primary categories for Turkish households have a total share of approximately 64%.

The two countries have independent and separate expenditure shares resulting from various reasons such as the average salary level, the cost of primary needs, ratio of infants to adults, etc. Thus, it is impossible to analyze the real rate of inflation in isolation from the inflation of primary goods / services having the majority of the expenditures. In order to have a comparative benchmark regarding the ideal composition of the expenditure patterns, there needs to be an ideal consumption index stem from the basic needs of human beings.

The Confederation of Turkish Trade Unions (Turk-Is) has been periodically providing estimates for Minimum Living Indices as Poverty and Hunger indices corresponding to 'the minimum financial requirements' (MLL) of Martins & Maritz's. This research began in 1987. Apart from the panel data of Turkish Statistics Institute prices,

Turk-Is also collects its own data from local markets and chain market stores. This is a simplified version of the periodical work of the official statistical agency.

This research also includes an analysis of the real rate of inflation for food and beverages upon an ideal consumption approach. There are various studies about the balanced nutrition levels both for children and adults regarding the necessary daily calories. Those studies have revealed a benchmarking index, which is a good measure of universally accepted, standard of nutrition among all countries. Turk-Is base their index on a household of four-persons, a consumption pattern based on a Hacettepe University Health Technology Institute study. According to universal standards, the daily calorie for an adult male is 3.500 Kcal and female is 2.300 Kcal, 3.200 Kcal for a person between 15-19 and 1.600 Kcal for an child between age of 4-6.

Turk-Is also has been also working with Hacettepe University on the optimal list of food products that need to be consumed for reaching healthy nutrition levels. They determine the products scientifically. There have also been debates in Turkey about the list of goods in the officially accepted basket of goods due to the substitution effect mentioned in the report of the Boskin Commission. Lentils were suggested as a substitute for meat in Turkey with a rationale of being ‘protein-rich’. That suggestion did lack a rational basis from a nutritional standpoint, since meat could not be substituted by lentils especially for children.

In addition, according to the data set, the annual rate of change of the minimum limit of poverty and the annual rate of change of the minimum limit of hunger for a family composed of 4 members is approximately 7.4%. The official figure of the TurkStat is 6.5%.

The study also emphasizes the boom of non-branded products sold at chain stores last years, as it is a signal of the price sensitiveness of Turkish citizens. Consumption of

primary food and beverages also heavily depend on the change of prices without taking the quality of the products into consideration.

Turk-Is index is a further study on fine-tuning the CPI methodology with a more representative approach for the real change of costs. It ideally considers a person who is able to consume a healthy set of nutrients and provides a room to analyze the change of the cost of that basket as opposed to a comparison of a given sum of goods and services consumed within various restrictions such as wage, local prices and other priorities.

## **CHAPTER 9: CONCLUSION**

Inflation rate is one of the main macroeconomic indicators of a country. There are many macro economic variables such as the wages and the interest rates that have positive correlation with the announced rate of inflation of a country. Thus, the official inflation rates are very crucial in terms of having a perfectly operating economy and a stable political environment. Considering the cost-of-living concept, the CPI could become a more superior indexation by systematically adjusting the indexation formula with a reference to a base year. However due to the natural and artificial biases within the CPI process, the rate of inflation could be comparatively overstated or understated. Minor discrepancies from the actual figure could tectonically shift the market's pareto optimal dynamics respectively. Both sampling and non-sampling biases are good benchmarks for verifying how representative the content of the basket, how realistic the weights of the products and how exact the micro level data are. Reaching the optimal aggregation schema is a tough issue from both political and arithmetical perspectives. On the one hand governments could manipulate the official figures through so called 'independent' statistical institutes; on the other hand there could be natural levels of systemic failures in analyzing the CPI. A valid and plutocratic index theoretically shall benefit from the cost-of-living concept and that could be optimized with an ideal perspective of 'needs'. The validity of the CPI could be diagnosed in mainly three parts; consumption patterns of

households, the weight of products / services and the aggregated household data. These are the issues that we need to make clear regarding any methodology.

