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Energy Cost Analysis for Domestic Economics in Egypt Based on the Pound Floating

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Abstract

Recently, the fuel saving becomes the most important title on the universe because the use of energy is going to be highly increased. Otherwise, the new strategy for fuel saving accounting the implementation of renewable energy instead of the traditional although its use is more expensive especially in the developing countries. The energy consumption has a great effect on the cost growth in different countries although it has a stable characteristic in some countries. This will be very significant for the developing countries in general, but the exchange market may take place in the process of costing. This paper presents the costing subject in Egypt as a developing country where the domestic economics can be evaluated. The energy consumption is investigated for the special tariff growth in Egypt where the social dependency for the low energy consumers in the main tariff. The correlation of energy cost in Egypt based on the process of accounting and the cycle of recording the readings of consumption to control the exact monthly (30 days) cost of domestic energy. The apparent cost excess, and the corresponding percentage rise, for the manual registering of energy consumption is calculated for the domestic customers in Egypt for 38 years according to the tariff history. The pricing of domestic energy utilization is proposed to cover the Engineering effect in the technical process of operation besides the principle of Economics related. The given investigation correlates the automatic random characteristics in the domestic loads of customers. The effect of the recent floating of the Egyptian Pound (2016) is studied due to its importance for the microeconomics. Also, the history of the Egyptian energy cost history is investigated and discussed. The insertion of communication technology for the exact readings is recommended because it solves the problem of delay in recording the readings.

Keywords

Monthly Reading Correlation, Domestic Energy, Pound Floating, Calibration, Tariff Progress, Cyclic Cost Analysis

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1. Introduction

Generally, the energy takes the vital role in the macro economics of all advanced countries besides many others in the developing countries so that the basic strategy and policy of most countries on the Globe may be directed towards the optimal utilization of energy. So, the recent support for the renewable energy can be seen everywhere because the target is the minimization of use of the original traditional fuels. Therefore, the fuel saving can be achieved for a long time, but the energy is always going up to be increased each moment due to the continuous innovations for applications in our life. Then, a great attention can be determined to the energy utilization in developing countries where this subject can be considered for deep investigation. Since 1946-1971, many of the world's major industrialized nations participated in a fixed exchange rate system known as the Bretton Woods Agreement. Since then, most major industrialized economies have adopted floating exchange rates. Many developing

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nations seek to protect their domestic industries and trade by using a managed float where the central bank intervenes to guide the currency. The frequency of such intervention varies. There are several reasons why a central bank intervenes in a currency market that is usually allowed to float [1].

Whatever, democratization in South Africa has been accompanied by continuing and even deepening economic inequalities. Rather than proposing a blueprint for a more equable economic system, implications of wide-ranging research on the history and current dynamics of the South African economy over the past fifty years were studied. A range of strategic economic trajectories, linking these to the shifting balance of economic and political power, was analyzed and the parameters within which the economic and political debates are conducted [2]. Otherwise, a traditional argument in favor of flexible exchange rates is that they insulate output better from real shocks, because the exchange rate can adjust and stabilize demand for domestic goods through expenditure switching. This argument is weakened in models with high foreign currency debt and low exchange rate pass-through to import prices [3]. The identification of potential disadvantages associated with the existence of national currencies with the floating exchange rate regime, during the current financial and economic crisis in countries postponing their entry into the eurozone, has been defined. The hypothesis is that the advantages of a floating exchange rate may be outweighed by their disadvantages (high volatility of exchange rates) [4].

Capital flows respond differently to global risk factors depending on whether a country's monetary authorities intervene in foreign exchange markets to influence the local currency exchange rate, or whether capital flow pressures result in changes in the exchange rate or interest rate sufficient to discourage capital flow pressures from being realized in actual flows. In fully floating exchange rate regimes, capital flow pressures would materialize in exchange rate adjustments while in fixed exchange rate regimes, the price adjustment is prevented, and a capital flow is fully realized in response to the same pressure [5]. Whereas the several models in many researches demonstrate a bidirectional relationship with different fields of investment while theoretical and policy implications discussed within the realm of macroeconomics and sustainability. Thus, the contribution of renewable resources and tourism development to the overall economic performance in T‐7 countries investigated. For this purpose, the bootstrap panel Granger causality test is used to examine the causal link between tourist arrivals, GDP, and renewable energy consumption. T‐7 countries offer a unique setting because of their respective large shares of the world's GDP, emissions, tourism development, and renewable energy consumption while a relatively new and innovative bootstrap panel Granger causality technique was considered [6].

On the other side, the energy consumption and its reflection on the standard of living through the investigation of cost growth may be necessary but the cost of energy totally may require more works. So, the domestic energy can be inserted as an example for the energy in general because the domestic economics has a high reflection to people in a country. Thus, the social consideration in the strategy and policy of Egypt may encourage researches to account the domestic loads or energy for the analysis.

2. Cost Analysis

It is crucial to implement policies and strategies at a macro level to mitigate the adverse impacts of traditional energy consumption on the environment and pursue the major tenets of sustainable tourism development. This subject leads to the importance of energy cost investigation although the tourism development depends too on the energy. Therefore, the cost analysis may be needed for covering the necessary energy for different applications and instruments, devices and tools, etc. Many diverse sectors play a vital role in the development of countries so that each of them must be considered for rationalization to give the optimal output of income. This title may be tailored into two sections: the first is required to increase the national income due to either the outcoming or the internal income while the second should be directed to minimize the consumption inside. Additionally, the energy price may be raised due to the pollution to cover the cost of processing to clear such pollution since the tariff of energy consumption is taking to be elevated. The nexus between economic growth and energy consumption has been extensively investigated in the energy economics literature. The fundamental pursuit of researchers is to examine the relationship between economic growth and energy consumption. In other words, researches are set forth to determine whether economic growth leads to an increase in energy consumption or vice versa. Growth, conservation, feedback, and neutrality hypotheses were proposed to test the causality between economic growth and energy consumption. However, the literature reports mixed results supporting unidirectional causality from energy consumption to economic growth (growth hypothesis) and economic growth to energy consumption (conservation hypothesis), bidirectional causality between economic growth and energy consumption (feedback hypothesis), and no causal link [6]. Thus, the study of energy costing in developing countries as Egypt would be necessary to be analyzed.

For most countries, the empirical results reveal that globalization increases energy consumption where in USA and UK, globalization is negatively correlated with energy consumption. The causality analysis indicates the presence of the globalization-driven energy consumption hypothesis. This empirical analysis suggests insightful policy guidelines for policy makers using globalization as an economic tool to utilize energy efficiently for sustainable economic development in the long run [7]. This means that, the energy consumption represents a vital factor for the domestic economy so that its study either for the energy growth or the costing performance may be objective function for the investigation in Egypt.

2.1. Energy Price

However, the price of energy must be updated according to the modification in the economic policy so that the tariff of electric energy in Egypt (as an example) is considered for the technology of economic evaluation. The principle of tariff for energy consumption has been widely investigated for a long time, consequently, this tariff in Egypt is based on the striped style as listed in Table A1 in the Appendix based on the social content of the society. Table A1 related to the domestic and commercial sectors including the industrial loads. Also, the domestic sector will be considered where the updating of the tariff can be accounted as given in Table A2 in the Appendix for the last modification in the domestic tariff. The rate of rise of price (RRP) for each stripe is accounted for two conditions (relative to base and with respect to the stripe itself) where its value is growing with the consumed energy in the case of base evaluation in the two sectors [8, 9].

