



**Cross-country Comparison:
Construction of the Consumer Price Index (CPI)**

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Abstract

“The Consumer Price Index (CPI)¹ is an instrument designed to measure changes over time in the prices paid by households for goods and services which are customarily purchased for consumption². Its principal objective is to reflect only pure price movement³”. That is to say, price changes due to quality differences, technological innovations, and different package sizes would not be reflected in the CPI figure as normal price movements. It is thus important to ask: which prices should be recorded to measure pure price movements; which basket of goods and services represents the average consumption of an urban household; and how is this ‘median’ household unit defined? These are critical questions in constructing the CPI.

The paper addresses these questions by comparing how different countries construct their CPI. The countries of comparison are Chile, Egypt, Japan, Korea, Mexico, the United Kingdom and the United States. The Choice of countries was made to include developed as well as developing nations. The objective of the comparison is not to come up with an ideal way of constructing a CPI, but rather to learn from other countries’ experiences how to improve the way Egypt constructs its CPI.

ملخص

الرقم القياسي لأسعار المستهلكين هو أداة مصممة لقياس التغيرات عبر الزمن في الأسعار التي تدفعها الأسر المعيشية مقابل السلع والخدمات المشتراة بغرض الاستهلاك. والهدف الرئيسي من الرقم هو أن يعكس التحركات السعرية المحضة فقط. أي أن التغيرات السعرية الناتجة عن فروق الجودة والابتكارات التكنولوجية وأحجام العبوات لا يُعبر عنها في هذا الرقم كتحركات سعرية عادية. ومن ثم، يتعين الإجابة عن الأسئلة الآتية عند إعداد الرقم القياسي لأسعار المستهلكين: ما الأسعار التي يجب تسجيلها لقياس التحركات السعرية المحضة؟ وما هي سلة السلع والخدمات التي تمثل الاستهلاك المتوسط لأسرة معيشية في الحضر؟ وما هو تعريف وحدة الأسر المعيشية المتوسطة؟

تحاول هذه الورقة الإجابة عن هذه الأسئلة بمقارنة أساليب إعداد البلدان المختلفة للرقم القياسي لأسعار المستهلكين، وهذه البلدان تضم شيلي ومصر وكوريا والمكسيك والمملكة المتحدة والولايات المتحدة. وجاء الاختيار ليشتمل على بلدان متقدمة ونامية على حد سواء. وليس الهدف من المقارنة هو التوصل إلى طريقة نموذجية لإعداد الرقم القياسي لأسعار المستهلكين ولكن للاستفادة من خبرات البلدان الأخرى في تحسين إعداد الرقم القياسي لأسعار المستهلكين في مصر.

¹ Most of the sources used are original sources from the related statistical offices. Therefore, the source for information related to a specific country will be from the statistical office of that country. The names are listed in the Reference appendix of this paper.

² Consumption expenditure excludes those kinds for expenditure representing investment, savings or transfers, (OECD, 1994).

³ OECD, 1994

I. Introduction

Since the CPI is a measure of inflation, it is very important to assess its accuracy and reliability, and to work on improving it. Inflation affects all of a country's economic actors. A higher inflation rate means lower standards of living for households by reducing their real wages. It means higher cost of investment for the business community by increasing nominal interest rates, and worsened terms of trade due to exchange rate devaluation. It also means larger budget deficits and more strict fiscal policies. In Latin American countries and many reforming economies, many structural reform programs were carried out mainly to combat inflation.

Some uncertainty surrounds Egypt's CPI figure due to doubt as to whether it is undervalued. These doubts will be cleared by comparing the methodology used in constructing Egypt's CPI with those used in other countries. This comparison will provide useful lessons to help improve the way the Egyptian CPI is constructed. A general common practice is followed by almost all countries in constructing the CPI. Each country also makes its own contributions to improving the reliability of figures. This paper compares the Egyptian methodology to these basic criteria, and then discusses how country-specific approaches are relevant to Egypt.

It is important to note that different domestic methodologies may be attributed to country-specific features, for example, consumption patterns may be influenced by cultural traditions, market size and structure, among other factors. These differences are not necessarily signs of inaccuracy or inefficiency in making the index.

It is first essential to verify the sources that publish Egypt's CPI to ensure their consistency. The discussion of the methodology used in producing the figure will follow the three main stages of constructing it: data collection, data processing and indices presentation. The data collection section investigates the data sources used in the construction of the CPI, and the methods of collecting data. Data processing deals with selecting basket items, assigning weights to them, and calculating the index. The last stage in producing the CPI consists in generating partial indices that are important to different interest groups and are useful for analytical purposes. The paper concludes with a set of recommendations and suggestions on how to improve the construction of Egypt's CPI.

II. Consistency of the Published Figure

Egypt's CPI figure is reported in several institutional publications, including the Central Agency for Public Mobilization and Statistics (CAPMAS), the Central Bank of Egypt (CBE), the World

Bank, the International Monetary Fund (IMF), the Economist Intelligence Unit (EIU), the US Embassy in Egypt and many others. Discrepancies among these figures are initially apparent. In reality, only CAPMAS is responsible for compiling and constructing Egypt's CPI figure, and all other institutions use that figure. CAPMAS compiles the urban CPI monthly, based on a fixed base year for prices.⁴ Interested institutions compile the monthly figures and report them, according to their convenience, either as annual averages, fiscal averages, quarterly averages, or even as rate of change in the index, based on the same or a different base year than CAPMAS. When verified against the same base and mathematical concept, all the published figures turned out to be identical, thereby refuting any uncertainties about their consistency (refer to Appendix A for graphical and statistical representation).

III. Data Collection Stage

Data collection is a very crucial stage in constructing the CPI. The quality and reliability of the data collected determine the accuracy of the CPI figure. After an initial discussion of data sources, price collection techniques are examined, including the type of prices to be collected, the frequency of collecting prices, and the calculation of average prices.

Sources of Data

In principle, countries use three surveys as a pool for the data needed for the CPI. Two of them provide data on expenditure items and weights. They are the household survey and the housing survey. The third selects a sample of outlets to be used as price sources for pricing the CPI basket.

Household Surveys

The CPI basket is extracted mainly from the household survey. Besides providing expenditure data, this survey inspects other income, consumption, and social indicators that serve as useful planning tools.⁵ The reliability and representativeness of the survey highly influence the effectiveness of the CPI figure. If the household survey gave a false indication of households expenditure and consumption patterns, the CPI in turn will be pricing an irrelevant basket of goods and services.

On the other hand, the frequency and regularity of the survey affect the representativeness of the CPI figure. Regular household surveys make frequent updates of the CPI basket possible, and

⁴ The base year currently in use is 1986/87 = 100. CAPMAS compiles a rural index as well every two months, but the urban figure is what is commonly quoted.

allow them to remain representative of household consumption and the cost of living.

The survey period usually covers 12 consecutive months. It is sometimes conducted regularly - every 5 or 10 years -- or irregularly -- on a random basis. In most cases, a survey's frequency corresponds to CPI basket updates.⁶ The longer the time lag between two households survey, the longer the basket remains fixed, and hence less representative of household consumption. An ideal case is when the survey is conducted on a continuous basis. In this case, a base year is selected which defines the original consumption basket and which sets the base period prices. Regular updates of the basket follow based on the continuous household survey results. This is done to ensure that the consumption basket remains representative of the consumption pattern by incorporating any eventual changes over time. The survey period is not only 12 months, but is an ongoing process.

It therefore becomes clear that its ability to reflect the consumption pattern of the typical consumer and to keep track of the changes that take place in this consumption pattern are the criteria which best measure a household survey's efficiency to construct the CPI.

The information provided by the survey relates to a certain reference population. It may focus on a single (or group) reference population such as urban, rural, retired, wage earners, or employed population, and exclude others. The sampling unit in the survey is the household. Though the definition of what constitutes a household unit differs among countries, it ought to target a country's typical household unit.

The name of the survey may differ from country to country, but all serve a common purpose.⁷ The major differences between countries' household surveys, in terms of eligible household definitions, frequency and time coverage, are highlighted in Table 1.⁸

Table 1 shows that it is common practice to conduct the survey on a continuous basis in many countries. It need not be conducted on a large scale. The United Kingdom, whose population is 56 million, surveys a sample of 7,000 households per year. Japan, whose population is 124 million,

⁵ Social indicators include age, literacy or educational background, occupation of household head and members, among others.

⁶ Except in the case of the United States, which appears later.

⁷ In countries of comparison, the following survey names hold: it is called "Household Budget Survey" in Chile, "Income, Expenditure and Consumption Survey (IECS)" in Egypt, "Family Income and Expenditure survey (FIES)" in Korea and Japan, "Household Income and Expenditure survey (HIES)" in Mexico, "Family Expenditure Survey (FES)" in the United Kingdom, and "Consumer Expenditure Survey (CES)" in the United States.

⁸ Information was unavailable on the structure of Mexico's National Survey of Household Income and Expenditure.

has a sample size of 8,000 households.⁹ Even the United States, whose population has reached
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⁹ This sample is renewed regularly with each sample household surveyed for six months and replaced by a new one. The replacement ratio is kept constant every month, thereby allowing one-sixth of the sample to be renewed monthly. Replacement takes place by survey unit area as a whole. Each unit area is surveyed for a year, after which the unit area is replaced by another within the same block. During the year, six sample households are randomly selected twice, in the beginning and in the 7th month. Replacement months are scattered equally from January to December.

