



Measuring the Elasticity of Demand for the Consumer Basket Components in Jordan¹

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Abstract

This study aims at measuring the income elasticity of demand based on a survey of the household income and expenditure in the Jordanian economy for the period 2017-2018. And in order to measure the income elasticity of demand, the researchers used the simple linear model. However, the researchers anticipated that the increase in the household income would lead to an increase in commodities consumption: in return for the possibility of reducing the consumption, by increasing the price of the commodity. The study reached a set of results, by measuring the income elasticity of demand for 77 types of commodities and services: such as the convergence between the consumer response to the movement of each income and price among the commodities in the Jordanian economy and in other countries, where fresh fish is on the list of luxury commodities among fish and meat.

What explains this is the shortage of this commodity offered quantities in the Jordanian market and its high prices. Thus, the presence of very low-income elasticity of 'garlic' commodity at the level (0.092), which indicates that this commodity cannot be abandoned in case of low income.

Keywords:

income elasticity of demand, price elasticity of demand, consumer basket, household budget, available income, and elasticities factors.

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1. Introduction

It is well-known to anyone that the starting point in making any production decision or a new project, starts with the analysis of the demand, from the market to the market. Knowing that it is not enough to estimate absolute values of the demand for products since the consumer behavior is highly complex and ever-fluctuating, requires tools that measure its sensitivity such as elasticities of demand. Such transactions are capable of guiding the decisions of economic units at the level of the macroeconomic system or the micro-level (individuals, companies, or sectors). Let us imagine the difficulty of deciding in business firms, at the level of pricing policies, for example, without referring to the elasticity of demand coefficients.

On one hand, these tools enable us to estimate current and future sales as well. On the other hand, it is established for estimating the sales trend of each stage. Meanwhile, the evaluation of profit is confined to these measures at the level of proper economic policy.

Whereas, price, as a tool in increasing profit, cannot be a repelling factor in maximizing this profit when revenues begin to decline due to the recession in the market demand. To implement this study, researchers divide the research into two parts: First, the theoretical aspect which is about the concept of elasticity and its uses. The second part, the practical aspect, includes statistical and standard treatments of data from the surveys of the Statistics Department¹. However, the analysis and treatment will focus on the components of the consumer basket adopted in the Jordanian economy, which constitute the basis for calculating the price index.

On the theoretical aspect, this study is the first of its kind at the level of the Jordanian economy. And in accordance with the goals of the study, the expected results will be accepted in the decision-making process at the micro and macro levels.

While, on the practical aspect, the study is considered the cornerstone of directing companies' decisions towards determining the industrial content in the Jordanian economy, also, it constitutes a reference database in the production decisions and diversification in commodity production. As well as formulating pricing policies and building marketing strategies at the present time, taking into account the consequences of the current Covid -19 pandemic.

How can the response of demand in the Jordanian economy be measured concerning the movement of income which is allocated to spending? Additionally, as to price movements overtime of the price basket components that are adopted in the Jordanian economy. Therefore, this study aims to measure the price and income elasticity of demand based on the household's income and expenditure survey carried out by the Department of Statistics in 2017.

The researchers have reviewed and studied the relevant economic literature locally and internationally, whereas they have discovered that there is the

invisibility of the topic of consumer behavior analysis according to the economic theory. Thus, on the basis of calculating the coefficient of price elasticity of demand and income elasticity of demand, for the areas of the carried out research studies.

Therefore, this study will gain an intellectual shift in the local economic literature by providing a database on demand elasticities. And, in order to enrich the topic of the current study, especially the theoretical side, the researchers review some relevant recent economic studies.

For example, the study of Mazurova³ (2015), the study is based on a combination of assessing the price elasticity of demand for motors fuel and the optimization of fuel supply for regions. The method allows studying the linkage between demand and price in relation to motors fuel, taking into account the degree of competition, resources limitations, technology change in the field of transportation, and the conditions of future uncertainty. Whereas, the recent trend of long-term studies, as indicated by the researcher, is to determine the price elasticity of demand for energy carriers on the basis of processing the results of predictive calculations of energy development during a different price dynamic. The researcher emphasized that the elasticity of demand is determined in comparison with the efficiency of using different types of fuels. However, the study showed the change in the structure of demand and, accordingly, the volume of demand on the impact of the emergence of environmentally friendly transportation alternatives, which means a decline in the demand for liquid fuels extracted from crude oil.