In this study, I did not go deeply into the validity of the changes of content of the basket of goods, the aggregation mechanism and the data set. As a premise I considered the work of Turkish Statistical Institute (TurkStat) as given, and concentrated on the debates on this issue in addition to revealing the fragility of the whole system on the weights of goods and services within the basket, which were assigned by the expenditure analysis of TurkStat.

Turkey met with high inflation rates after opening its economy to world markets and got used to living with high and permanent inflation rates since then. Inflation has been the top agenda item for governments. As the macroeconomic variables had been floating on an open economy model, the governments were not very active in keeping the rate of inflation under control. Although the Boskin Commission asserted a natural level of overstatement in rate of inflation due to the failure to combine substitution and other effects into the price indexation, the presence of a counter manipulation seems to be valid. That could also be perceived as a manipulation effect, which would crowd out the natural level of overstatement hitherto embedded in the consumer price index formulation.

If statistical agencies such as TurkStat continue to report to the governmental authorities, the dependency within bureaucracy would result in even more debates about the inflation rates, because both sampling and non-sampling biases are hard to measure, and have significance in effecting the overall indices.

Further research into a more optimal, ideal index methodology could bring more validity to inflation calculation process in the long-term. On the other hand, to optimize the process in short-term, the analysis could benefit from the pluralistic view with the help of

personal inflation calculators and some additional techniques for a representative aggregation of micro level preferences.

## APPENDICES

### APPENDIX I: CONSUMER PRICE INDICES

**Table a1.1:** 2003 Based Consumer Price Index – Content of the CPI Basket, Turkey

Code	Items	Code	Items	Code	Items	Code	Items
0111101	Rice	0119004	Baking powder	0511102	Single table	0820001	Phone machine
0111201	Wheat Flour	0119005	Vinegar	0511105	Single chair	0820002	Spare parts for telephone (SIM card, battery)
0111203	Rice flour	0119008	Catchup	0511201	Bed-room furniture	0820003	Repair of phone machines
0111208	Baby food	0119009	Mayonnaise	0511204	Single-bed	0830001	Fee for phone calls (inter - urban)
0111209	Boiled and pounded wheat	0119014	Packaged soup	0511205	Double-bed	0830002	Phone cards
0111301	White bread	0119015	Pudding	0511207	Trunk for bed	0830004	Fee for cellular phone calls
0111401	Biscuits	0121101	Coffee	0511301	Living room furniture	0830008	Subscription costs of telephone
0111402	Cracker	0121102	Ready-made coffee	0511302	Dining-room furniture	0830009	Internet
0111404	Waffle-like chocolate cookie	0121201	Tea	0511303	Sofa	0830010	Fee for phone calls (intra - urban)
0111405	Cream-cake and patisserie	0121202	Herbal teas	0511307	Tripod set	0830011	Fee for phone calls (international)
0111408	Cake	0121301	Cacao	0512001	Carpet	0830012	Fee for phone calls (from stationary line to GSM)
0111411	Desserts	0121304	Cacao beverages	0520001	Curtains	0830013	Fee for phone calls (monthly fixed fee)
0111415	Thin dough	0122101	Water	0520003	Tulle	0911101	Television

0111501	Macaroni	0122102	Mineral water	0520006	Household textile fabrics	0911102	DVD player
0111502	Wermicelli	0122202	Carbonated fruit beverages	0520007	Bed covering	0911104	Dish antenna and receiver
0111602	Cereals	0122203	Coke	0520008	Sleeping set	0911202	Music set
0112201	Veal	0122301	Fruit Juices	0520010	Quilt	0911204	Mp3 player
0112401	Mutton	0211001	Raki	0520012	Blanket	0912001	Camera
0112501	Poultry	0211006	Whisky	0520014	Furnishing fabrics-upholstery,etc.	0912002	Camera
0112602	Offal	0212101	Wine	0520015	Pillow	0913001	PC, Laptop
0112701	Garlic-flavored sausage	0213001	Beer	0520025	Towel	0913003	Printer
0112702	Sausage	0220101	Cigarettes (Samsun )	0520028	Lacework, needlework material for hometextiles	0913005	Modem ADSL
0112703	Salami	0220102	Cigarettes (Maltepe )	0531101	Refrigerator	0913008	PC equipments
0113101	Fresh fish	0220106	Cigarettes (Tekel 2001)	0531102	Refrigerator No-Frost	0914102	CD and VCD
0114101	Milk	0220107	Cigarettes (LM)	0531201	Washing machine	0914201	Unrecorded cassette and CD
0114301	Yoghourts	0220110	Cigarettes (Marlboro)	0531202	Dish washing machine	0915001	Maintenance and repairs for audio-visual equipments-equipment and service
0114401	White cheese	0220111	Cigarettes (Winston )	0531301	Oven	0915002	Maintenance and repairs for audio-visual equipments-service
0114402	Kosher cheese	0220112	Cigarettes (Parliament)	0531302	Furnace with gas	0922001	Music equipment (flute)