Table 1: Household Surveys in Countries of Comparison

Country	Reference Population	Definition of Eligible Household Unit	Frequency & Time Coverage
Chile	Entire urban population of Santiago province	Group of individuals that live in the same house and share a common budget.	Not regular. Covers 12 months but collects data for a period of 14 months.
Egypt	Entire rural and urban population	An individual or group of individuals living together and sharing the same budget. ¹⁰	Not regular. Covers a period of 12 months.
Japan	Entire population of Japan.	All households are eligible, except for households engaged in agriculture, forestry and fishery; one-person household; foreigner household; households managing hotels, restaurants & dormitories; households whose heads are absent on long term; households with 4 or more living in employees.	Continuous. Monthly and annual averages are regularly published.
Korea	Private households of the urban areas of Korea	Eligible households exclude those involved in farming, fishery, and one-person households.	N/A.
Mexico	N/A.	N/A.	N/A.
United Kingdom	All private households.	All household units. After collecting all the data, households representing the top 4 percent income earners and households who represent the lowest 4 percent income earners (usually consist of pensioners enjoying state-benefits) are excluded.	Continuous. Updated quarterly reports are issued.
United States.	Only urban population. Rural consumers, military and institutional population are excluded from the survey. The survey covers as well wage earners and clerical workers, to whom a CPI is specially designed.	N/A.	Continuous. ¹¹

Note: From the table above, the survey extends in Chile for a period of 14 months. The objective of choosing such duration was to be able to collect three observations¹² about the expenditures with more variability (not frequently bought), as medical expenses or electro-domestic items, to avoid that abnormal expenditures during a particular month would distort the representative expenses on any given item.

million, bases its Consumer Expenditure Survey (CES) on a national sample of almost 29,000 households. This makes it possible for them to conduct the survey on a continuous basis.

The frequency of the household survey in Egypt is irregular. It was first conducted in 1958/59, then in 1965/66, 1974/75, 1981/82, and most recently in 1990/91, whose results are currently used

¹⁰ Includes visitors spending more than six months (including the survey month) with the family, and live-in servants. Excludes family members who are (in the survey period) completing their military service or are military officers and therefore spend less than six months a year with their families.

¹¹ Though the CES is a continuous survey, CPI basket weights have historically been changed at 10 year intervals.

¹² The three observations represent the reference month, a month before and after.

in producing the CPI series. Egypt has a population of 56 million among which 15,000 households were surveyed -- an average of 1,250 households were treated monthly.¹³ In relative terms, the Egyptian sample is twice as big as that of the United Kingdom and the United States, and four times that of Japan. The results of another household survey recently conducted in 1995/96 are neither published nor utilized. The good news is that the Central Agency for Public Mobilization and Statistics has now decided to conduct this survey every five years.

Conducting a continuous survey bears heavy costs, but a cost-benefit evaluation is necessary to decide whether to conduct the survey annually on a small scale or to keep it as it is now -- bearing in mind that the survey's continuity is an essential condition for a regularly updated basket.¹⁴ The cost of neglecting this updating is high. Pricing a basket of goods and services whose items are obsolete means that some of these items may be available in small quantities in the market and may be sold at clearing prices. This may result in a false price signal that would leave the index downwardly biased. This is not due to a true price decline. Consumers will not be buying that product anymore, but a new substitute which is not yet priced by the CPI. The index will thus lose its function as a cost-of-living indicator.

Outlet Survey

This survey scans the retail outlets available for consumers in their respective geographic areas. It generates a pool of those outlets which are frequently visited by households. From this pool a sample is selected which is visited regularly and used as the source for the pricing of the CPI basket. So that the CPI reflects only pure price changes, price collectors must treat the same outlets each time.

For some commodities, it is not necessary to survey the most commonly used outlets. They are those that are supplied by central authorities or monopolies. Examples include electricity, railway tickets, and water charges. The prices of such commodities are commonly collected from central authorities. These collected prices are representative of those paid by the reference (target) consumer in buying the basket components. The problem lies in choosing the sample outlets for commodities whose prices vary from one geographic area, or from one shop, to the other. In this case, the common question that the survey attempts to answer is: "From where do you usually buy

¹³ Population data for the United Kingdom, Japan, United States and Egypt are 1993 estimates from World Tables, World Bank, 1995.

¹⁴ Basket revision and update is reviewed Section 3.

a specific product?”

In theory, an outlets survey is necessary for choosing a representative sample of outlets, which in turn is a source of prices for the CPI basket items. Some countries overlook the need for this survey and choose to select the sample outlets in a casual way, while others prefer to conduct the outlets survey on a continuous basis. The need for a continuous or frequent survey largely depends on the diversity of prices, the pattern of retail trade, and country-specific commercial practices.¹⁵ There is in fact no consensus on what should be standard frequency of conducting this survey.

The criteria which best measures the success of the outlet survey and the derived sample of outlets used in pricing are: its geographic, behavioral and commercial¹⁶ representation, and the existence of a predefined mechanism which allows the enumerator to replace any of the selected outlets in case one of them closes. Table 2 overviews the variation in outlets sampling among the countries of comparison.

Chile, the United Kingdom and the United States each have a remarkable addition to their own outlets survey design. Chile succeeded in satisfying both the commercial and behavioral representativeness criteria of outlets sampling. The first criterion is satisfied by surveying all types of outlets and identifying the most representative for the sale of different items, and thereby establish a typology of these outlets with respect to the availability of products, subgroups, groups or clusters of items for sale. The second criterion is satisfied by surveying household buying habits and by assigning weights according to household answers as to where they usually purchase. Weights are thus assigned to different types of outlets according to household preferences. The sample is also sensitive to household levels of expenditure. It is representative of an area's expenses because it allocates households which spend more on a larger sample size, and therefore assigns them a bigger weight in the survey. Choosing a different sample size for different socioeconomic levels does not result in over or underrepresentation of the respective households in the outlets survey. The sample results of each household are multiplied by the reciprocal value of the probability of selection. The results are also expanded to cover all the CPI target population in Chile, by constructing a factor of expansion that universally extrapolates the results of the

¹⁵ OECD, 1994.

survey. The main reason for using this factor is to ensure that the sample of households interviewed is universally representative.

The United Kingdom, aside from satisfying the commercial and geographic criteria, rightly addressed the outlets replacement mechanism. For each commodity group (in addition to the required number of outlets), it selected reserve outlets to replace those that closed. Every few

¹⁶ Behavioral representation means that the sample represents household buying habits. Commercial representation means that the sample represents all forms of retail shops, such as supermarkets, department stores, public markets, small shops, and specialized shops (butchers and groceries).

Table 2: Outlets Selection Methodology

Country	Tools	Approach for Selection
Chile	<ul style="list-style-type: none"> - Census of retail selling stores - Survey of Sites of Purchase (SSP) 	<ul style="list-style-type: none"> - First a census of retail stores is conducted, whose objective is to identify outlets with respect to the availability of products, subgroups, groups or clusters of items for sale. - Second, a survey of sites of purchase (SSP) is applied to approximately 1000 households to identify the main types of outlets where they bought different articles and to define how the purchases are distributed over the whole area of the survey. - According to the resulting households preferences, a sample of outlets are selected from the Census of stores weighted by these preferences.
Egypt	<ul style="list-style-type: none"> - No survey 	<ul style="list-style-type: none"> - Three sources of prices are selected for every item in each city¹⁷. The bases on which the choice of the currently used outlets are made are neither documented nor officially known to researchers. - The selected outlets represent the public sector, the private sector, and the public markets.¹⁸ - The outlet remains in use until it shuts down or ceases its activity for whatever reason. It is then that the price collector will have to judge when choosing another similar outlet.¹⁹
Japan	<ul style="list-style-type: none"> - Retail Price Survey 	<ul style="list-style-type: none"> - First, a survey screens retail outlets and covers the whole area of Japan. - A sample of outlets is selected in each district, relative to its population size.
Korea	<ul style="list-style-type: none"> - N/A. 	Some 6,000 retail shops which are frequently visited by consumers for commodities and services in the FIES area are used.
Mexico	<ul style="list-style-type: none"> - Economic Census 	A sample of 18,400 outlets are drawn from the pool of outlets collected in the Economic Census carried out by the INEGI.
United Kingdom	<ul style="list-style-type: none"> - Outlets Enumeration (census) - Outlets Sampling 	<ul style="list-style-type: none"> - Outlet enumeration covers all places with greatest retailing importance, including retail parks and out-of-town retailing. It yields a list of all outlets in the areas specified. - A sample is chosen from this pool of outlets, using the net retail floor space, as a proxy for the size measure (later turnover will be used as a better size). This technique will be fully implemented by 1998
United States.	<ul style="list-style-type: none"> - Continuous Point of Purchase Survey (CPOPS) 	<ul style="list-style-type: none"> - The survey provides up-to-date data on retail outlets and the type of groups of commodities and services which urban households usually purchase from them. - It is conducted annually over a period of 4 to 6 weeks, in approximately one-fifth of the primary sampling units (PSUs)²⁰ in the CPI on a rotating basis to ensure that the outlet sample for any PSU is never more than 5 years old.

years fresh samples of outlets will be drawn in each location to ensure that the sample stays

¹⁷ Cities here refer to the capitals of the governorates. For Cairo, there are six sources for each price.