While the study of Novoseliev (2016), aimed to measure food products group, from the components of the consumer basket, taking into consideration the market structure and using this evaluation in the pricing management, particularly in the event of determining the price and the discount rate. The researchers employed mathematical modeling to reach a precise relationship between revenue and price elasticity of demand through breakeven point analysis. Also, the model relied on the assumption that: Creating a sufficient elasticity coefficient to maintain the company a previous profit on the basis of the identity: (price after profit = price before profit).

According to Orlovtsova A. (2016), the study dealt with the possibility of applying the elasticity function in order to achieve the pricing policy optimization and as a result, increasing the revenues volume. The study reached to measure the elasticity of food products group such as butter, buttermilk, milk, and others. Moreover, the study determined the coefficient of price elasticity for these products, respectively, as follows: 12.89, 1.16, and 13.33.

As for Sahbgaryeva et al. (2017), their study aimed to measure the price elasticity of demand for services provided by dental clinics. The researchers employed the descriptive method through a sample survey of 2,346 beneficiaries of the medical services (Mokhtar, 2021).

The study concluded that the lowest elastic coefficient was among the patients who suffer from a toothache. The study also showed that the increase in the prices of medical services was accompanied by an increase in the elastic

coefficient. As well as it presented some numerical results on the basis of the duration, which were represented in the following: price elasticity of demand $EP = 0.31$ for the short-term period, price elasticity of demand in the long-term period was at the level of 0.68, with a change in the two periods at around 219%. One of the important results of the study is the existence of a proportional trend between cheaper medical services and the price elasticity of demand coefficient. Where cheaper medical services are distinguished by a low price elasticity coefficient. On the level of cosmetic medical services, the study showed a high elasticity of demand coefficient regardless of the duration length, which is determined at a level greater than 1 (elastic demand). The study emphasized on the necessity of adopting the calculation of arc elasticity against calculating point elasticity, driven by the accuracy in the results, where the value of the curve regression of the demand changes with the price change (Muhenda & Kule, 2022).

2. Theoretical framework

2.1. Elasticity concept, since inception

The price elasticity of demand as an economic concept is relatively recent, and the use of this concept roots extend back to the seventeenth century. However, this pioneering concept was first used in the field of natural sciences by the chemist and physicist Boyle (1626 - 1691) when he studied the properties of gases (Boyle-Mariotte Law). Later, over the passage of more than two centuries, and in the year 1885, the English economist Alfred Marshall⁴, was able to give an economic definition to elasticity on both the demand and supply (Mazurova, 2015).

This concept seems simple but great in its meaning, has now become a compass for directing the economic decisions at the micro and macro levels. On the demand side, it measures the consumer sensitivity through the movements of the demanded quantities along the price movements in the market, income movements (disposable income), and other commodities price movements, whenever the relationship between product groups is examined. On the supply side, the concept of price elasticity measures the response to a change in the supplied quantity along the price movements in the market.

a. Elasticities of demand to the balance

To be able to measure in this study, it requires stopping on the types of elasticities of demand along price movements and the other factors, and thus in order to show the practical meaning in the use of elasticity at the economic system level or the level of small economic units (companies and sectors). We will go through these types analytically as follows:

First, the price elasticity of demand, it is considered an important measurement in revealing the volume of product discharges in the market. So if the price raise contributes to the increase in the revenues of the business

companies, then the goal is not necessarily achieved without taking into account the reactions of the consumer. Therefore, raising the price may lead to a decrease in the purchasing power and, consequently, a decline in the market sales and in the end, a profit decrease.

Meanwhile, for sellers, it is important to know how much demand and supply volume has changed under price changes in a given period of time. But here it must be taken into account that the response of different groups of consumers to price changes for a particular commodity may be different⁵.

On the other hand, through the price elasticity of demand, we can estimate the volume of sales, as a quantitative method in addition to the regression methods (Uraovtsova A., 2016). And through the price elasticity of demand, we can, at the level of scientific research, formulate a mechanism for determining the optimization of pricing policy and its consequences such as an increase in the revenue received. This objective enables the researchers, by using the elasticity function, to estimate the establishment's income, sales revenue, at each stage, taking into account the period of time to which the economic decision is subject (Uraovtsova, 2016).