The energy costing is a major type of Economic problems around the world due to the modification every day in the style of equipment not only for control or even in protection schemes, but also for the new types of power generation. This has a high effect on the domestic economics for every country because the population is normally increasing leading to more stress for the macro economy scale. Then, the characteristics of tariff may be defined well according to the progress in the economics of each country. On the other hand, the new types of stations and the performance of optimal power flow in electric networks may direct the problem of costing for the consumed energy to include the varied shape of load curves. This transforms the importance of insertion of renewable energies in such networks.

The pricing of energy depends on two sections of cost as:

$$\text{Total Cost} = \text{Fixed Cost} + \text{Running Cost} \quad (1)$$

This equation means that, the costing of energy must depend on, firstly, the capital cost of stations (Power Stations, Substations) and the connection between them with the ends of utilization. Secondly, the cost depends also on the running cost, which means the consumed power where the presented research is concentrated to solve the problem of evaluation for both sides (customers and Electricity Company). This is more important in some countries as it will be concluded later so that a modification for the process of costing may be needed and therefore, the problem could be correlated.

The fixed cost will be omitted out of the study to concentrate the analysis on the energy only. The process of determination of the tariff contains the average price of the energy, which can be specified to each sector to cover all possible variations in the loads of customers in the deduced shape of the stripes in kWh. The average monthly price P_{av} in the units of L. E. for the total energy (E_t) may be formulated as a function of the total energy used in the units (kWh). The total cost as seen in Equation 1depends also on the running cost, including both generated and consumed powers where the presented research is concentrated to investigate the part of consumption energy with respect to both sides (customers and Electricity Company). Then, the average monthly price P_{av} in the units of L. E. for the total energy (E_t) may be expressed as a function of the total energy used in the units (kWh) by:

$$\text{Pav} = \left(\frac{1}{\text{Et}}\right) \times \sum_{=1}^{nc} (\text{P} \quad \times \text{kWh} \quad) \quad (2)$$

Thus, the average price should be equivalent to that deduced according to the stripes of the customers where they have (m) classes for each sector and the price in each can be remarked as P_m for the m^{th} stripe (It varies between 1 and 9 according to Table A1). Then, the average price will obey the same given expression in equation (2). The developed static and dynamic values for the tariff of both mentioned sectors above were calculated in [8]. It is remarked that RRP for the base conditions is highly increased with respect to the initial cases of Table A1, however, the dynamic values were vibrated between 1 to 5.68 (instead of 1 to 1.37) for industrial loads and 1 to 2.81 (instead of 1 to 1.52) for the domestic. This means that, the system of accounting is directed to protect the small customers as a social support while the rate of increase in the cost is usually changed not only between stripes but also inside each stripe itself.

2.2. Energy Cost

The energy consumption may be inserted within as one of these factors since it depends on the fuel utility. So, the fuel consumption leads to a gas generation in the air either polluted or treated so that the electric energy consumption may be one of the vital effects in the climate performance. Researchers argue that these impacts can be mitigated if proper courses of action are taken [6]. Indeed, as a global strategy, reducing the consumption of traditional energy resources while increasing the use of renewable or alternative energy for sustainable economic and tourism development is suggested [6]. To respond to such suggestions, there have been enduring efforts among nations to reach a unanimous agreement to develop common climate change mitigation and adaptation strategies. Despite the fact that low - income countries in the developing world strive to boost their economies through tourism development, their share of world tourism activity still remains very small; thus, these countries pay even less attention to sustainable tourism issues compared to developed countries (Organization for Economic Co - operation and Development & United Nations Environment Program, 2011; www.oecd.org, www.unep.org) [6, 10]. Since the price stripe inside the total consumption depends on the actual period for the measurement, the applied date for the recording the consumed energy must be the same each month, i. e. a constant cycle of time (T). This process is very difficult due to the manual system for recording so that a deflection may be occurred in the determined consumed energy [6, 11].

It is well known that the load curve for a specified place cannot be the same every day due to the performance of its variation, and so, the speech about all populations of loads may be impracticable. Hence the concept of simulation (sampling) may be the way to investigate the overall characteristics of a load. However, it will be a step in the way to cost the energy consumption in the network. The sample must reflect the overall view of consumers in the studied field since it may be for only one sector of customers. Two directions for the variation in a random way are needed. The first is the change in the number of customers connected at ends of the network while the second will be the continuous addition for new consumers or all together [8].

There are two axes for the possible mistake in the process of accounting to find the total cost for the consumed energy in a certain reading or the sequence of measurements. The treated, here, such mistake may be appeared in either the period or the zone stripe. This can be illustrated in the following paragraph. It should be indicated that, the annual average energy consumption can be treated as the sum of monthly readings within the year divided by the number of months despite the number of readings may be different. This case represents the first axis of mistake that needs a correlation as proved by the extracted points of mistake while the second axis will be related to the time of the consumed energy in different periods leading to a mistake in the suitable stripe of the tariff. The correlation factor for the first item may be the division to get the average monthly reading and then another one to correlate the period, but only one factor can be proposed to cover both mistakes in the form [8].

Whatever, the electrical load varied not only by time but also with the place and users because the end users are continuously increased day by day, and consequently, the load may be changed. The allowable energy to be generated will be included through the energy too inside the term of running cost of equation (1) while its installed value is computed with the capital cost. This can balance the process of costing for the energy consumption. Moreover, although low - income countries strive to boost their economies through tourism development, they attain relatively minor benefits from the tourism growth in the world [6].

However, the stages of pricing for the domestic energy consumption may be estimated for the different strips of consumption along the investigated period (38 years) since the results of calculations for the original tariffs are listed in Table A2 in the Appendix [12, 13]. The string of energy cost for the domestic consumption can be introduced as given in Table A3 while the values in P E (100 P E = L E) are found for different years as included according to the stages of pricing and tariff’s production. Additionally, the results of calculations for the cost according to 6 sequential tariffs are drawn in Figure 1 because these values will be the reference for all next computations.

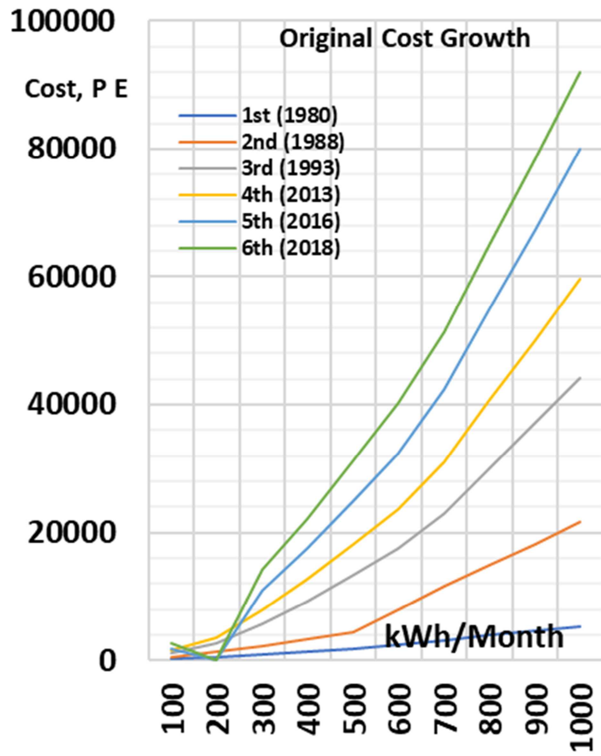

Figure 1. Energy Cost Development (EGP).