¹⁸ Such as El-Obour, Road El-Farag, and Boulaq.

¹⁹ Similar in geographic coverage and in representing the same socioeconomic class.

representative.

The United States is adopting a rotation approach in conducting its CPOPS whereby it is capable of completely renewing the outlets sample every five years. This approach is applied in the United States only and is justified by its diversified market.²¹

While most developed and developing countries are moving away from judgmental selections, Egypt's criteria stand out as relatively subjective and unclear. This indicates that the subjective selection of outlets that Egypt is adopting may have a biased effect on prices collected to calculate the CPI. Although outlets selection covers all Egyptian governorates, the sample might not be representative of the buying habits of households. Three selected outlets, which supposedly represent all income groups, are assigned equal weights. This means that the buying habits of different income classes in the economy are equally represented in the outlets sample (i.e. the economy is equally divided into high, middle, and low income groups) or else different types of shops experience the same relative price changes. This is a very simple and ingenuous assumption. Moreover, selecting three outlets from each governorate to price an item is not enough to obtain a representative price.

What needs to be introduced to the CPI surveys framework in Egypt is the outlets survey. Reliable sampling techniques are needed to select a sample of representative outlets to be used as price sources. Country experiences emphasized the need for such a survey. There are two possible approaches to designing the survey: either relying on household interviews to survey households buying preferences (US and Chilean style), or to survey the different outlets by their geographic distribution, degree of specialization, and the turnover of each outlet (UK and Japanese style). A positive start for Egypt would be to include in its Income, Expenditure and Consumption Survey (IECS) a question that reflects households buying preferences -- "From where do you usually buy these products?" -- and pose this question for every group of products, at least to acquire a sense of the most widely used type of retail shops. More emphasis could then be given to this type of shop, whether a supermarket, department store, grocery, cooperative, wholesale public market, hawker or specialized retailers, such as butchers and greengrocers. A sample of outlets could be drawn representing all sources, with the size of each type proportionate to its relative importance to the households. The 1996 Census provides a ready-made count of all retail outlets across the country. Samples can be drawn from it based on the weights generated by the household survey.

²⁰ A PSU is a county or a group of contiguous counties. Its definition is based on geographic areas defined by the Census Bureau.

This would be an acceptable solution to the outlets selection problem until a separate outlet survey is designed.

*Housing Survey*²²

As a major component of household expenditure, housing deserves separate treatment. A survey should bring to light housing costs by selecting and regularly pricing a representative sample of tenants, publicly owned houses, and owner-occupied houses. Housing costs should be a weighted average of the costs of the selected sample, with weights reflecting the structure of the housing market.

In theory, the housing price is a function of the shelter service cost in addition to maintenance and water charges. The shelter component of housing includes rent paid by tenants²³; rents reported by local authorities renting apartments to the public; an imputed rent for the cost of owner-occupied houses; and the cost of other types of dwellings.²⁴ In practice, some countries take the rent paid by tenants as proxy for the shelter cost, ignoring other types of dwellings. Although this approach affects the accuracy of the housing price, the harm could be minimized if rents were determined freely by market forces, and would thereby be good proxies for the cost of shelter.

The survey design, sample selection, and method of calculating the imputed rent of owner-occupied houses differ according to each country's housing market. The frequency of collecting prices depends on the housing market structure. Countries with relatively stable housing prices may use quarterly or monthly price collecting schemes.

The ability to represent all types of dwellings in a target population is an important criterion with which to measure the housing survey's efficiency. Table 3 outlines different country approaches in pricing the housing component of the CPI basket.

The Egyptian housing market is unique but full of problems. One part of the market is subject to rent control with legally fixed prices; another is dominated by owner occupation where the cost of buying houses is continuously increasing²⁵; and another consists of furnished dwellings where

²¹ For details on how CPOPS, see the Bureau of Labor Statistics (BLS) Handbook of Methods, Bulletin 2414, Chapter 19.

²² The treatment of the housing component in the CPI in Egypt is explained here based on an interview with Mr. Amin Fouad, the head of the Central Department for Statistics, CAPMAS, Egypt.

²³ The rent usually reflects the cost of unfurnished dwellings.

²⁴ Like furnished dwellings, for example, after excluding the equivalent price of furniture.

²⁵ The cost of buying a house is considered a capital expenditure (investment) which is not accounted for in the CPI basket. However, an equivalent of the shelter service, in addition to other services usually provided by landlords, and a depreciation

prices are freely determined according to supply and demand forces. Add to this a significant part of the market that is made up of informal housing (slums),²⁶ which is still ignored. In spite of this reality, no regular housing survey has ever been performed in Egypt – except once to update the housing index to account for the cost of new houses. In any case, the shelter component of Egypt’s CPI index covers only rent occupied houses. The index remains fixed to reflect the nature of rent control in Egypt. This problem might be less serious if there were no rent controls. Rent could then serve as proxy to the cost of other types of shelter.

The results obtained from the 1990/91 Income, Expenditure and Consumption Survey (IECS) carried out by CAPMAS, on a sample of 15,000 households, show that owner occupation dominates Egypt’s formal housing market²⁷ -- which makes the problem worse. Rent controlled and subsidized housing are not representative of the Egyptian market. The shelter component of housing in the CPI is therefore a source of downward bias to the index.

The housing index should reflect the magnitude of price changes in the housing market, especially after implementing new rent laws. The Egyptian economy will witness a revolution in the housing market. Leased dwellings will be offered at market prices. The prices will fluctuate based on demand and supply forces. This free housing market will coexist with the previous rent controlled dwellings whose rents will also increase. Producing a CPI without the housing component would remove the deceiving downward bias of the fixed housing index. This of course could never replace simply finding a solution to the housing problem.

A separate survey for housing is not necessary. In Japan, for example, it is part of the retail price survey. Part of the problem may be resolved by using the housing index produced by the real-estate market of the National Bank of Egypt as an indicator for the cost of owning houses (which will in turn help impute the rent equivalent for owner-occupied houses).²⁸ For rent controlled housing and furnished dwellings, normal survey methods could serve to develop a price movement index. Estimates should be developed to account for informal communities. On a wider scope, the 1996 Census could serve to calculate the exact housing market structure. A sample of houses could then be regularly priced (twice a year) to indicate the trends and relative

component are included in the CPI. The shelter service equivalent and depreciation are expected to increase if capital expenditure on houses increases.

²⁶ 40 percent of Egypt’s urban population lives in informal communities estimated at 1.9 mln housing units (Cardiff 1995, p. 6).

²⁷ Owner-occupied houses represent 67.27 percent of the market; rent controlled houses, 19.7 percent; furnished dwellings, 5.13 percent; and subsidized houses, 7.9 percent (Cardiff, 1995, p. 12, Table 2).

magnitude of changes in the costs of the shelter. The housing component accounts for almost 10 percent of the weight of the CPI basket. The high cost of housing surveys could be justified simply by the importance of housing.

Table 3: Treatment of the Housing Component of the CPI

Country	Housing Survey	Method of Pricing Housing
Chile	N.A.	- Basically, housing items are included in the household survey and treated as other basket items.
Egypt	No	- A fixed index of 100 is assigned to the rent component of housing. - No account is made for furnished dwellings or owner-occupied housing - The fixed index is occasionally increased by two index points to account for cleanliness, whereas, water charges and maintenance components vary according to price changes.
Japan	Yes	- The House rents survey covers rents of privately owned houses and rooms, and publicly owned houses. - The rents and floor space of privately owned houses and rooms are collected monthly by enumerators, whereas the rents of publicly owned houses are collected monthly by local authorities.
Korea	Yes	- A sample of 4,500 households in the Family Income and Expenditure Survey (FIES) area are visited to collect data on rent. - Information on the criteria used in selecting these households are not available.
Mexico	N.A.	N.A.
United Kingdom	N.A.	- The housing component of the CPI is divided into three main components in addition to water charges, maintenance, insurance, among others. - The three main components are rent, mortgage interest payments (MIPs), depreciation, and council tax. - Rents are derived from the price survey - The MIPs are revised annually through the Financial Statistics, and the FES expenditure data on MIPs. - Depreciation rate is derived from National Accounts, FES data and monthly price surveys. - Council tax is calculated based on official tax schedules provided by Formal Authorities in addition to other FES data.
United States.	Yes	- A separate price survey is dedicated to collecting data on rents from about 40,000 landlords or tenants and 20,000 owner occupants by asking them about their housing units. Data on owner occupants expenses help in calculating the owners' equivalent rent.

*Periodic Collection of Prices*²⁹

Price collection is similar to a regular survey. Prices are collected on specified dates every month (or every quarter for some commodities). The outlets used in collecting prices are those selected

²⁸ This requires arrangements between the National Bank of Egypt and CAPMAS so that the bank can classify the index, and disaggregate houses used for living versus those for business.

²⁹ Prices refer to all basket items except for shelter (rent).

from the Outlets survey. The products (items) whose prices are collected should be clearly defined, so that enumerators collect the price of the same product every time. Defining the product includes defining the brand, size, and/or weight. The type of prices collected and the number of quotes per item must also be predefined.