Within the calculations of price elasticity of demand, some exceptions must be taken into account about consumer sensitivity. We may experience situations in the market where the consumer is unresponsive to price changes. Consequently, this leads us to analyze the price elasticity of demand factors such as consumer interest in the characteristics of the commodity, the consumer's desire to own the commodity through purchase via reservations.

Where the consumer is fully prepared to pay for it, or when the consumer obtains clear savings from the use of a particular good or service and also, when the price is low according to his budget or the period (such as a very short period) doesn't allow to change the purchasing decisions.

It is equally important in the analysis to determine the extent to which a set of factors affect the price elasticity, such as the length of time required to make a purchase decision, the number of commodities uses. Here, electric energy is a good example in this field and the proportion of spending on the commodity from the consumption budget, while salt in this field is in low elasticity and the extent of alternatives' availability for the goods or services that are demanded.

Whereas in the field of marketing policies, studying the elasticities of demand enables us to develop a specific marketing strategy. For example, in the field of medical services, dental services, the elasticity of demand level is low compared to other medical fields. In this field, services are usually differentiated and consumer choice is related to demographic, social, and economic factors (Sahbgaryeva, 2017).

The researchers of this study believe that the use of the economic definition of price elasticity is the basis for making (innovation) of advertising in the field of marketing. Researchers' interest in the field of product promotion has focused on influencing the consumer response through these tools for the purpose of making the demand for the good or service less elastic. That means making the demand

change at a rate that corresponds to the rate of price change, especially in the case of raising the product price.

What must be noted in the analysis of elasticity is that this coefficient isn't constant and changes over time, in addition to the changes that occur in elasticity on the basis of the length of time periods. However, elasticity varies over time between countries, according to the nature of consumers, customs and traditions, the cultural level, and most importantly of all, the consumption pattern: the proportion in the food structure building upon quality and quantity.

Second, the elasticity of demand with respect to income change (income elasticity). When the consumer demands the commodity in relation to income movements within the framework of the consumer basket, in his preferable consumption decision among the commodity groups that enable him to achieve the greatest satisfaction.

In economics, these commodity groups are classified into four main groups: first-order essential commodities, where the coefficient of elasticity is confined between 0 and 1. And second-order essential (basic) commodities, where the income elasticity coefficient equals 1 ($E_y = 1$). Then luxury goods, where the coefficient of income elasticity is greater than 1. And if researchers experience a value at the 0 levels, this means that any increase in income doesn't have an impact on the required quantity of the commodity.

This classification plays a major role in the distribution of the resources among the economic sectors at the level of economic units' activity and contributes to determining the components of the consumer basket at the time of choosing the tax base, such as determining the general sales tax, which is considered one of the main sources of financing public expenditures in low-income countries (AL Sawaie, 2020).

As well as that the income elasticity of demand coefficient is affected by some factors which make the demand regarding less or more income. For example, the more the commodity is demanded, the less elasticity is. This, in turn, depends on the place of the commodity in relation to the household budget. Besides, elasticity in this area is affected by what is called "consumer conservatism", so when income increases, consumers won't rush to demand expensive commodities.

An important use of income elasticity of demand in economic studies and at the economic policy level is the assessment of future taxation flows. For example, through the elasticity coefficient, we can estimate how much will the tax base decrease.

Third, Cross-elasticity of demand, used to reveal the extent of consumer response to other commodities price changes. On one hand, elasticity enables us to define the relationships between commodity groups that the consumer chooses in time and place. Also, cross-elasticity contributes to determining the production decisions on the basis of the correlation between the production of an economic sector and the demand for that product by other economic sectors.

To give an example in the field of seed production, it is necessary to take into account the size of the demand for wheat in the market through its various

uses, consequently, this analysis enables us to determine the agricultural areas at this stage. While on the level of fuel use, the consumer behavior analysis based on changes in motor fuel prices, is a priority issue to reveal the correlation between fuel consumption and vehicle supply. Then the complementary relationship between fuel and vehicle identifies the basis for assessing the country's revenues from fuel production and the tax revenue achieved from vehicle licensing in the local market, within the implementation of the fiscal policy.