The curves in Figure 1 illustrate the continuous rise for the cost of energy with the energy consumption increase. Otherwise, the low energy consumption appears to have low cost for all tariffs since the social support is the target of the government. It is remarked that, small rise relatively is seen for the last tariffs 4th, 5th and 6th where contrary it has a high rise with the 2nd (1980) and 3rd (1988) relative to the fundamental tariff at 1980. This is a general view as a simple classification for the cost rise of energy pricing.

2.3. Apparent Cost

A metric that combines price and quantity information, within an updated *exchange market pressure index* (EMP) building on early contributions has given [5]. EMP is an alternative gauge of net capital flow pressures, which considers outright capital flows through foreign exchange reserves as well as exchange rate and interest rate changes for use in time series and cross-country analyses. It relies on data which is available in monthly frequency and is more up-to-date than outright capital flows. Departing from the earlier literature on exchange market pressure indices, which has operated with several assumptions about how the components of the index should be weighed against each other. Instead, it is grounded in international asset market equilibrium conditions, investor gross international asset and liability positions, and alternative exchange rate regimes that shift the balance of price and quantity reaction to international capital flow pressures. EMP is less likely to be biased, as monthly frequency, and with conceptual underpinnings constructed specifically to capture capital flow pressures [5].

2.3.1. Cost Diversity

However, the given above results of Table A3 have been tested for the noncyclic registration for the energy consumption although the semi-cyclic readings are considered for investigation. The semi-cyclic reading means the summation of two sequential months readings to be averaged for only one month. This can be expressed as a function of the value of the present month reading (Reading_1) and a part of the next reading (Reading_2). The mathematical explanation may be formatted as:

$$1^{st}\text{ month Reading} = 1^{st}\text{ month consumption} + \text{part of } 2^{nd}\text{ month consumption}$$

$$2^{nd}\text{ month reading} = \text{reminder consumption of } 2^{nd}\text{ month} + 3^{rd}\text{ month consumption} \quad (3)$$

This sequence would be repeated every month so that the cost in this case will diverse from the original value (See Table A3). The overall results are presented in Figure 2 without the classification.

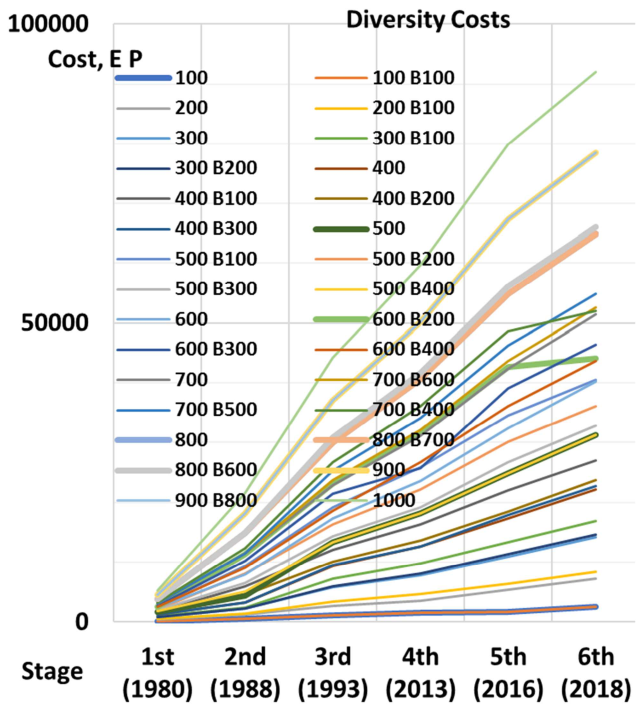

Figure 2. The Costs of Energy Consumption at distinctly cases.

Otherwise, the curves of Figure 3 need to more explanation since the diversity presence in Figure 3 may be required to illustrate. So, the base of monthly 100 kWh can be studied for comparison where the energy consumption is estimated as the average of the two sequential readings. This means that, the begging value is always 100 kWh and then adding all next values sequentially (100+100, 100+200, 100+300, 100+400, etc.) while the results for the average value as (100, 150, 200, etc.). It should be noted that all original curves are drawn with after 600 kWh because the difference between both type of readings (original and apparent) is clear. The apparent is always greater than the original one.

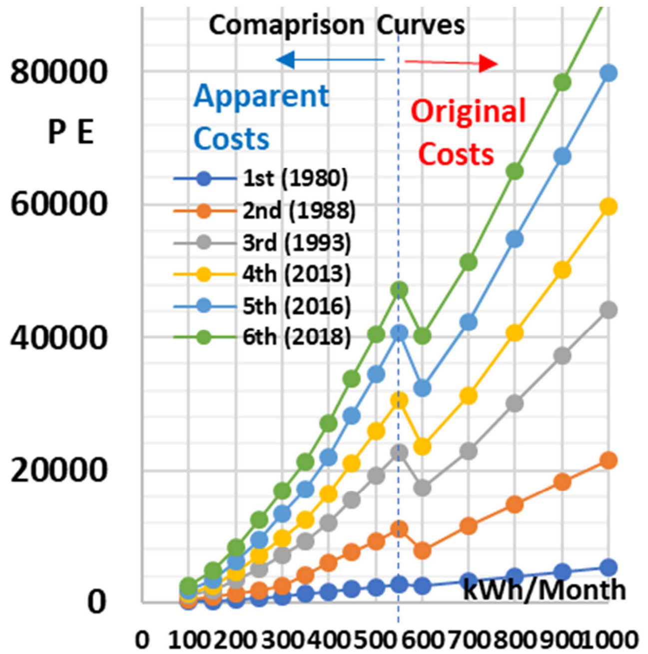

Figure 3. The comparison curves of apparent costs at 100 kWh base with originals.

Moreover, the analysis of results of the apparent cost may be inserted for the base of both 200 and 600 kWh where the evaluated apparent cost for the apparent reading for both bases can be shown in Figure 4. It is noticed that, the average cost for all apparent costs is located approximately on the third case of tariff (1993). Both curves are in sequence since the base of 200 kWh begins at 250 and ends at 600. Contrary, the base of 600 kWh begins at 650 and ends at 800 kWh so that both curves can be drawn together.

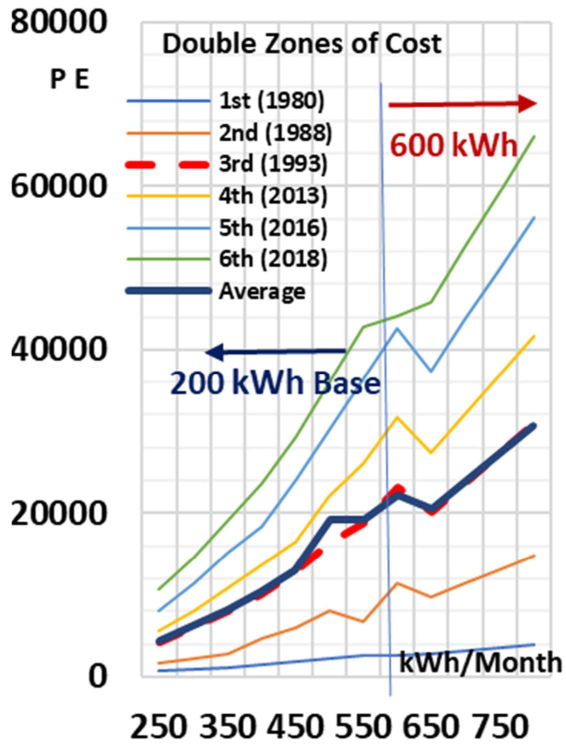

Figure 4. The curves of apparent cost for base 0f 200 and 600 kWh characteristics.