Prices are generally collected every month. Exceptions are made for commodities whose prices are fixed over a certain period of time, such as school and university fees, or commodities whose prices change frequently during the month, such as fruits and vegetables. In this case, the nature of a commodity imposes the frequency of price collecting.

Prices are reported at the retail level. The price recorded must be that paid by the consumer including all taxes in the selling price. Discrepancies arise when countries individually decide which retail prices should be included. Some countries do not account for sale prices, special offers, or second hand articles and treat them as normal prices, while others exclude them. Some analysis is required during disaster and sales periods. Enumerators should be able to explain the reasons behind positive or negative price changes.

The number of quotes collected should follow clear criteria. Though no general rule exists, the number of quotations may depend on price fluctuations (nature of the item), weight (importance), or the type of retail selling (whether the item is supplied centrally, is subject to price control, or varies in price over geographic areas and shop types). The frequency of this price collecting is often the same as that of the index compilation. Some goods are exempt from this general practice. Food item prices (especially fresh food) tend to fluctuate more frequently than other items, such as tuition fees, water charges, and rent. As a result, obtaining a truly representative monthly average for food items requires continued surveillance of their price fluctuations. Cost savings are possible, without affecting the precision of the index, by collecting prices on school fees and rent less frequently.

A single average price is required per item in calculating the CPI. If more than one quote is collected for the item (which is usually the case), an average must be calculated. Different mathematical approaches could be applied (simple mathematical average, weighted averages by outlets or number of quotes).

All these issues must be considered and decided on before the enumerators can start their survey. These decisions should in turn apply to the entire CPI series. Different country decisions are highlighted in Table 4.

Table 4 shows that Egypt appears to be adopting a simple mathematical formula in calculating

price aggregates (averages). The average price per item in each governorate is the arithmetic mean of the three collected prices.³⁰ This in turn assumes equal weights for the three sources (public and private) without accounting for the share of each source in sales. The arithmetic mean would pose no problem if the sample of outlets selected already reflects the buying habits of the reference population. From the Outlets sampling methods, Chile succeeded in selecting a sample of outlets weighted in a way that represents the reference population purchasing habits (as a result of the SSP). Therefore, aggregating an item price by taking an arithmetic mean poses no problem. In the United Kingdom, weights assigned to different shops and regions make it possible to calculate an average price for the whole country that still reflects the reference population buying preferences.³¹ The same applies to the United States and Japan. It is therefore possible to calculate price aggregates using simple arithmetic means of the collected prices if the outlets sample used already reflects households buying habits.

In the Egyptian case, the mathematical average of prices that assumes equal weights for the three outlet sources used is in essence assuming one of two things. Either the households in this economy are indifferent and buy from any of the three sources, or households are divided into three equal groups with each buying from one source. It is also assuming that all shops experience the same relative price changes. Both assumptions are oversimplified. The result is that if one source experiences relatively higher price changes, it will proportionately be reflected on the index, regardless of whether the source is commonly used by households or not. The index will consequently be downward or upward biased.³² This bias can be removed either by selecting a

Processing Data

After gathering all the necessary information, the data processing stage begins. The methodology needed to calculate the CPI is determined by defining criteria for the selection of basket items and assigning weights to seasonal and non-seasonal items; circumscribing the standards for quality adjustment, replacement of obsolete products, and treatment of odd products; and setting the mathematical formulas needed to calculate the CPI figure.

³⁰ The national average price of the item is the weighted average of the average price in each governorate, weighted by population over all governorates.

³¹ For more details on shops weights see Appendix C.

³² For example, if the source experiencing this strong price movement is a private sector representative (a supermarket), and the supermarket is more commonly used by households in buying a specific good, and the mathematical mean gives this source the same weight as the other two sources, then the impact of this change will be moderated by the other two sources, resulting in a downward biased index. If the supermarket is less commonly used, the mathematical mean will relatively exaggerate the impact of this price change, leaving the index with an upward bias.

Selecting Basket Items and Assigning Weights for Seasonal and Non-Seasonal Items

The representative basket of goods and services priced by the CPI is fixed over a certain period of time. It denotes a set of goods and services with specified and unchanging quantitative proportions³³ over this period, which is the basket reference period. In the selected countries, the

Table 4: Cross-country Comparison of Price Treatments

Country	Retail Price Definition ³⁴	Survey Dates	Price Aggregates (PA)
Chile	N/A	<ul style="list-style-type: none"> - Fresh food prices are enumerated three times weekly, - Clothing, equipment and other goods and services are enumerated monthly, - School fees are enumerated quarterly. 	- The PA is the arithmetic mean of the collected prices.
Egypt	Standard definition	<ul style="list-style-type: none"> _ In general, prices are collected monthly. - For some products like transportation and other services, prices are collected quarterly. - Others, like water and electricity, prices are centrally collected once a year. 	- The PA is the arithmetic mean of the three collected prices on the city/ governorate level.
Japan	<i>Excludes</i> low prices due to bargain, clearance, prices of second-hand articles, auctioned goods and those sold on installments; and prices of odd items, incomplete sets, or goods sold in combination.	<ul style="list-style-type: none"> - Fresh food is enumerated three times a month. - Equipment and other goods and services are enumerated monthly. - School fees are enumerated semi-annually. 	N/A
Korea	<i>Excludes</i> prices of second-hand articles and goods that are sold on an installment basis.	<ul style="list-style-type: none"> - In general, prices are collected three times a month. - Rents and cinema admission fees which are enumerated monthly, - School fees are enumerated quarterly. 	N/A
Mexico	N/A	- Most prices are collected fortnightly.	N/A
United Kingdom	<i>Includes</i> seasonal sales prices and stock clearing sales; but <i>excludes</i> prices in closing down sales, special purchases or end of range goods, temporary extra free weights (until they become permanent pack sizes), and free gifts (regarded as extras which the consumer may not want).	- Prices of most items are collected monthly.	N/A

³³ OECD, 1994.

³⁴ The standard Retail Price Definition generally excludes quantity discounts, sales discounts, and price fluctuation during disasters and similar conditions, unless otherwise indicated.

Country	Retail Price Definition ³⁴	Survey Dates	Price Aggregates (PA)
United States.	<i>Includes:</i> Quantity discounts reported for the first multiple unit price ³⁵ , and bonus items included in the purchase of a certain item (regarded as additional satisfaction to the consumer).	- Commodities and services other than shelter are re-priced monthly or bimonthly. - Rental units are re-priced every six months. (Moulton, 1996. P.163.)	- PA is a weighted average (where the weights are quoted and reflect the number of quotes useable for average price estimation).

basket components are basically classified into eight major clusters, according the 1968 United Nations System of National Accounts.³⁶ These main clusters are divided into major groups, subgroups and single items.

The CPI basket of goods and services should be representative of the average consumption of a certain reference population. It is therefore derived mainly from the household survey that reveals the expenditure patterns of this population. Other complementary sources might also be used, such as National Accounts and Food Surveys.

Over time this fixed basket may become less representative of the target consumer's expenditure pattern, due to taste and fashion changes and to consumer reaction to changing prices. This may result in consumers changing their spending habits -- buying relatively more though less expensive products. In this case, the basket would require an update.

The frequency of updating the CPI basket is the same as that of household surveys. If the household survey is continuous, the basket is updated once every year. Otherwise, whenever a new household survey is conducted, its results will be used to construct a new consumption basket. One exception is the United States, which conducts the CES continuously but does not use it to periodically revise the basket items and weights. Instead, it revises the basket almost every 10 years.

In a dynamic economy, if the basket remains fixed for a long time, the CPI will partially lose its role as a Cost of Living (COL) indicator, and end up only measuring the price changes of a hypothetical consumption basket. When the relative price of a certain good rises in comparison to another, consumers tend to choose the cheaper. As a measure of inflation, the CPI may tend to

³⁵ For example, if a 12-ounce can of corn being priced can be purchased at 25 cents for a single can, three cans for 69 cents or five cans for \$1, the price used in the CPI will be the per-ounce price of the three cans.

³⁶ This classification includes (1) Food, beverage and tobacco; (2) Clothing and footwear; (3) Housing and energy; (4) Furniture, equipment and maintenance; (5) Health care; (6) Transportation and communication; (7) Education and recreation; and (8) Miscellaneous goods and services. The only difference is that sometimes one of these clusters may be split into two groups (such as the first cluster that could be split into food and beverage, and tobacco) or two groups may join together to form one cluster.

over-estimate the inflation rate, since it does not consider the substitution shift in consumers expenditures. As a result, the CPI will lose its function as an inflation indicator.

But how long is *long*? This varies from country to country according to their market dynamics. All or some items change when updating the basket, generating a break in the CPI time series because it prices different baskets -- an old and a new. A common time period between two CPI series with different baskets can serve as a link between the two periods (chaining).³⁷ Updating does not negate the CPI concept of pricing a fixed basket -- a chain links the original and updated basket series together.

General and country specific criteria are used to select CPI basket items. The basket's generic items are selected based on their relative importance in household unit consumption and expenditure.³⁸ All expenditure items must be represented in the basket. This is done through a selected group of goods and services whose prices should reflect or represent a larger group of goods and services. The choices usually meet the following general criteria:³⁹

- they are regularly consumed by households;
- the change in their prices is typical of that of a family of similar items; and
- their prices are easily observable.