0114403	Cheese encased in a skin	0220119	Cigarettes (Monte Carlo)	0531303	Furnace with oven	0931003	Children's toys
0114404	Processed cheese	0311001	Woolen fabrics	0531401	Air conditioner	0932002	Items for sport and recreation (soccer ball)
0114501	Eggs	0311003	Cotton fabrics	0531403	Stove	0935001	Veterinary fee
0115101	Butter	0311007	Mixture fabrics	0531404	Bath stove	0941001	Sport Games (football)
0115102	Butter for cooking	0312101	Men's overcoats	0531405	Flash heaters	0941002	Renting of mini football fields
0115201	Margarine	0312103	Men's raincoats	0531406	Space heaters	0942101	Film development
0115301	Olive oil	0312104	Men's Coats	0531408	Aspirator	0942105	Fee paid for having pictures taken
0115302	Sun-flower oil	0312106	Men's Coats (sports)	0531501	Vacuum cleaner	0942203	Cable TV service fee
0115303	Corn oil	0312108	Men's Suits	0532001	Kitchen robot	0942204	Cinema
0116101	Oranges	0312109	Men's Jackets	0532002	Toster	0942205	Theather
0116102	Grapes	0312110	Men's Trousers	0532003	Water heaters	0942206	Other recreational and cultural services (Internet cafe)
0116105	Pears	0312112	Men's Sweaters	0532004	Iron	0943001	Horse racing
0116107	Quinces	0312115	Men's Shirts	0532007	Other small electrical appliances	0943005	Number 10
0116110	Strawberries	0312116	Men's Sweatshirts	0533001	Repair of household appliances	0943006	National lottery
0116112	Apples	0312117	Men's T-Shirt	0540102	Glass household utensils	0943007	Lotto
0116113	Plums	0312120	Men's Tracksuit	0540104	Porcelain household utensils	0943008	Lottery game (iddaa)
0116115	Grapefruit	0312122	Men's Pijamas	0540201	Steel kitchen utensils	0943009	Lottery

0116121	Water melon	0312125	Men's underwear	0540301	Other steel kitchen utensils	0951002	Children books
0116122	Melon	0312130	Men's socks	0540302	Teflon household utensils	0951003	School books
0116123	Apricots	0312201	Women's overcoats	0540304	Plastic household utensils	0951004	Other books
0116127	Cherries	0312202	Women's raincoats	0540312	Other non-electrical appliances	0952001	Newspapers
0116130	Lemons	0312204	Women's Coats	0552103	Battery	0952002	Magazines
0116131	Tangerines	0312209	Women's Suits (with tousers)	0552104	Electric bulb	0954001	Notebook
0116134	Bananas	0312210	Women's Suits (with skirts)	0552105	Fluorescent lighting tubes	0954003	Pencil
0116135	Pomegranate	0312215	Women's Skirts	0552203	Door fittings	0954004	Box of coloured pencils for painting
0116137	Peaches	0312216	Women's Trousers	0552204	Stove equipments	0954005	Stationery papers
0116202	Walnuts (Without shells)	0312217	Women's Cardigan	0561101	Detergents (for laundry)	0954010	Other stationery
0116203	Hazelnuts (Without shells)	0312219	Women's Sweaters and Blouses	0561102	Dishwasher detergents	0960002	Package holidays weekend
0116204	Pistachio	0312222	Women's Sweatshirts	0561103	Disinfectants and insecticides	0960003	Package holidays for one week and more
0116206	Peanuts	0312224	Women's T-Shirt	0561201	Articles for cleaning	0960005	Package holidays (abroad)
0116207	Roasted chick-peas	0312230	Women's Tracksuit	0561202	Sponge for dish washing	0960008	The pilgrimage to Mecca
0116208	Sun flower seeds	0312235	Women's Pijamas	0561203	Aluminium and stretch foil	1010001	Kindergarten fees
0116209	Pumpkin seeds	0312237	Women's underwear	0561204	Kitchen paper and napkins	1010002	Private school fees (primary)