Similarly, the bases of 400, 700 and 800/900 kWh are introduced in Figure 5 where all values of monthly cost have an *excess* in the cost (P E). This may be explained because of the semi-cyclic readings due to the manual registration. This can be avoided if the computerized registration system is inserted instead.

On the other side, the apparent cost dependency relative to the original cost can be illustrated in a defined shape as given in Figure 6 where the relationship is directly seen. Both bases of 100, 200 and 300 kWh are accounted for the final monthly cost of 400 kWh and the results are drawn in Figure 6. It is seen from Figure 6 that, the average cost of 400 kWh on the base of 100 kWh is greater than that for the base of 200 kWh because the base 100 means 100 + 700 = 800 leading to an average of 800/2 = 400 kWh. Contrary, the base 200 means the average of 200 + 600 where the cost of 800 kWh is relatively higher. Thus, the base 100 kWh causes a rise excess because of the cost of 800 kWh. Similarly, the higher base for the same average consumption cost gives a lower cost relatively while the lowest cost is the original one for all curves. Also, the base 200 kWh leads to lower cost than that for 100 kWh and greater cost for 300 kWh base since the results of Figure 6 prove this conclusion.

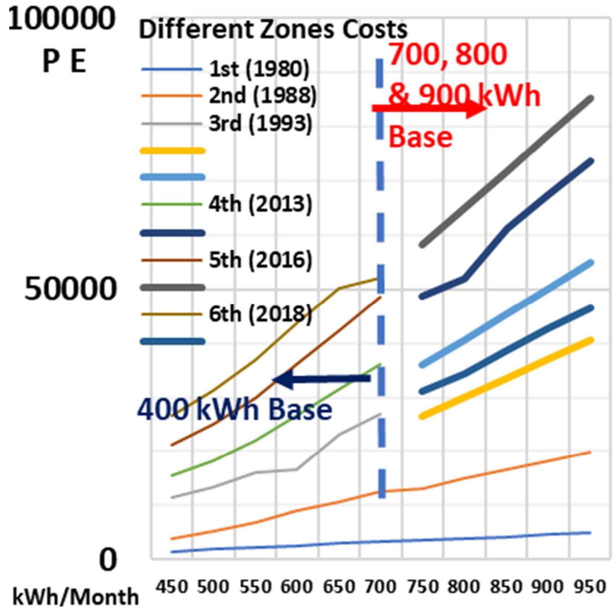

Figure 5. The curves of apparent cost for base 0f 400-900 kWh characteristics.

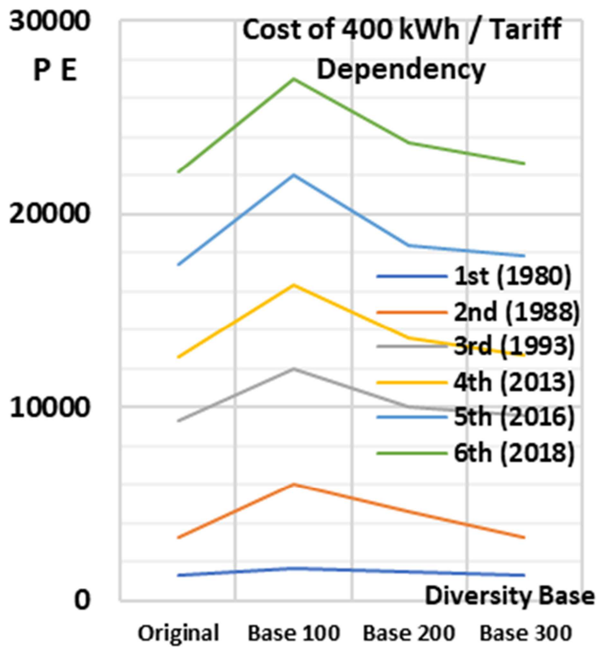

Figure 6. The Cost of 400 kWh/Month Consumption.

Consequentially, the high values of costs for high monthly consumption can be introduced where the average cost of 800 kWh is estimated for different bases and the of computations are drawn in Figure 7.

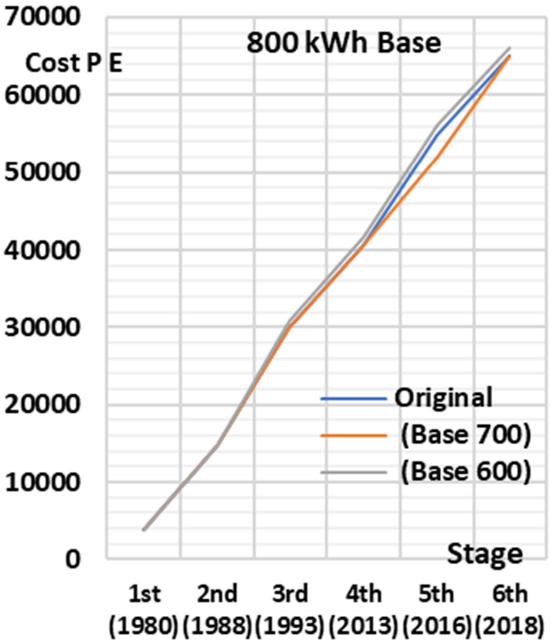

Figure 7. The Cost of 800 kWh/Month Consumption.

2.3.2. Cost Excess

Therefore, the above apparent costs indicate that, a correlation value for the monthly average cost is needed to treat the impurities in the semi-cyclic readings since the aimed goal is the real cost. Then, the cost *excess* for the readings in the semi-cyclic system can be studied and analyzed while the evaluation of this increase is deduced for the given cases above. The general results for the cases are given in Figure 8 where all bases of consumption are inserted in calculations [13, 14].

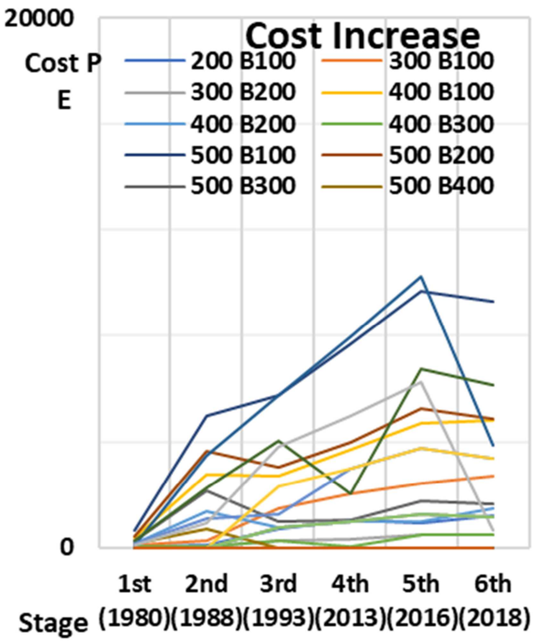

Figure 8. The Cost increase (P E) due to the unsymmetrical Time readings.

Consequentially, the apparent cost in percentage is determined for the results of cost *excess* as illustrated in Figure 9 where the percentage over cost is shown for all cases studied above as general chart for the title of cost performance.