Moreover, cross-elasticity of demand calculations enable us to determine the content of the industry or the producing group, as well as in cases of country's anti-monopoly in light of the increasing control of market shares by limited companies (decline in the shares of most competitors). Also, we can use this tool to change the boundaries of the industry and define the line of commerce (Holton Wilson, 1987).

The consumer basket: concept and components. The concept of consumer basket is used at the economic system level as a base in calculating some cumulative indicators such as the general price index to identify the minimum consumer budget⁶, which is determined based on the retail prices in the market and tariffs on paid services in a certain period of time. Whereas the consumer basket helps to determine the minimum wage and fixing the minimum pension at the country's level.

Furthermore, it is defined as a group of necessary goods and services to satisfy the basic needs of the human. The structure of the basket (components) includes household expenditures on food, clothes, shoes, sanitary items, medicines, housewares, furniture, besides housing and related services. As well as entertainment and leisure time, and other expenditures, as it constitutes 2% of total expenditures.

Knowing that the appraisal process is carried out annually by the Department of Statistics, as is the case in Jordan, or by an equivalent authority in other countries. In the national accounts, lower prices are taken into consideration for each product, and if there are different prices for the same product, the lowest price is chosen. Unusual commodities such as spending on cocoa and its derivatives, alcoholic drinks, luxury goods, and cake gateaux are not included in the consumer basket.

Apart from this, the structure of the consumer basket, including clothes, shoes, and durable goods, such as housewares expenditures are calculated according to the annual consumption of consumers and using the depreciation principle for these products. For example, a silk dress serves for three years, therefore, in the national accounts, the annual value is calculated as one-third of the total value of this product. By the same token, at the level of the economic system, and taking into consideration the specificity of the country, the maximum depreciation limits for durable goods is adopted such as refrigerators (the depreciable life of refrigerators is 15 years of service), fans, shoes, clothes, and others.

Among the components of the consumer basket; food, clothes, and shoes constitute 70%. The need for food products included in the content of the consumer

basket is determined based upon the physiological criterion of the consumer. The components of the basket cover 300 types of commodities and services that are subject to international control in the annual national accounts.

Country's specificities are taken into account when evaluating the consumer basket on the basis of components and prices, such as gender (male / female), a working or non-working individual, and also the issue of new goods and services emergence. In the beginning, the basket is calculated for the working-age man and separately for the city or village. Then, through specific gender-based parameters for population groups.

In addition to the mentioned above concept of the standardized consumer basket, countries use what is called the actual consumer basket, which evaluation is carried out periodically through household expenditure and income surveys of each population group based on the demography, nationality, and geographic distribution.

3. Study methodology:

3.1. Modeling the study and measuring the income elasticity of demand

Elasticities are the most comprehensive measures of the demand for commodities, services as well as resources. However, the methods of measurement differ with the development of statistics and mathematical models⁷. Thus, the issue of demand estimates becomes important in business companies and at the level of economic policies within the framework of the so-called management of current demand at every stage in conformity with high accuracy future estimates.

In this part, the researchers see the importance of using the regression calculations for the gradient of a slope function of the demand and income movements in the study period. The data available to researchers in accordance with the Department of Statistics surveys for the period 2017-2018 enabled the researchers to estimate the income elasticity of demand for a relatively large and comprehensive group of commodities in the components of the consumer basket in the Jordanian economy. Therefore, the selected sample included dairy products and derivatives, fruits, vegetables, dessert, legumes, citrus fruits, vegetable oils, nuts, eggs, and canned foods. The sample size reached 76 units of commodities and services.

Tables "1-6" show the inputs of the elasticity calculation during the study period. Also, the accounts will be presented in tables "1-7 " based on classifying them into goods and services.