0116210	Raisins	0312242	Women's socks	0561208	Vacuum cleaner bag	1020002	Private school fees (secondary)
0116212	Dried apricot	0312303	Children's Coats	0562104	Maid and cleaners' fee	1020005	Fees for education courses for secondary education
0117110	Okra	0312315	Children's Trousers	0562202	Carpet and other floor coverings cleanings	1030002	Fees for education courses for university
0117112	Green peas	0312318	Children's Sweaters	0611001	Medicine	1040001	Private university fee
0117114	Sweet green pepper	0312321	Children's Shirts	0612001	First-aid tools	1040002	University fee
0117115	Stuff pepper	0312322	Children's Sweatshirts	0612002	Injector and clinical thermometer	1050001	Courses for computer and language education
0117117	Green pepper	0312323	Children's T-Shirt	0613101	Corrective eye-glasses	1110101	Soups
0117122	Tomatoes	0312328	Children's Tracksuit	0613102	Contact lenses	1110102	Cold meals
0117125	Green beans	0312329	Children's Pijamas	0613201	Therapeutic appliances	1110103	Broiled meat (kebab)
0117130	Carrot	0312332	Children's underwear	0621201	Fees paid to specialist doctor	1110104	Flat bread (pide, lahmacun)
0117134	Spinach	0312336	Children's socks	0622001	Dentist fees (Pulling)	1110106	Döner in bread
0117135	Squash	0312338	School uniform	0622002	Dentist fees (Filling)	1110108	Hamburger and sandwiches
0117139	Cauliflower	0312403	Overalls for baby	0623101	X-ray fees	1110113	Patisserie products served
0117146	Onions	0312409	Baby's pyjamas	0623102	Ultrasound fee	1110115	Desserts in restaurants
0117148	Cabbage	0312410	Baby's underwear	0623105	MR fee	1110201	Hot drinks served
0117150	Red cabbage	0312414	Baby's socks	0623108	Laboratory analysis fees	1110202	Cold drinks served

0117151	Mushroom	0313001	Knitting wool	0630001	Hospital bed fees	1110204	Ayran served
0117152	Lettuce	0313002	Sewing-Thread	0630002	Surgical operation	1110206	Raki and beer served
0117153	Parsley	0313006	Tie	0630003	Delivery fee (normal)	1120101	Hotel charges
0117158	Eggplant	0313012	Belts	0630004	Delivery fee	1120204	Accomodations services of boarding universities
0117160	Leek	0313014	Scarf	0711101	Automobile (Diesel)	1211101	Men's Hairdressing
0117162	Cucumbers	0314002	Expenditure on tailor-made women's costume	0711301	Automobile (Gasoline)	1211201	Women's Hairdressing
0117164	Garlic	0314005	Suit Repair	0712001	Scooter	1211202	Manicures and beauty service
0117166	Purslane	0314007	Dry cleaning	0713001	Bicycle	1212002	Electric razors
0117174	Radish	0321101	Men's footwear	0721001	Spare parts and accessories	1212003	Hair care appliances
0117176	Grape leaf/Brine grapevine	0321102	Men's boots	0721003	Products for maintenance of transport equipments	1213001	Shaving articles
0117179	Green onions	0321104	Men's sport shoes	0722001	Petrol	1213002	Articles for dental hygiene
0117201	Potatoes	0321201	Women's footwear	0722002	Liquid petroleum gas (LPG)	1213005	Toiletsoap
0117401	Dry beans	0321202	Women's boots (with strings)	0722003	Diesei	1213006	Bathsoap
0117402	Chickpeas	0321203	Women's boots	0722004	Motor oil	1213007	Perfumes
0117403	Lentils	0321204	Women's sport shoes	0723001	Maintenance and repairs equipment and service for vehicle	1213008	Deodorant
0117404	Other pulse	0321206	Slipper for	0723002	Maintenance and	1213009	Cologne