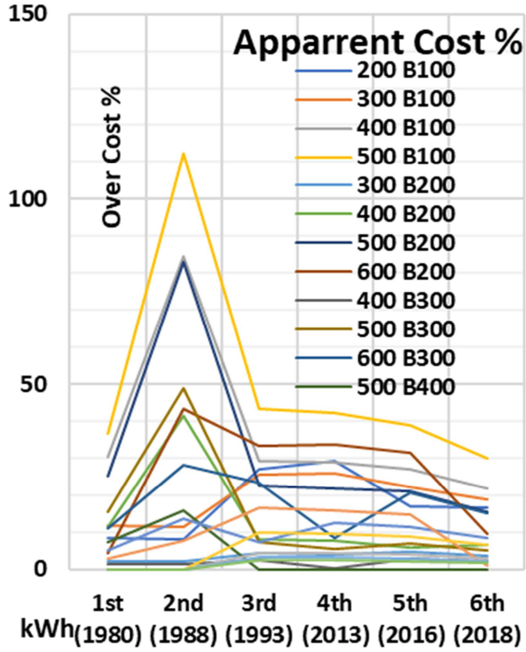

Figure 9. Percentage cost rise (%) for all stages.

However, the cost growth of energy for the country development would be necessary if the target is a general view for the economics of energy cost. This is important because energy represents a vital item in life on the universe. So, the energy cost growth is accounted for the general cases above and the results are shown in Figure 10 where the most usable values of energy consumption are considered.

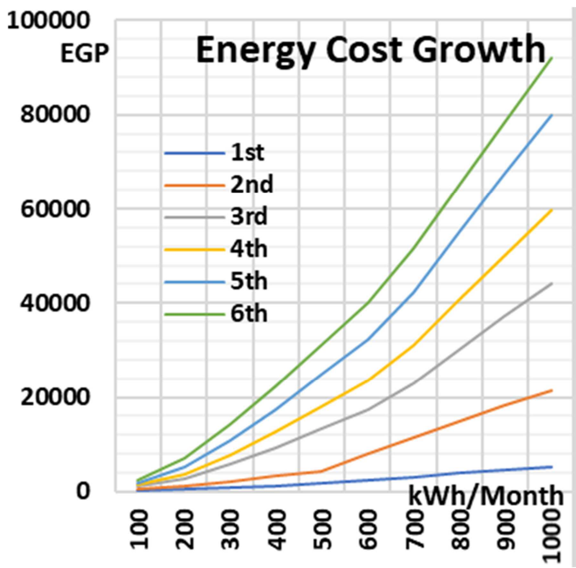

Figure 10. The general growth of energy cost.

Consequentially, the Rise Ratio for the general values would be required for the explanation of the cost growth of energy in the domestic sector where the ratio is expressed by:

$$\text{Cost Ratio} = \frac{\text{Present Reading}}{\text{Previous Reading}} \tag{4}$$

The mathematical formula can be given in the form:

$$\text{Cost Ratio / kWh} = \frac{\text{Reading of a Stage}}{\text{Reading of the Previous Stage}} \tag{5}$$

Figure 11 represents six stages of tariff within 38 years (1980-2018) so that the deduced values are referred to the first stage in per unit system [15].

It is seen that; all stages of computations are high and above the unity but three of them at low ratio (up to 1.5). The other two stages are in a high ratio which varies between 2 and 4.2 where the third stage is varied between 2 and 3. The second stage varied within 2.5 and 4.2 but the stages 4, 5 and 6 are varying in a low level near the unity (less than 1.5 approximately). This view reflects the ratio of each stage to the previous one in contrary with the cost level because the stages 5 and 6 are the highest level of cost. Therefore, the above ratio is applied to a sample of cost for real readings of [8] and the resulting values are indicated in Figure 12.

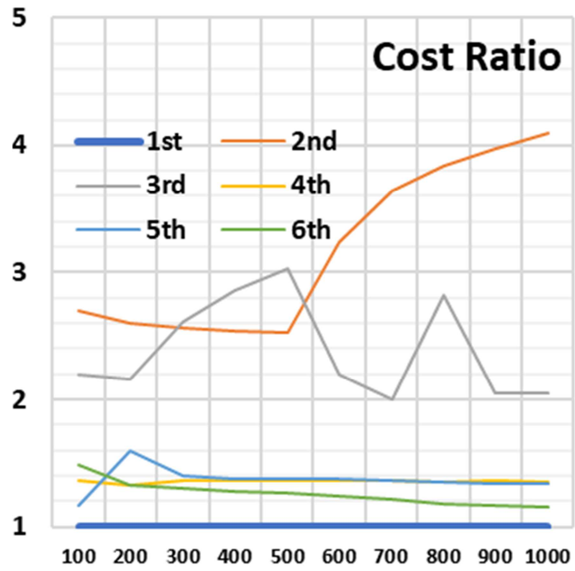

Figure 11. Cost Ratio EGP /Strip.

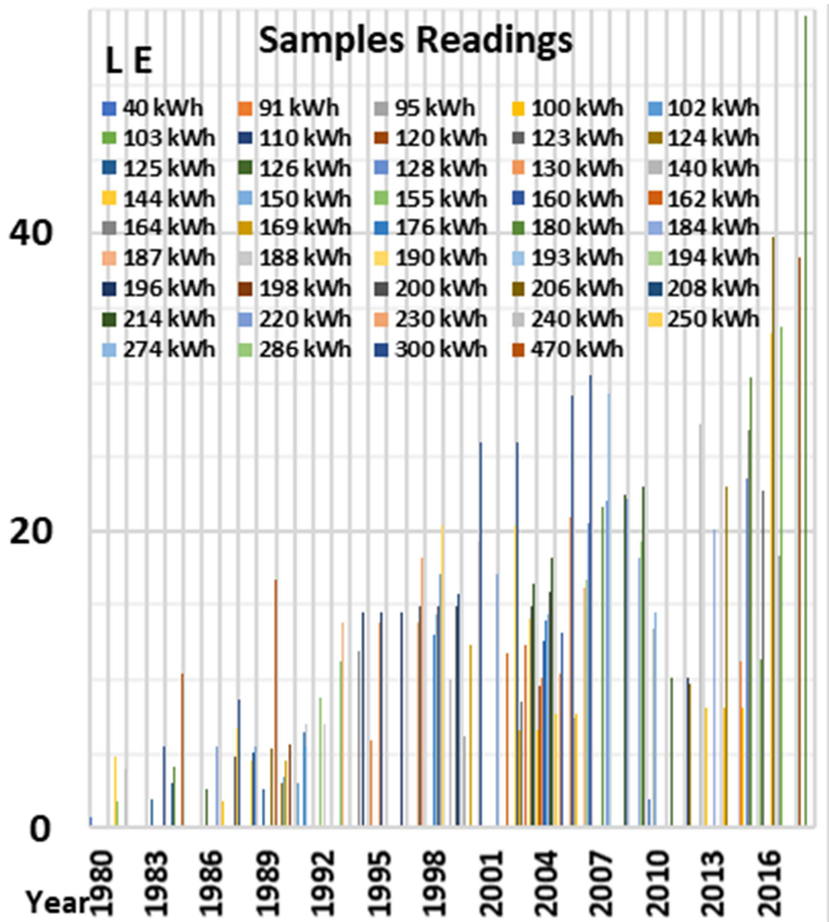

Figure 12. The cost ratio for the sample [8].