When assigning weights to selected items, they should reflect their relative importance in household consumption. Less important items are excluded and their weights are distributed among other substitute items (within the same subgroup). Item weights in the fixed-basket remain unchanged over at least one year for non-seasonal items. For seasonal items, the subgroup weights are fixed, but item weights may change from month to month. Seasonal items are dominant mainly in the fresh food group. Each country handles the problem of seasonality in its own way. Table 5 compares the criteria used by the countries of comparison in selecting and updating basket items. The most widely used seasonal adjustment method is the moving averages technique, such as that used by Chile, Mexico, the United States, and occasionally Japan. This technique is applied to the whole CPI series or to the set of goods that exhibit seasonal variations. Some countries, including the United Kingdom, and Egypt, either drop or substitute seasonal goods in off-season with similar products. Japan, with its monthly schedule of seasonal item weights, overcame this substitutability problem. Direct substitution of seasonal items is not

³⁷ Chain indices are explained in Appendix B.

³⁸ The relative importance of the items are derived from the households survey.

necessary. Overlapping substitute items in any month may be represented in the basket depending on their monthly importance.⁴⁰

Egypt's unique approach is related to household spending behavior. The use of average price relatives of the entire seasonal items subgroup is based on the assumption that low and middle income groups, which include the majority of households, have a given budget, and are indifferent to the various types of vegetables, for example, in the market. It is important that purchases fall within a given budget. Since it is difficult to assign specific weights to each type of vegetable, the enumerator collects prices for all available vegetables, excluding those with seasonal peak prices,

Table 5: Comparing Criteria of Selecting Basket Items

Country	Criteria for Selecting Basket Items	Seasonality Treatment
Chile	<ul style="list-style-type: none"> - Products are selected if their relative importance to total household expenses is above a certain threshold (0.0325 percent of total expenses) . - Exceptions include selecting products which do not meet this criterion if they are consumed by a large proportion of the population, and exclude those which meet the criterion but are consumed by a small portion of the population. 	<ul style="list-style-type: none"> - Seasonality is corrected using the method of the asymmetric mobile average with a period of twelve months. - The treatment is applied to 23 of 368 products included in the consumption basket that exhibit significant seasonal variations, mostly food products.
Egypt	Egypt follows the general criteria stated above. In addition, levels of domestic production and imports are taken into consideration in the selection process.	<ul style="list-style-type: none"> - Fixed weights are assigned to each subgroup of seasonal items through the year. The mean of the price relatives of all available items in this subgroup is obtained, and is used for pricing that subgroup. - Seasonal peak prices are excluded from compilation (i.e. prices at the beginning and end of the season) to reduce the impact of seasonality.
Japan	- Applies the general criteria for selection	<ul style="list-style-type: none"> - Applies a "monthly weights" approach. Seasonal items are grouped under three subgroups, fresh fish and shellfish, fresh vegetables, and fresh fruits. The subgroup's weights are fixed throughout the year, whereas, item weights differ from one month to another, starting by zero during its off-season, and varying according to its availability. - The base prices of these seasonal items are calculated as weighted arithmetic means using monthly weights - As the total of each item weights do not coincide with the subgroup weight, item weights are adjusted proportionately so as to sum up to the constant total of subgroup weight.
Korea	- Applies the general criteria for selection	<ul style="list-style-type: none"> - Ignores the seasonality problem. - Weights are fixed all through the year. - During the off-seasons, the last available prices are used.

³⁹ OECD, 1994

⁴⁰ Appendix E presents the monthly weights used in Japan for the above three mentioned groups.

Country	Criteria for Selecting Basket Items	Seasonality Treatment
Mexico	- N/A.	- The method combines weights and base prices with a moving average of the last twelve months.
United Kingdom	- Applies the general criteria for selection	- Section/subgroup weights are fixed, whereas seasonal items weights vary within the section. - When an item is not available in some months, it is replaced by another item with the same weight.
United States.	- Selection follows the general criteria. - On the item definition level the data collectors begin item sampling within each sample outlet. - To reflect changes in marketplace, new item and outlet samples are selected each year for 20 percent of the PSUs on a rotating basis. - Within each region, each item sample uses a systematic sampling procedure, in which each item has a probability of selection proportional to the urban CPI population expenditures for the item within its stratum/subgroup.	- The whole CPI series is adjusted using moving averages (X-11-ARIMA), as long as there is an economic rationale for the observed seasonality. - In some cases intervention analysis seasonal adjustment is used in combination to derive more accurate seasonal factors.

and obtains an arithmetic average of their price relatives. This average is multiplied by the weight of the vegetable subgroup to produce its index.⁴¹ By excluding seasonal peak prices and adopting this pricing approach, Egypt eliminates the effect of seasonality and the need for seasonal adjustment treatments on the CPI series. This approach allows the enumerator to use personal judgment to decide which prices are seasonally high, and which represent normal prices. Though errors do arise, the CPI series for the last 25 years has been free of any seasonal effects.⁴²

Quality Adjustment and Replacement of Obsolete Products

By definition, the CPI measures pure price changes in the components of a basket of goods and services over a defined period of time, by pricing the same items every time. If the enumerator collects the price of a different item, it will distort the accuracy of the CPI either by over or underestimating its value. But over a long period of time it is not realistic, in a dynamic market, to keep the same product in the market without undergoing some changes. It is then necessary to choose between maintaining a fixed or representative basket. The progressive change in the quality of a product or its complete disappearance makes it impossible to continue pricing the original product defined in the basket, since it no longer exists. If a product undergoes technological improvements, it is no longer the original product the CPI once priced. Some adjustments help account for quality changes in the priced product, neutralize the price difference attributable to this quality change, and thereby maintain the concept of a constant and

⁴¹ This approach was discussed in an interview with a CAPMAS official.

representative basket.

CPI methodology must include a quality adjustment technique. Whether or not a country should adopt quality adjustment measures depends on how the CPI constructor perceives the market. If the market is seen as dynamic, with products entering and exiting the market frequently, the need for quality adjustment measures will be recognized.

The frequency of quality adjustment measures accords with need, which depends on several factors:⁴³

- importance of quality change;
- size of the probable price difference due to this change;
- possibility of splitting the price difference into pure price and quality components; and
- possibility of simultaneously collecting the prices of the two items at least once.

If there is a replacement of an old product with a new one, the observer usually faces one of the following cases:

- either there is no major difference between the two products, and therefore no need to incur the cost of adjustment measures. Sometimes the difference is only in the pack size. In this case the price is adjusted to the new weight (directly comparable products);
- or the two products are quite similar with some difference in their composition;
- or the two products are significantly different, and a price could be obtained for the two products in the same period; or
- or the two products are significantly different, but it is not possible to obtain prices for the two products in the same period.

In the last three cases an adjustment is needed. In Egypt, the United Kingdom and Japan, the approach is quite simple. In the second case, either they add the cost of changes to the base price of the old product to achieve a base price for the new, or a correction factor is multiplied by the old base price. This correction factor is provided by consulting industry specialists. In the third case where they can obtain prices for the two products during a common period, they would assume that the price relatives of the two products are the same⁴⁴ (direct quality adjustment). In the last case, where they can not obtain prices for both products in one common period, they

⁴² This conclusion is drawn based on a paper prepared by Mohieldin and Ismail, ECES Working Paper Series, 1997.

⁴³ OECD, 1994.

⁴⁴ Having the base price and current price of the old product on one side, and the current price of the new product on the other side, one can calculate the base price of the new product.

would assume that the price relative of the new product is the same as the average price relatives of the other products belonging to the same generic item group (imputed value).⁴⁵ The United States follows almost the same procedures, but pays special attention to odd products.⁴⁶ In this order, no country, including Egypt, deviates from the basic approach, even if there are slight differences in application.

Special Treatment of Odd Products

Due to the unique nature of some products, they deserve special treatment. These measures are country-specific. It is not possible to generalize them and recommend their use by all countries, especially since they involve high costs. A market, such as the American, is relatively very large and dynamic when compared with the Egyptian market. Consequently the CPI basket includes products that are not priced in the Egyptian CPI basket. Examples of these products are cars, new vehicles and computers. In the United States they enter the consumption basket of the CPI. The car industry is characterized by frequent changes in car models which requires adjusting the price to account for structural and engineering changes that affect safety, environment, reliability and performance, and even to account for changes in the warranty coverage provided by auto manufacturers.

This special treatment extends to natural gas pricing in the United States. The CPI prices a fixed amount of energy consumption. The energy value of natural gas varies according to the quality of the gas supplied. The amount of gas needed to produce a constant amount of energy varies depending on the heating value of the gas. To ensure that a constant amount of energy is priced, the amount of gas consumed is adjusted each month based on the current heating value. Through time, a constant amount of energy is priced. Other items such as health insurance, automobile finance charges, and even bottle deposits receive special pricing treatment in calculating the CPI.

In the United Kingdom, potatoes receive special treatment, using what is called the "Potato Quality Ratios." This adjustment is needed because new potatoes change in quality. When they first become available each year, they are of superior quality to old potatoes. The quality differential declines during the year so that quality adjustment is needed for each month. Potatoes

⁴⁵ For example, a generic item such as detergent has more than one precisely defined good. If a new product is introduced while another in this item group disappeared, the price relative of the new item would equal the average price relatives of the rest of the goods under detergents.