			woman		repairs service for vehicle		
0117501	Canned vegetables	0321301	Children's footwear	0724001	Hire of car	1213010	Body cream and lotion
0117505	Tomato sauce	0321302	Children's boots	0724005	Car park fee	1213011	Make-up products
0117506	Olive	0321304	Children's sport shoes	0724006	Tolls	1213013	Hair care products
0117507	Chips and appetizers	0322001	Men's footwear repair	0724008	Bridge fare	1213014	Toilet paper
0118101	Powdered sugar	0322002	Women's footwear repair	0724009	Driver course fare	1213015	Paper Tissue
0118102	Lump sugar	0410001	Actual rent	0731101	Train fare (inter- urban)	1213016	Cotton wool
0118201	Jam	0431001	Painter's fee	0731102	Underground	1213017	Baby napkin
0118203	Honey	0431002	Expenditure on floor covering (wall tiling)	0731201	Train fare (intra- urban)	1213018	Hygiene pad for women
0118204	Grape molasses	0431004	Expenditure on the purchase of glass	0732101	City bus fare(inter-urban)	1231001	Jewellery
0118205	Helva	0431006	Windowpane (PVC)	0732104	Mini bus fare	1232101	Travel goods
0118301	Chocolate	0431008	Plumbing items	0732105	Transportation service fee to school	1232106	School bag
0118302	Tablet of chocolate	0441001	Water fee	0732201	Taxi fare	1232201	Umbrella
0118303	Chocolate cream	0442001	Refuse collection	0732301	Bus fare (intra- urban)	1240001	Crèche and day-care center
0118305	Turkish delight	0451001	Electricity fee	0733001	Airplane fare	1252001	Insurance connected with health
0118311	Chewing gum	0452101	Natural gas	0734001	Boat fare	1253002	Insurance connected with health
0118312	Confectionery	0452102	Natural gas	0736002	Cargo	1254001	Insurance connected

			subscription fee				with transport
0118401	Ice-cream	0452201	Tube gas	0736003	Transportation fee	1262006	Banking services
0119001	Condiment-spices	0454001	Coal price	0810001	Payment for delivery of letters	1270001	Fees for legal service
0119002	Salt	0454002	Firewood price	0810002	Payment for delivery of parcels	1270002	Fees for transportation vehicle
						1270008	Payment for photocopies

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Source: TurkStat

**Table a1.2:** Weights for Sub Groups of 2003 Based Consumer Price Index for 2010, Turkey

Codes	Items	Weights (2010)
011	FOOD	93.36
012	NON-ALCOHOLIC BEVERAGES	6.64
021	ALCOHOLIC BEVERAGES	4.22
022	TOBACCO	95.78
031	CLOTHING	76.38
032	FOOTWEAR	23.62
041	ACTUAL RENTALS FOR HOUSING	30.67
043	MAINTENANCE AND REPAIR OF THE DWELLING	8.74
044	WATER SUPPLY AND MISCELLANEOUS SERVICES RELATING TO THE DWELLING	14.87
045	ELECTRICITY, GAS AND OTHER FUELS	45.72
051	FURNITURE AND FURNISHINGS, CARPETS AND OTHER FLOOR COVERINGS	28.36
052	HOUSEHOLD TEXTILES	9.81
053	HOUSEHOLD APPLIANCES	26.58
054	GLASSWARE, TABLEWARE AND HOUSEHOLD UTENSILS	7.28
055	TOOLS AND EQUIPMENT FOR HOUSE AND GARDEN	2.96
056	GOODS AND SERVICES FOR ROUTINE HOUSEHOLD MAINTENANCE	25.01
061	MEDICAL PRODUCTS, APPLIANCES AND EQUIPMENT	39.91
062	OUTPATIENT SERVICES	49.09
063	HOSPITAL SERVICES	11
071	PURCHASE OF VEHICLES	39.29
072	OPERATION OF PERSONAL TRANSPORT EQUIPMENT	33.67
073	TRANSPORT SERVICES	27.04
081	POSTAL SERVICES	0.08
082	TELEPHONE AND TELEFAX EQUIPMENT	9.8
083	TELEPHONE AND TELEFAX SERVICES	90.12
091	AUDIO-VISUAL, PHOTOGRAPHIC AND INFORMATION PROCESSING EQUIPMENT	36.18
092	OTHER MAJOR DURABLES FOR RECREATION AND CULTURE	0.61
093	OTHER RECREATIONAL ITEMS AND EQUIPMENT, GARDENS AND PETS	9.61
094	RECREATIONAL AND CULTURAL SERVICES	23.42
095	NEWSPAPERS, BOOKS AND STATIONERY	23.37
096	PACKAGE HOLIDAYS	6.81
101	PRE-PRIMARY AND PRIMARY EDUCATION	19.28
102	SECONDARY EDUCATION	23.02
103	POST-SECONDARY NON-TERTIARY EDUCATION	28.7
104	TERTIARY EDUCATION	20.98
105	EDUCATION NOT DEFINABLE BY LEVEL	8.02
111	CATERING SERVICES	91.7
112	ACCOMMODATION SERVICES	8.3
121	PERSONAL CARE	54.01
123	PERSONAL EFFECTS N.E.C.	27.6
124	SOCIAL PROTECTION	1.62
125	INSURANCE	4.82
126	FINANCIAL SERVICES N.E.C.	0.16
127	OTHER SERVICES N.E.C.	11.79
<b>Source:</b> TurkStat		