Otherwise, the increase value of Cost (1980-2018), which means the *Cost excess* (CE), may be considered for mathematical analysis where it can be evaluated according to the expression:

$$\text{Cost Excess} = \text{Final Reading} - 1^{st}\ \text{Reading} \tag{6}$$

Otherwise, the rate of this increase value should be referred to a defined time so that the Rate of cost increase for the domestic energy consumption can be determined in the form:

$$\text{Rate of Cost } excess = \frac{\text{Cost } excess}{\text{Period}} \quad (7)$$

Thus, the results of computations are tabulated in Table A4, Table A5 and Table A6 (See Appendix) since the axis of estimation is taken for each column. The original general values for EGP will be referred to the axis of each energy consumption, individually. Whatever, the above three charts can be translated into the overall value for the *Rate of Static Rise of Cost*, within the investigated period 1980-2018, (RSRC) corresponding to each energy consumption while the Rate of Static Rise of Cost (RSRC) may be considered for mathematical analysis. Thus, the theoretical value would be evaluated according to the formulae:

$$\text{RSRC } (\%) = 100 \times \frac{\text{Rate of Cost } excess}{\text{First Reading}} \quad (8)$$

The estimated values for the most usual domestic consumption in the original readings are deduced as recorded in Figure 13 where the oscillatory characteristic is generated as shown in Figure 13. So, the oscillation is concentrated within these most visible values in readings.

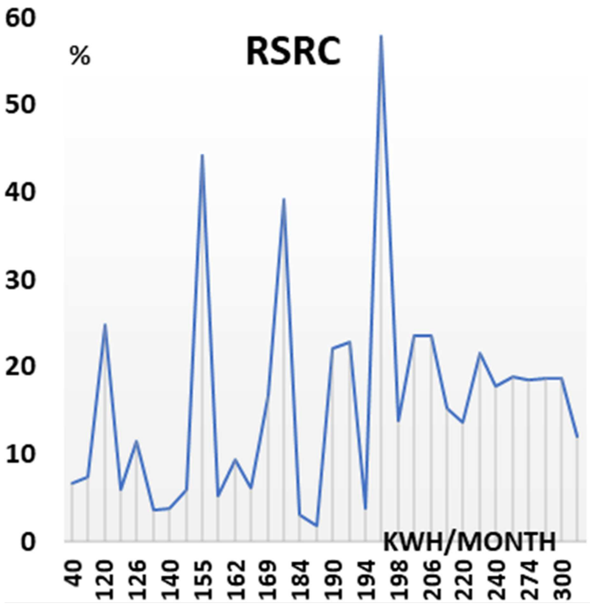

Figure 13. The calculated RSRC for the original readings.

For simplicity, the corresponding overall values for the cost *excess* for the original readings may be summarized as drawn in Figure 14.

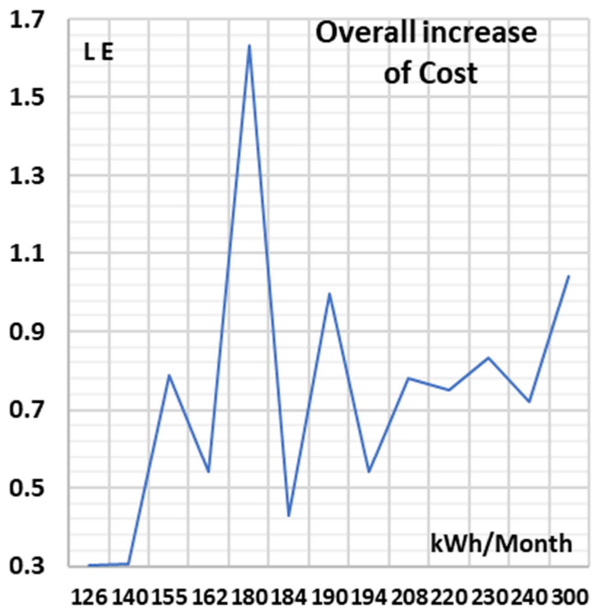

Figure 14. The overall *excess* of energy cost (L E).

Whatever, the apparent cost may be concentrated through the agenda of manual recording system for the energy consumption monthly since the reading must be accounted monthly as 30 days each. The daily energy consumption is estimated and tabulated in Table 1 while the dates for the sequential months are deduced as shown in Table 2 as an example for all other data. Sometimes, the exact timetable for a 30-day accounting becomes very difficult so that the schedule may be implemented in a cyclic method as illustrated in Table 2. Then, the presence of apparent cost will be induced where the timetable of registries can be taken in the sequence listed for sequential months (See Table 2).

Table 1. Cyclic Average Readings for Apparent Cost.

kWh	2 months	Monthly	Daily
100+200	300	150	5
100+500	600	300	10
200+400	600	300	10
100+800	900	450	15
200+700	900	450	15
300+600	900	450	15
400+500	900	450	15
200+1000	1200	600	20
300+900	1200	600	20
400+800	1200	600	20
500+700	1200	600	20
500+1000	1500	750	25
600+900	1500	750	25
700+800	1500	750	25
800+1000	1800	900	30

The cycle, for example, is appeared in a cup of months, but the reading should be calibrated to a single month. So, the chosen data of the research may be listed in Table 2 and the equivalent average for the cyclic readings is accounted for each.

Table 2. Cyclic date sequence of energy readings.

Month	1	2	3	4	5	6
100+200	20	10	20	10	20	10
100+500	25	1	25	1	25	1
200+400	20	10	20	10	20	10
100+800	27	1	27	1	27	1
200+700	24	1	24	1	24	1
300+600	20	10	20	10	20	10
400+500	20	17	20	17	20	17
200+1000	26	1	26	1	26	1
300+900	23	1	23	1	23	1
400+800	20	10	20	10	20	10
500+700	20	15	20	15	20	15
500+1000	20	10	20	10	20	10
600+900	20	14	20	14	20	14
700+800	20	18	20	18	20	18
800+1000	20	17	20	17	20	17

2.3.3. EGP Floating

International capital flows are demonstrated as consistently important for economic outcomes and driven by global factors [5]. Global risk aversion tends to drive capital flows into emerging market countries when global risk perceptions are low, and out again when global risk perceptions increase. Advanced economy monetary policies matter too, as illustrated by the sharp swing in emerging market capital flows following the Federal Reserve's tapering talk in 2013. In advanced economies, global risk aversion is linked to capital flows and appreciation pressures on so-called SAFEN HAVEN countries [5]. The international capital flows characterizes global risk sensitivity based on the relationship between data on capital flows and measures of global risk aversion. These two phenomena flows to advanced economies and risk-on risk-off capital flows to emerging markets, are intimately connected. While generalizations often are made with respect to the status of specific countries or groups of countries, but these are not necessarily valid, and certainly are not intrinsic country features. Consequentially, neither capital flow data nor exchange rate data, as commonly used in these types of analyses, can adequately represent market pressures or capture the strength of the global factor in a cross-country setting [5, 9].

A dirty float is a floating exchange rate where a country's central bank occasionally intervenes to change the direction or the pace of change of a country's currency value. In most instances, the central bank in a dirty float system acts as a buffer against an external economic shock before its effects become disruptive to the domestic economy. A dirty float is also known as a "managed float" [10]. Central banks sometimes intervene to support a currency that is under attack by a hedge fund or other speculators. For example, a central bank may find that a hedge fund is speculating that its currency might depreciate substantially; thus, the hedge fund is building up speculative short positions. The central bank can purchase a large amount of its own currency to limit the amount of devaluation caused by the hedge fund [1].