⁴⁶ No information is available on Chile, Korea, and Mexico.

receive special treatment because of their relative importance in British household consumption.

Special treatment cases show how precise these countries calculate their CPI figure. General rules apply to all countries, but country-specific features impose the need for special treatment of certain products. The more a country recognizes and analyses its odd features, the more representative its CPI figure will be.

Mathematical Formula

The mathematical formula used to calculate the index is the most straight forward part of the methodology. All countries in the study, including Egypt, use the Laspeyres formula.⁴⁷ It is a weighted, aggregative fixed-base index. In most cases, an index is calculated for each city in the country. The general index for the whole country is usually calculated by taking an average of city indices weighted by population or by expenditure.⁴⁸

V. CPI Partial Derivatives (Presenting the Index)

From the given set of data required for constructing the CPI come many other derivative indices. This section outlines some CPI partial derivatives used by countries in this study (without reference to specific countries). The possibility of calculating them from current Egyptian surveys will be also examined.

Egypt currently publishes a general index for Cairo and Alexandria, averages for Suez Canal cities, Lower Egypt urban cities, Upper Egypt urban cities, and border cities. A weighted average by population of these indices is calculated to represent Egypt's urban population. A rural index is also compiled for both Upper and Lower rural areas. Using the same geographic distribution for the urban population, indices of the major clusters, groups, subgroups, and selected group of generic products are produced.⁴⁹

Better use could be made of the available data. Indices of household characteristics could be

⁴⁷ The Laspeyres index: $IG_t = 100 * \frac{\sum_i q_{oi} P_{ti}}{\sum_i q_{oi} P_{oi}}$ where the weights are represented by base period quantities (q_{oi}), and

(p_{oi}) represent base period prices, and (p_{ti}) represent current prices. Sometimes relative expenditure on product i in the base period is used instead of quantity q_{oi} , and price relatives p_{ti} / p_{oi} substitute absolute prices. Strict Laspeyres index (by definition) uses the expenditure period (reference period for weights) the same as the base period of prices. Some countries do not strictly adhere to this condition, especially if the basket items and weights are frequently updated (as in the United Kingdom). In practice, this does not make much of a difference.

⁴⁸ Expenditure weight is obtained as a product of mean annual expenditure per consumer unit and the number of consumer units.

⁴⁹ A list of these clusters, groups, subgroups and items is available in Appendix D.

compiled using expenditure data from the household survey (IECS), which include index by occupation of household head, by income groups, by age of household head. Occupation, age and income information on household heads are already compiled in the IECS. Another useful index classification is by item characteristics. Two separate indices could be produced, an index for goods items and another for services items. Indices could be calculated by classifying commodity groups according to living expenditure elasticity. Japan uses this approach by classifying items into two categories: one, with items whose income elasticities are less than one, and therefore considered basic expenditures; and two, with items whose income elasticities are greater or equal to one, and considered selective expenditures. Mexico's attempt to compile the index by sector of origin is another example of index classification by item characteristics.⁵⁰

Another set of partial indices is easy to prepare and requires no additional information: an index excluding the housing component, since housing is usually considered a problematic area; an index excluding the food component, since food includes most of seasonal items; and an index excluding both housing and food. These examples of derivative indices require some study and analysis on the constructor's side.

VI. Recommendations and Suggestions for Egypt

The paper surveyed the stages and processes involved in producing the CPI in countries of comparison, starting from data collection to data processing to presentation. Egypt seems to satisfy the basic criteria for producing the figure. But some measures are still needed to improve the figure's reliability and accuracy. These measures vary in importance and value added. The CPI survey framework needs the following major additions:

- * **The outlets survey:** reliable sampling techniques are needed to select a sample of representative outlets to be used as price sources. Country experiences emphasize the need for such a survey. Two approaches are possible in designing it:
 - either to rely on household interviews to survey household buying preferences (American and Chilean style); or
 - to survey the different outlets by their geographic distribution, degree of specialization, and outlet turnover (British and Japanese style).

⁵⁰ The origins include: agriculture, livestock, forestry and fishery; food, beverages, and tobacco; textiles and clothing; wood products; paper, paper products, printing and publishing; chemical petroleum, rubber and plastic products; non-metallic mineral products; metal products, machinery and equipment; other manufacturing industries, electricity; commerce, restaurants and hotels; transportation and communications; finance, insurance and real estate services; community, social and personal services.

The 1996 Census of retail shops would serve in both cases as a pool for selecting this sample.

* **The housing survey:** a proper way of pricing housing, which accounts for 10 percent of the basket weight, is necessary because of its strong impact on the index. This entails:

- abolishing the fixed index concept used for housing;
- incorporating all types of housing in the housing price, including rents, ownership equivalent, unfurnished equivalent of furnished dwellings, and informal communities; and
- pricing a representative sample of houses, based on the results of the 1996 Census of houses.

Other issues should also be addressed:

* **The comprehensiveness of the CPI basket:** by definition, the basket should be representative of all household expenditures except for investment, savings and transfers. On consulting a CAPMAS official, it turned out that the transportation subgroup does not include the maintenance cost of private cars, and the housing component includes only ordinary rented houses. The basket needs to be revised to ensure that it covers all expenditure items.

* **The representativeness of the basket:** regular revisions are required to keep the basket a representative, which requires an ongoing household survey. If such revisions are introduced, indices should be connected to link the two periods using different baskets. A first step in this direction is the CAMPAS decision to carry out the household survey every five years, which will allow for more frequent updates of the CPI basket. Less costly improvements include:

* **Production of partial indices:** partial indices are useful in serving as additional indicators for the community:

- an index excluding housing will help shield the bias resulting from mispricing the housing item;
- the Japanese example of producing indices classified by income levels and by commodity groups (goods and services, tradables and non-tradables) are useful. They will enable both decision makers and entrepreneurs to make sound decisions on the rationing of subsidies and the targeting of specific income groups.

The data for these indices are already available from the IECS. Different baskets relevant to the target population must be derived from the survey, while prices are already available (the same used for producing the general index), which entails no or minimum costs of producing these partial indices.

Each country can invent additional measures to improve the representation and accuracy of its index, according to its specific conditions. Egypt is also expected to develop country-specific measures tailored to its market structure and consumption behavior. It is not possible to simply copy other countries' experiences because that would only stand out as advanced and precise. For example, the American approach to conducting a continuous outlets survey (CPOPS) may be relevant to its own market, but too complicated for other countries. The size and structure of the American market justify the cost and effort spent in conducting this survey, but it may not be justified elsewhere. The same applies to the detailed treatment of fish in Japan.⁵¹ The idea of assigning changing weights to seasonal items (as fish, fruits and vegetables) is appealing. Because fish is an important item in the Japanese consumption basket, paying special attention to it is justified. This does not mean that fish should receive the same treatment in all other countries. In essence, the Japanese Seasonal Adjustment technique is very useful. Countries can tailor it to their own needs. The same applies to the British approach to potatoes. The relative importance of items and the market structure are what impose the need for country-specific approaches in treating the CPI. But it is possible to learn from such experiences and apply them where they are relevant.

⁵¹ Refer to Appendix E, showing the seasonal weights of fish, fruits and vegetables.

Appendix A

Table A.1: CPI Data (using the following sources)

	CAPMAS	CAPMAS	CB	IFS	W T	US Emb	EIU
Base Yr.	1986/87 =100	1986/87 =100	1986/87 =100	1990 =100	1987 =100	% Change	1990 =100
Concept	Fiscal Average	Annual Average	Fiscal Average	Annual Average	Annual Average	Fiscal Average	Annual Average
	CAPMAS	CAPMAS	CB	IFS	W T	US Emb	EIU
1980	39.78	37.6	n/a	21.00	34.96	n/a	n/a
1981	44.25	41.4	n/a	23.20	38.57	n/a	n/a
1982	50.98	47.6	n/a	26.60	44.29	n/a	n/a
1983	60.15	55.2	60.2	30.90	51.41	n/a	30.85
1984	68.80	64.6	68.8	36.10	60.17	14	36.11
1985	79.88	72.5	79.9	40.50	67.45	16	40.49
1986	100.00	89.8	100	50.20	83.55	25	50.16
1987	118.60	107.4	118.6	60.00	100.00	19	60.12
1988	138.36	126.4	138.4	70.60	117.66	17	70.65
1989	167.72	153.3	167.7	85.60	142.68	21.2	85.63
1990	192.43	179.0	192.4	100.00	166.59	14.7	100.00
1991	232.98	214.3	233	119.70	199.49	21.1	119.94
1992	258.86	243.5	258.9	136.10	226.69	11.1	136.03
1993	282.28	273.0	282.3	152.50	254.10	9.1	152.53
1994	308.60	295.2	308.6	165	274.68	n/a	164.98

CAPMAS Monthly Bulletin for CPI

CB Central Bank Economic Magazine (Annual Bulletin)