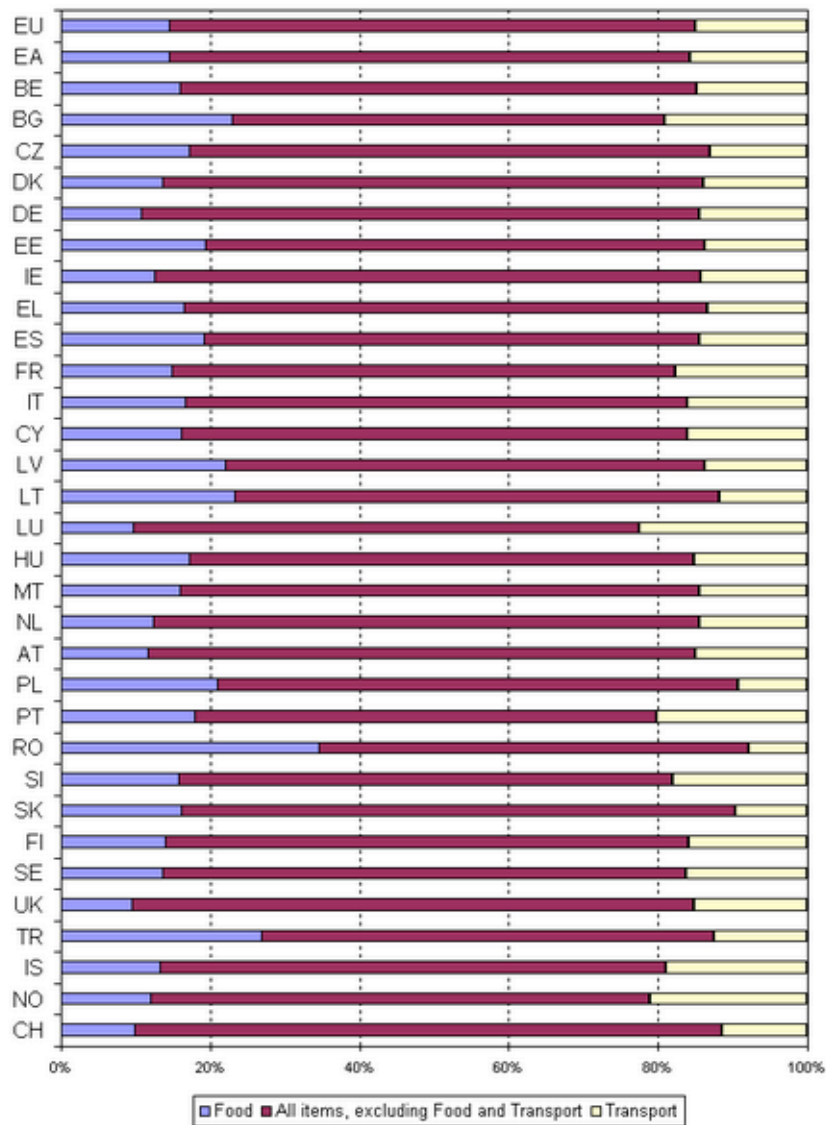
**Table a1.3: 1978-1979 Based Consumer Price Index, Chronological Trend of Monthly Values, Turkey**