On the other side, the Central Bank in Egypt had no other option but to move the Egyptian pound to a free market exchange rate with other currencies. The alternative was to lower its price voluntarily while maintaining the black market and being unable to secure required hard foreign currency reserves. Thus, a decision was made to float the pound in the free market while also increasing interest rates to a record high to persuade people not to dispose of the pounds they have [9]. The exchange rate has fallen from 8.8 Egyptian pounds to the US dollar, to 16 or 17 pounds. It was expected that the rate would reach 20 or 22 pounds per dollar, but the Central Bank pumped 100 million dollars into the market on Thursday, the first day of the change, selling to banks at a rate of 13 pounds per dollar. It also demanded that banks make a profit of no more than 10%. By doing so, the Central Bank guaranteed that the pound would not collapse on the first day of its floatation, thus postponing the predicted collapse in the exchange rate [9].

As the exchange rate of the pound went down, the Central Bank also raised interest rates by 3 per cent, to 15 per cent, a rate more than 20 times the dollar interest rate. This helped the exchange rate not to plummet as soon as the decision to float the pound was announced. However, the high interest rate doesn't really mean anything because the Egyptian pound lost more than 50 per cent of its value in one year, while the interest rate is still much less than that. In effect, the Central Bank took 50 per cent of people's savings and compensated them with 3 per cent (the additional interest), which is payable in one year. It is not important to explain the meaning of the decision to float the pound and the increase in the interest rate, because it has become a reality and people are now able to understand it as they're living the situation. What's more important is to answer the question of what comes after the floatation [9].

Moving the pound to a free market rate will necessarily lead to a continuous decline in the exchange rate. This is because the cash reserves of foreign currency are at their lowest level for several decades. At the same time, demand for hard currency is increasing because of the presence of trade imbalance. All of this means that, the pound is heading inevitably towards more falls. As to why it hasn't collapsed immediately, the Central Bank injecting extraordinary amounts of US dollars onto the market, but this is an exceptional movement and will not go on forever. Also, a loan from the International Monetary Fund, if received quickly, could slow down the collapse of the Egyptian pound; slowing down, though, does not mean that it will not happen. Lowering the rate of the pound and removing fuel subsidies mean that, Egyptians face an increase in prices of three or even four times for some commodities. Furthermore, local currency will lose its purchasing power, inflation rates will rise along with unemployment and the Egyptian economy — the second largest Arab economy — will enter a new phase of crises [9].

On the other hand, the bottom line is that the Central Bank and the other financial and monetary authorities in Egypt are running forward without taking steps necessary for decisive action, since such steps are linked to politics, the military and the barons of corruption. Thus, they are taking care of the immediately visible symptoms but are not providing long-lasting treatment of the original cause. Over the past three years, the Egyptian economy has survived on financial aid from the Gulf, including US dollar deposits payable with interest. Now it will survive further by living off a loan from the IMF for the next three years, on which interest is also paid [9]. It should be mentioned that; the central bank devalued the pound by 32 per cent as it set a new official exchange rate of 13 to the US dollar compared with 8.88 previously. It also raised its benchmark interest rate by 300 basis points to 14.75 per cent [10].

Nowadays, Egypt lives with the free exchange media, but the investment climate becomes more better. This style of investment may need for more and more of energy to help in insertion of new factories and companies despite the good modifications with the new law of investment in Egypt. Therefore, the energy subject can represent a vigorous item for deep researches so that the given work is appeared as one of the most today subjects. Since the EPG equivalent to Dollars are indicated in Table 3, the columns of Table 3 will be set for the suitable references of exchange possibility.

Table 3. Energy Cost Development ($).

kWh	1st stage	2nd stage	3rd stage	4th stage	5th stage	6th stage
K	**2.5**	**10/15**	**1/3**	**1/7**	**1/18**	**1/18**
100	4.5	3.33	3.66	2.14	0.57	1.44
200	12	8.33	9	5.14	3	4
300	21.6	14.66	19.17	11.14	6.06	7.89
400	32	21.66	31	18.07	9.67	12.33
500	43.5	29.33	44.5	25.93	13.83	17.33
600	61.26	53	58	33.79	18	22.33
700	79	76.66	76.48	44.5	23.56	28.58
800	96.75	99	100.15	58.07	30.5	36.08
900	114.6	121.33	123.82	71.64	37.44	43.58
1000	132.26	143.66	147.48	85.21	44.39	51.08

Then, the evaluated equivalent values in USD are deduced according to the reference values of Table A7 in the Appendix so that each stage will follow the general mathematical form as:

$$\text{USD Value} = \text{EGP value} \times K \quad (9)$$

It should be mentioned that, the value of K depends on the time of column according to Table A7 in the Appendix and so, it is indicated in the second row of Table 3 for each. Then, the energy cost in $ is accounted and drawn in Figure 15.

It is seen from Figure 15 that; these curves of cost differ from the original standard (Figure 1) due to the exchange balance for each time where the close values of first and second stages. Then, a high rise is appeared in the third stage relative to the second and then another high rise for the third stage. Contrary, the last two stages have the same values approximately. Thus, the parameters studied for energy costs above may diverse from the corresponding in USD and so, the next analysis may be necessary. This means for the scale of USD analysis that, very small rise of cost at the last (6^{th}) stage although it was a high increase in the energy cost referring to Figure 3, Figure 4 and Figure 5. Contrary, the cost at first and second stages is higher than the corresponding if the EGP is considered because it is clear from Figure 15 comparing to the results of Figure 3, Figure 4 and Figure 5.

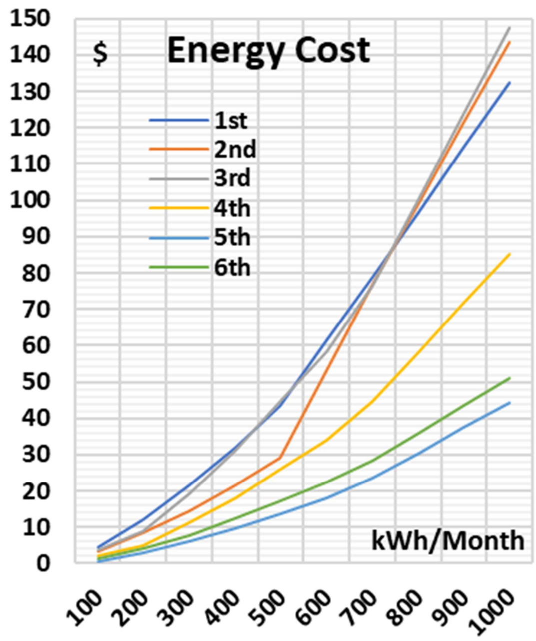

Figure 15. The energy costs for different energies (100-1000) kWh in USD.

Otherwise, the growth of energy cost is introduced for all stages of tariff and the results of computations are given in

Figure 16. The cost ratio is based on the first stage value where the results are given in per unit referring to the 1st stage. It is noticed that, the second, fourth and fifth stages went to a less cost referring to the base of first stage in contrary with the EGP characteristics, but the second stage of tariff began to be raised for the high level of energy consumption (700 kWh and above). On the other hand, the two stages (third and sixth) have a high initial value for the low energy consumption (less than 200 kWh) and go to be less at high energy consumption. it should be stated that, the third case oscillates to go up (200-500) kWh and then decayed for higher energy. This phenomenon proves that the tariff changes are useful for the Egyptian macroeconomics although the general vison appears to be a rising value internally at the local level of evaluation.