The demand for a commodity can be determined using the framework of demand theory, and the demand for a commodity can be expressed in general terms as a function of the commodity price, the price of substitute goods, income, and other variables such as the size of the household. As we have indicated in the theoretical framework and based on the data available to calculate the income elasticity and price elasticity of demand, as well as using simple linear regression, we will use the following model:

$$Q_i = \alpha_0 + \alpha_1 X_i + e_i \quad (1)$$

Where the consumption quantity of a commodity (i), the independent variables such as income (Y) family (i), and the price of a commodity (P), the symbols, the constant term, and the slope of the equation respectively, represent the random error term. Elasticity is a numerical measure of the quantity demand and supply response to price, also the elasticity of demand measures the relative change in quantity demanded to a change in price or income in one unit; mathematically, we identify elasticity as follows:

$$\varepsilon_Y = \frac{\Delta Q}{\Delta Y} \cdot \frac{Y}{Q} = \frac{dQ}{dY} \cdot \frac{Y}{Q} \quad (2)$$

Where ε_Y is the income elasticity.

$$\varepsilon_P = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{dQ}{dP} \cdot \frac{P}{Q} \quad (3)$$

Where ε_P is the price elasticity.

The increase in household income is expected to increase the consumption of the commodity. It is also anticipated that an increase in the price of the commodity reduces the consumption of the commodity. The elasticity of demand can be estimated from the assessed coefficient, and the income elasticity of demand is as follows, see the tables.

What should be noted is that when we classify commodities in line with elasticity in relation to the movement of income as financially basic and poor, then this classification doesn't correspond to Maslow's hierarchy of needs by priority. Since needs in practice are met in a holistic manner rather than as maintained by the preferences⁸. The elasticities were estimated based on the data of the 2017 household expenditure and income study conducted by the Department of Statistics, and the results were as follows:

Table "1": The income elasticity of demand for milk and its derivatives

No.	Product	Income elasticity	Nature of commodities
1	Milk products	0.233	Essential commodities
2	Fresh milk	0.313	Essential commodities
3	Pasteurized milk	1.417	Luxury goods
4	Kids milk	<u>-0.165</u>	<u>Poor</u>
5	Powdered milk	0.096	
6	Strained yogurt	0.216	Essential commodities
7	White cheese	0.450	Essential commodities
8	Canned yellow cheese	0.372	Essential commodities
9	Big yellow cheese	0.653	Essential commodities
10	Wrapped yellow cheese	0.185	Essential commodities

Table "2": The income elasticity of demand for meat and fish

No.	Product	Income elasticity	Nature of commodities
1	Meat	0.438	Essential commodities
2	Fish	0.394	Essential commodities
3	Fresh fish	1.110	Essential commodities
4	Frozen fish	-0.135	Inferior Goods
5	Canned fish	0.075	Essential commodities
6	Frozen meat	-0.173	Inferior Goods
7	Imported frozen meat	<u>0.150</u>	Essential commodities
8	Canned meat	0.021	Essential commodities
9	Local lamb meat	0.799	Essential commodities
10	<u>Imported lamb meat</u>	0.399	Essential commodities
11	Local beef	0.692	Essential commodities
12	Imported beef	0.350	Essential commodities
13	Goat meat	0.480	Essential commodities
14	Luncheon meat	0.279	Essential commodities

Table "3": The income elasticity of demand for fruit

No.	Product	Income elasticity	Nature of commodities
1	Fruit	0.530	Essential commodities
2	Banana	0.495	Essential commodities
3	Apple	0.606	Essential commodities
4	Grape	0.717	Essential commodities
5	Watermelon	0.293	Essential commodities
6	Tomato	0.089	Essential commodities
7	Orange	0.569	Essential commodities
8	Lemon	0.334	Essential commodities

Table "4": The income elasticity of demand for the vegetable

No.	Product	Income elasticity	Nature of commodities
1	Vegetable	0.185	Essential commodities
2	Potato	0.144	Essential commodities
3	Onion	0.108	Essential commodities
4	Garlic	0.092	Essential commodities
5	Zucchini	0.278	Essential commodities
6	Eggplant	0.169	Essential commodities
7	Cucumber	0.184	Essential commodities
8	Cauliflower	0.215	Essential commodities
9	Carrot	0.413	Essential commodities
10	Cabbage	0.248	Essential commodities
11	Bean	0.301	Essential commodities
12	Okra	0.348	Essential commodities
13	Mulukhiyah	0.111	Essential commodities
14	Black pepper	<u>0.161</u>	Essential commodities
15	Olive	0.194	Essential commodities
16	Grape leaves	0.306	Essential commodities
17	Lettuce	0.433	Essential commodities
18	Parsley & mint	0.215	Essential commodities
19	Spinach	0.270	Essential commodities