Year	January	February	March	April	May	June	July	August	September	October	November	December
1982	373	382	391	394	395	402	406	412	425	436	446	462
1983	481	492	503	511	514	521	526	539	556	585	607	633
1984	655	665	685	728	763	813	820	841	858	895	930	947
1985	1,000	1,033	1,082	1,091	1,118	1,109	1,125	1,154	1,209	1,285	1,344	1,366
1986	1,410	1,434	1,453	1,458	1,486	1,521	1,550	1,563	1,599	1,717	1,756	1,785
1987	1,837	1,887	1,957	1,998	2,097	2,095	2,135	2,171	2,235	2,342	2,489	2,767
1988	2,933	3,090	3,324	3,487	3,569	3,646	3,747	3,875	4,062	4,365	4,666	4,848
1989	5,113	5,334	5,469	5,667	5,809	6,114	6,461	6,717	7,033	7,567	7,904	8,183
1990	8,493	8,852	9,285	9,656	9,829	10,126	10,316	10,609	11,302	12,118	12,839	13,141
1991	13,697	14,398	14,903	15,440	16,050	16,858	17,326	18,111	19,000	20,244	21,527	22,484
1992	24,485	25,773	26,740	27,087	27,345	28,146	29,088	30,240	32,393	35,057	36,529	37,748
1993	39,859	41,223	42,554	43,585	45,626	47,886	51,243	52,572	54,698	58,243	62,525	64,695
1994	66,961	70,958	74,563	94,060	102,017	105,781	109,425	111,796	118,203	129,548	139,731	150,181
1995	160,158	169,734	176,157	187,480	193,123	195,964	200,941	208,885	223,952	241,049	254,771	263,667
1996	285,265	295,517	310,002	332,090	347,727	355,115	358,313	375,233	397,006	427,281	452,088	462,066
1997	486,939	514,912	544,979	591,125	614,479	626,022	654,419	689,992	742,807	816,598	873,920	916,498
1998	979,423	1,026,265	1,067,142	1,122,293	1,156,812	1,164,317	1,197,049	1,241,649	1,327,138	1,414,696	1,485,639	1,526,376
1999	1,588,988	1,625,982	1,692,654	1,784,866	1,820,825	1,852,065	1,910,731	1,975,748	2,085,096	2,215,141	2,321,098	2,449,441
2000	2,561,547	2,660,877	2,750,928	2,815,736	2,880,621	2,882,316	2,945,717	3,003,075	3,086,117	3,203,510	3,336,508	3,401,704
2001	3,473,079	3,522,742	3,722,456	4,115,306	4,335,261	4,461,293	4,561,228	4,654,507	4,962,754	5,307,284	5,604,134	5,820,672
2002	6,174,953	6,280,844	6,348,308	6,502,055	6,513,298	6,521,565	6,560,786	6,675,401	6,928,427	7,211,939	7,484,929	7,598,668
2003	7,761,927	7,957,828	8,267,518	8,528,413	8,667,132	8,601,045	8,520,083	8,469,297	8,598,780	8,745,170	8,951,059	9,007,595
2004	9,057,767	9,076,979	9,176,044	9,230,466	9,158,621	9,053,000	9,049,038	9,073,151	9,117,563	9,367,679	9,541,516	9,599,091
2005	9,682,418	9,718,091	9,762,680	9,879,679	10,033,388	10,120,678	10,116,630	10,174,295	10,295,369	10,513,631	10,644,000	10,700,413

Source: TurkStat

## APPENDIX II: HOUSEHOLD CONSUMPTION PATTERNS

**Table a2.1:** Country Level Household Consumption Patterns for 2008



Source: [http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/HICP\\_-\\_Household\\_consumption\\_patterns](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/HICP_-_Household_consumption_patterns)

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