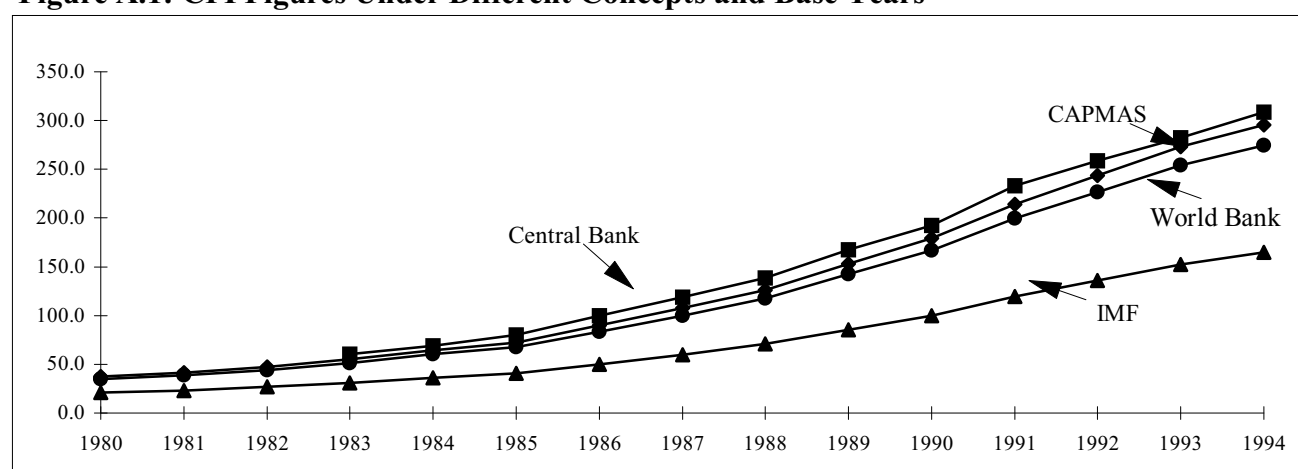
IFS International Financial Statistics-IMF Statistical Yearbook

WT World Tables 1995 - World Bank

US Emb United States Embassy in Egypt - Bi-annual Report- Foreign Economic Trends

EIU Economic Intelligence Unit - Quarterly Report - Egypt

Figure A.1: CPI Figures Under Different Concepts and Base Years



Note: sources are listed on graph.

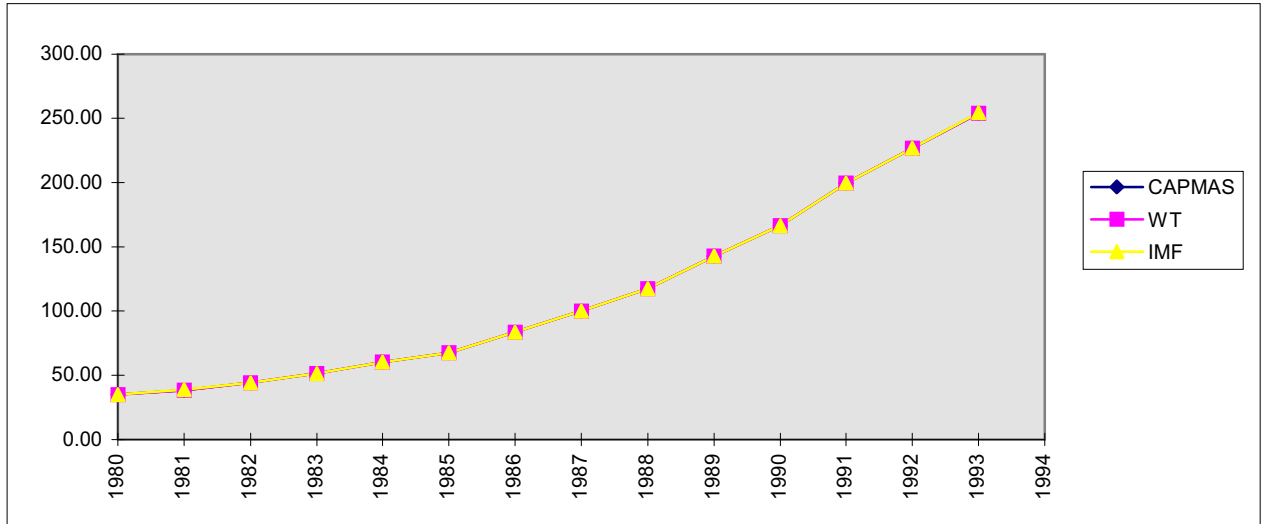
Table A.2: CPI Figures Expressed on the Same Basis

Base Year 1987=100					Base Year 1986/87 =100				
Annual Average					Fiscal Average			% Change	
Period	CAPMAS	WT	IMF	E I U	Period	CAPMAS	C B	CAPMAS	US Emb
1980	34.96	34.96	35.00	n/a	80/81	39.78	n/a	n/a	n/a
1981	38.57	38.57	38.67	n/a	81/82	44.25	n/a	11.23	n/a
1982	44.29	44.29	44.33	n/a	82/83	50.98	n/a	15.20	n/a
1983	51.41	51.41	51.50	51.31	83/84	60.15	60.20	18.00	n/a
1984	60.17	60.17	60.17	60.07	84/85	68.80	68.80	14.38	14
1985	67.45	67.45	67.50	67.34	85/86	79.88	79.90	16.10	16
1986	83.55	83.55	83.67	83.43	86/87	100.00	100.00	25.20	25
1987	100.00	100.00	100.00	100.00	87/88	118.60	118.60	18.60	19
1988	117.66	117.66	117.67	117.51	88/89	138.36	138.40	16.66	17
1989	142.68	142.68	142.67	142.42	89/90	167.72	167.70	21.22	21.2
1990	166.59	166.59	166.67	166.33	90/91	192.43	192.40	14.74	14.7
1991	199.50	199.49	199.50	199.49	91/92	232.98	233.00	21.07	21.1
1992	226.66	226.69	226.83	226.26	92/93	258.86	258.90	11.11	11.1
1993	254.10	254.10	254.17	253.69	93/94	282.28	n/a	9.05	9.1
1994	n/a	n/a	n/a	274.40	n/a	n/a	n/a	n/a	n/a

Note: EIU is calculated as the arithmetic mean of the quarterly figures published in their report and indexed in 1987 instead of 1990

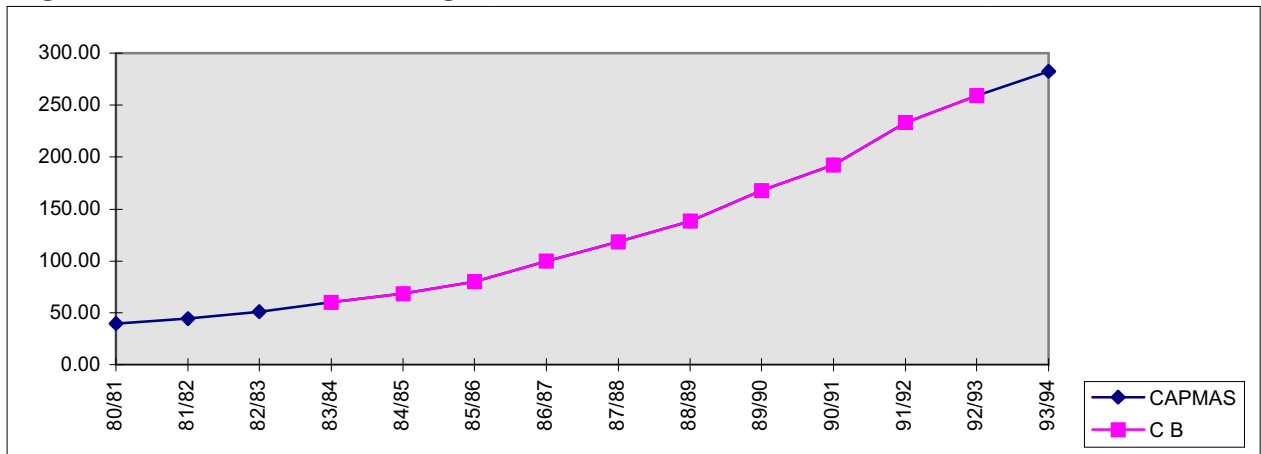
Note: sources are listed in table.

Figure A.2: CPI as Annual Average (with 1987 Prices as the Base Year)



Note: sources are listed on graph.

Figure A.3: CPI as Fiscal Average (with 1986/87 Prices as the Base Year)



Note: sources are listed on graph.

Appendix B: Chaining Indices

The Consumer Price Index (CPI), as any other price index, measures changes in the prices of a certain basket of goods and services in a current period by comparing them to a defined base period. The fixed-base Laspeyres index, which is usually used to calculate CPI, generally assumes that nothing important has changed between the current period and the base period of the index, except prices. In a dynamic market, with rapid technological innovations, and changing consumer preferences, this assumption is not realistic.

Chain indexing provides a solution to this problem by constantly shifting the base period, so that the index for a given period uses the previous period as its base. This procedure makes it relatively easy to change the items and outlets each year, although they must remain constant as much as possible within each year. The resulting indices are then linked together in a multiplicative form to link the current period with the very first base year (original base period of the index). In calculating the chain index, it is necessary to calculate, in every period, the index of the current period relative to the previous period, which is called the ring index. The chain index is compiled by linking these ring indexes. A series of price indices is thus produced linking each two consecutive periods together, as well as relating each period to the original base period, as follows:

If the price index for period $t=1$ is

$$I_{01} = \frac{\sum p_1 q_0}{\sum p_0 q_0}$$

and for period $t=2$, the ring index is

$$I_{12} = \frac{\sum p_2 q_1}{\sum p_1 q_1}$$

and for period $t=3$, the ring index is

$$I_{23} = \frac{\sum p_3 q_2}{\sum p_2 q_2}$$

where p_0 q_0 are the prices and quantities of the base period respectively, p_1 are the current prices,

and using q_0 ⁵² as weights, then the index of period $t=3$ compared to base period 0 is

$$I_{03} = I_{01} \times I_{12} \times I_{23}.$$

“The disadvantage with the chain indices is that any consistent biases present in the index formula will lead to cumulative error. ...In addition, there is a tendency in the chain index to magnify successions of sharp price changes, which poses a serious problem.”⁵³ This is why the chain index alone is not enough.