Table "5": The income elasticity of demand for the services

No.	Product	Income elasticity	Nature of commodities
1	Healthcare	1.080	Second- order luxury goods
2	Medicine (within treatment services)	0.410	Essential commodities
3	Water bills	0.398	Essential commodities
4	Transport	0.911	Essential commodities
5	Bus services	0.14	Essential commodities
6	Taxi services	0.182	Essential commodities

Table "6": The income elasticity of demand for the variety

No.	Product	Income elasticity	Nature of commodities
1	White bread	0.048	Very-essential commodities
2	Wheat	0.160	Essential commodities
3	Semolina	0.174	Essential commodities
4	Rice	0.130	Essential commodities
5	Long grain rice	0.306	Essential commodities
6	Pasta	0.061	Essential commodities
7	Egg	0.122	Essential commodities
8	Olive oil	0.172	Essential commodities
9	Nuts	0.603	Essential commodities
10	Sugar	0.660	Essential commodities
11	Halvah	0.142	Essential commodities
12	Honey	0.821	Essential commodities
13	Kunafa	0.715	Essential commodities
14	Table salt	0.100	Essential commodities
15	Tahina	0.152	Essential commodities
16	Frekeh	0.262	Essential commodities
17	Qatayif	0.283	Seasonal- essential commodities

Table "7": The income elasticity of demand for fuel and others

No.	Product	Income elasticity	Nature of commodities
1	Diesel	3.051	Luxury goods
2	Kerosene	0.97	Essential commodities
3	Detergents	0.211	Essential commodities

The researchers believe that it is important to conduct a comparative analysis of the price elasticity of demand abroad with the movement of income and its impact on consumer response to a group of commodities in the Jordanian economy. To simplify the comparison, the researchers use Table "8", which includes calculations of the price elasticity of demand in one of the studies and the income elasticity of demand, the measuring results of researchers in the Jordanian economy:

Table "8": Price & Income elasticity in the two economics

Commodities in the Jordanian economy		Commodities in foreign country economy	
Commodity	Income elasticity	Commodity	Price elasticity
White bread	0.048	Bread	0.15
Local beef	0.692	Beef	0.64
Local lamb meat	0.799	Lamb meat	2.65
Egg	0.122	Egg	0.32
Healthcare	1.080	Paid medical services	0.31

4. Results and Recommendations

4.1. Results

1. The researchers were able, through the measurements, to stabilize the income elasticity of demand for a group of commodities, including the consumer basket components in the Jordanian economy, and the results were logical and realistic.
2. According to the classification carried out by the researchers, the concept of first-order and second-order essential commodities is improved. The closer the coefficient of income elasticity is to 1, the commodity becomes in the second-order essential commodities.
3. The existence of convergence between the consumer response to the movement of income and the price movement among the commodities in the Jordanian economy and other countries.
4. The variation in consumer response to the income movement upon the demand of commodity as a result of the product dissimilarity. This is explained by a change in the pattern of consumption, tastes, and preferences. For instance, the variation in the demand for rice varieties.
5. Garlic was characterized by a very low-income elasticity (0.092), indicating that this commodity couldn't be abandoned in the case of low income. On the other hand, this commodity is demanded regardless of the individuals' social status, even if its prices are high. Such as the income elasticity of demand for powdered milk in the Jordanian citizen's consumer basket.
6. Among fish and meat, fresh fish is on top of the luxury items list. What explains this is the lack of the provided quantities of this commodity in the Jordanian market and its high prices.

4.2. Recommendations

1. The necessity of providing a database including the consumer basket at the level of the Jordanian economy so that researchers can use the elasticities calculations in applied studies at the micro-level (sector level).

2. To reach a very accurate elasticity measure, one must take into account the variance in the sales tax rate (consumption tax) and its impact, through price movement, on the response to demand.
3. The necessity to take into account the level of government support provided to producers in the commodity market in the process of measuring elasticity.
4. Making use of the income elasticity of demand calculations in the financial policy at the level of the Jordanian economy in estimating the outcome of tax revenues at each stage. The researchers propose to use the idea of marginal tax revenue for income movement and the values of income elasticity of demand.

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