Chaining is only applied to the “all items” index. Item and section indices are not chained, because so many items may change each year. The chain index allows comparing the indices of any two months together. If both months lie after the index base period, they can be calculated as follows:⁵⁴ assume May 1988 Index = 106.2, and August 1994 Index = 144.7, given a base period of 1987, the change between these months is the percentage change between the values of these two indices, or 100 percent $\times (144.7/106.2 - 1) = 36.3$ percent.

For the months before the base year (for example before 1987), it is possible to use the previous series which was based (in the case of the United Kingdom) on January 1974. That is, if the indices of July 1986 and January 1987 based on January 1974 are 384.7 and 394.5 respectively, and July 1987 is 101.8, then the change from July 1986 to July 1987 is 100 percent $\times (101.8 / 100 \times 394.5 / 384.7 - 1) = 4.4$ percent, or:

$$I_{July86/July87} = 100\% \times \left(\frac{I_{July87/Jan87}}{I_{Jan87/Jan87}} \times \frac{I_{Jan87/Jan74}}{I_{July86/Jan74}} - 1 \right)$$

⁵² An alternative formula for the index uses the expenditure values p_0q_0 as weights instead of the direct quantities. The ring index

$$I^{t-1,t} = \frac{\sum_{t=1}^n \frac{P_t^t}{P_t^{t-1}} w_t^{t-1}}{\sum_{t=1}^n w_t^{t-1}} * 100$$

in this case is calculated as:

where: I is ring index, p is the price, w is the weight, I is the items used for index calculation, n is the number of items, t is the comparison time (current period), and $t-1$ is the previous period.

⁵³ Wallace and Cullison. (1981) pp. 22-23.

⁵⁴ These mathematical formulas are used by the Office of National Statistics, United Kingdom in calculating the RPI.

For the months belonging to the previous series, such as July 1968, a chain links the series

based on 1962 (which prevailed before 1974) to that based on 1974 and on 1987 in the same manner where:

$$I_{July68/July87} = 100\% \times \left(\frac{I_{July87/Jan87}}{I_{Jan87/Jan87}} \times \frac{I_{Jan87/Jan74}}{I_{Jan74/Jan74}} \times \frac{I_{Jan74/Jan62}}{I_{July68/Jan62}} - 1 \right)$$

and so on.

Appendix C: Stratum and Shop Weights

The assigning of stratum and shop weights serves to determine the number of quotes which should be collected per item and the source for obtaining these quotes. In this way, the sample of quotes collected to price each item is representative of the true price. Stratum and shop weights are independent from section and item weights (weights of groups, subgroups and individual items in the basket). Item weights rely on households expenditure patterns. While stratum and shop weights depend on the nature of the item, and its retail pattern, each individual item is allocated to a stratum. In the United Kingdom, there are five types of stratum: (a) region and shop type, (b) region only, (c) shop type only, (d) no stratification, and (e) feed-on (only for centrally collected items).

Ideally, each item should be stratified by region and shop (the “a” strata). But in case the information available is inconclusive or not enough, the item is assigned to one of the other strata. In the United Kingdom, data on shop type is supplied through the CSO Retailing Inquiry, whereas the regional weights are obtained from the FES average household regional expenditure. The stratum weights equal 100 for each item.

Shop weights are assigned based on stratum weights. Central shop weights reflect the market share of the chain of shops. Central shops are of two types, supermarkets and non-supermarkets. Information on shop weights are generally an estimate of the true state of affairs because accurate sources on market shares are usually out-of-date. One way of obtaining up-to-date data on market shares is to use the household survey for collecting the outlet name where each item is purchased. This was adopted in the United Kingdom in April 1995. Since the number of quotes and sources of prices already reflect the market shares of price sources, it is safe to calculate the average price per item as the arithmetic mean of the collected quotes.

Appendix D: CPI and Its Partial Indices in Egypt

The Monthly Bulletin of Consumer Prices Index produced by CAPMAS publishes a price index for the following item groups and subgroups besides the general number.

Food, Beverage and Tobacco			
Bread & Cereals	Meat & Poultry	Fish	Milk & Cheese
Oil & Fats	Fruits	Vegetables	Pulses
Sugar & Sweets	Other Food Stuff	Beverage	Tobacco
Clothing and Footwear			
Clothing	Fabrics	Footwear	Clothing manufacture
Rent, Power and Fuel			
Rent & Water	Energy & Fuel		
Furniture and Equipment			
Furniture	Domestic services	Maintenance Products	
Medical Care			
Medical products	Physician & Hospitals		
Transport and Communication			
Private Transportation		Purchased Transportation	
Communication			
Recreation and Education			
Equipment	Education	Entertainment & Cultural Services	
Miscellaneous			
Personal Care	Restaurants & Hotels		
The indices are published for the following urban areas			
Cairo	Alexandria	Suez Canal Cities	
Upper Egypt	Lower Egypt	Border Cities	

The weighted average (by population) of these indices gives the average of the urban population, which is calculated in addition to the rural CPI which is published with the same disaggregation level for the Lower and Upper Egypt rural areas average.

In addition, indices of the following selected items are published for the same geographic areas:

Rice	Wheat flour	Macaroni	Fresh Meat
Poultry	Milk	Cheese	Eggs
Edible Oil	Butter	Citrus Fruits	Bananas
Tomatoes	Potatoes	Onion	Beans
Lentils	Sugar	Halawa	Tea
Coffee	Soft Drinks	Cigarettes	Electricity
Butane Gas	Refrigerators	Gasoline	Televisions

The Bulletin also publishes the weights of each of these groups and subgroups by the same geographic areas.

Appendix E**Table E.1: Example of a Monthly Weights Schedule of Seasonal Items for Japan's CPI**

Items	Jan	Feb.	Mar	Apr.	May	Jun.	Jul.	Aug	Spt.	Oct.	Nov	Dec
Fresh fish & Shell fish	209	209	209	209	209	209	209	209	209	209	209	209
Tuna Fish	35	36	36	35	34	34	35	34	31	30	32	35
Norac mackerel	9	11	13	14	16	18	18	16	13	11	11	6
Sardines	7	8	6	6	6	6	5	4	4	4	4	3
Bqalto	-	-	9	16	18	15	14	11	8	6	-	-
Flounder	14	16	16	16	15	13	11	10	10	10	11	8
Salmon	6	7	8	9	10	12	13	13	15	15	16	8
Mackerel	5	5	3	3	3	3	2	2	2	4	4	2
Saury	5	5	4	4	4	4	4	9	23	15	9	3
Sea Bream	10	8	10	10	10	8	8	10	9	10	10	13
Cod	6	4	2	1	1	1	1	1	1	2	3	2
Yellow tail	25	22	20	18	14	12	12	16	17	21	24	33
Cuttlefish	23	24	22	22	23	28	30	27	26	24	25	19
Octopus	7	8	8	8	8	8	9	10	7	7	7	12
Prawns	31	31	32	31	32	33	34	36	32	32	31	43
Short-necked class	7	8	10	11	10	9	8	7	7	7	7	4
Oysters	13	11	5	-	-	-	-	-	-	5	10	10
Scallops	6	6	5	6	5	5	5	5	5	5	5	7
Fruits	137	137	137	137	137	137	137	137	137	137	137	137
Apples (star king)	2	2	1	-	-	-	-	-	-	19	2	1
Apples (fuji)	25	30	36	30	20	14	-	-	-	-	36	39
Mandarin oranges	62	40	17	-	-	-	-	-	7	46	62	82
Summer oranges	-	1	5	15	15	6	-	-	-	-	-	-
Lemons	2	2	2	3	2	3	2	2	2	2	2	2
Grapefruits	1	2	4	6	7	7	3	1	1	1	1	1

Oranges	2	5	8	9	7	8	6	3	2	1	1	1
Pears	-	-	-	-	-	-	-	28	65	21	-	-
Grapes (delaware)	-	-	-	-	-	5	10	24	15	1	-	-
Grapes (kyoho)	-	-	-	-	-	-	2	12	29	16	1	-
Persimmons	-	-	-	-	-	-	-	-	-	18	24	6
Peaches	-	-	-	-	-	-	24	18	4	-	-	-
Watermelon	-	-	-	-	10	25	39	26	-	-	-	-
Melons (prince melomns)-	-	-	-	6	17	17	8	-	-	-	-	-
Melons (Andes melons)	-	-	-	-	15	36	32	16	-	-	-	-
Strawberries	35	43	48	50	28	-	-	-	-	-	-	-
Bananas	7	9	12	15	13	13	9	6	9	10	7	5
Kiwi fruits	2	4	5	4	3	3	2	2	3	3	2	2

Source: National Statistical Office, Japan.

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