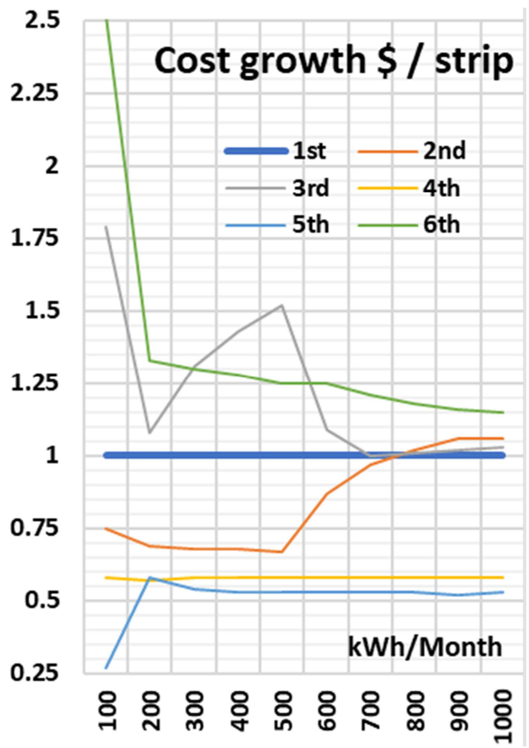

Figure 16. The Cost Growth Dependency (USD).

It can be remarked that, the results of Figure 16 are corresponding to that of Figure 10 since Figure 10 and Figure 16 present the cost growth in Egypt within the studied period in the units of P E and USD, respectively. Therefore, the distraction of both money systems is highly clear although the comparison is taken for the same studied values. This means that the EGP floating in the market resolved the problem of electricity support if the energy consumption tariff history is considered. Otherwise, results of the USD costs for the domestic energy consumption in Egypt within the accounted period lead to importance for floating principle because the cost of energy consumption is improved referring to Figure 16.

3. Conclusion

As the manual readings have a relatively high distortion, the mathematical treatment will be very urgent to reach the right target for the cost of domestic energy as a branch in the field of energy consumption. Thus, the theoretical analysis either mathematical or statistical should be implemented to the treated data freely and the results must be real and accurate.

Apparent costs can be presented in the readings of energy consumption since the manual registration for the domestic energy consumption is implemented. Therefore, an automatic control system for the registration process may be applied so that the utilization of last innovations for computers and communication may be required. Then, the computerized system besides the internet utility can be the way to overcome the problem of incorrect readings times.

Recently, the energy represents the most important title for researches around the world in general so that the simplification methods for saving the fuel consumption required for the electric generation may be needed. So, the cost rise for high levels of consumption would be the rationalized way to improve such condition everywhere but the protection base for social statements must be accounted. Thus, the strategy of strip tariff principles in developing countries is preferred to confirm the integration performance of society in the country.

Since the financial support for people in the developing countries such as Egypt is considered for a long time, the freedom of financial system may be the good way for advancing the country and its macroeconomics. However, the domestic sector can represent all other sectors so that its study for economics may be necessary. Then, cost of energy consumption is inserted for analysis and the results prove that the EGP floating in 2016 improved the energy cost to the real values which appeared in lower level than the corresponding in EGP before.

The manual process for costing the energy cost must be modified if the target is the implementation of accurate system for the domestic energy cost. Since the semi-cyclic base for readings of energy consumption is based, the cost ***excess*** and consequentially, the rate of rise of energy cost would lead to apparent costs although the correlation process may be simple. Thus, the continuous averaging of costs every month will be the most suitable for simple evaluation of energy consumption in general.

Appendix

Table A1. The calculated cost difference between dynamic / static tariff.

Energy	Domestic Loads				Commercial Loads			
(kWh)	Pitch (P. T.)	Energy cost / average	Cost / strip	Rate of increase	Pitch (P. T.)	Energy cost / average	Cost / strip	increase Rate
100	75	180	180	0	90	210	210	0
125		300	255	45		356.25	300	56.2
150		360	330	30		427.5	390	37.5
175		420	405	15		498.75	480	18.7
200		480	480	0		570	570	0
225	95	643.5	575	68.5	160	906.75	730	176.7
250		715	670	45		1007.5	890	117.5
275		786.5	765	21.5		1108.25	1050	58.2
300		860	860	0		1210	1210	0
325	105	1040	965	75	190	1600.62	1400	200.6
350		1120	1070	50		1723.75	1590	133.7
375		1200	1175	25		1846.87	1780	66.8
400		1280	1280	0		1970	1970	0
425	115	1479	1395	84	220	2422.5	2190	232.5
450		1566	1510	56		2565	2410	155
475		1653	1625	28		2707.5	2630	77.5
500		1740	1740	0		2850	2850	0
600	355	3174	2095	1079	500	4710	3350	1360
700		3703	2450	1253		5495	3850	1645
800		4232	2805	1427		6280	4350	1930
900		4761	3160	1601		7065	4850	2215
1000		5290	5290	0		7850	7850	0

Source: Ministry of Electricity & Renewable Energy

Table A2. The last tariff for the domestic sector in Egypt (L E / kWh).

kWh	Single Stage	EGP (1980)	EGP (1990)	EGP (2000)	EGP (2016)	Double Stage	EGP (2017)	Triple Stage	EGP (2018)
0-50		0.018	0.05	0.075	0.11		0.13	First Stage	0.22
51-100		0.018	0.05	0.145	0.19		0.22		0.30
101- 200		0.03	0.075	0.16	0.21		0.22		0.30
0-200							0.27		0.36
201-300		0.038	0.095	0.305	0.42		0.55		0.70
301-350		0.042	0.105	0.305	0.42		0.75		0.70
351-400	First Stage	0.042	0.105	0.405	0.55	Ascending price	0.75	Second Stage	0.90
401-500		0.046	0.115	0.405	0.55		0.75		0.90
501-650		0.071	0.355	0.405	0.55		0.75		0.90
651-1000		0.071	0.355	0.71	0.95		1.25		1.35
651-1000		0.071	0.355	0.71	0.95		1.25		1.35
>1000		0.12	0.355	0.84	0.95		1.25		1.45
0 - 1000								Third Stage	

Source: Ministry of Electricity & Renewable Energy

Table A3. The Original (Reference) Energy Cost Development (EGP).

kWh/Stage	1st (1980)	2nd (1988)	3rd (1993)	4th (2013)	5th (2016)	6th (2018)
100	180	500	1100	1500	1750	2600
200	480	1250	2700	3600	3950 (5400)	5600 (7200)
300	860	2200	5750	7800	10900	14200
400	1280	3250	9300	12650	17400	22200
500	1740	4400	13350	18150	24900	31200
600	2450	7950	17400	23650	32400	40200
700	3160	11500	22945	31150	42400	51450
800	3870	14850	30045	40650	54900	64950
900	4580	18200	37145	50150	67400	78450
1000	5290	21550	44245	59650	79900	91950

Source: Ministry of Electricity & Renewable Energy

Table A4. Map of the annual average increase of energy cost (L E / Year) for 40-140 kWh/Month.

kWh	40	91	95	102	110	120	123	124	125	126	128	130	140	144	150	155	160	162
1980																		
1981																		
1982																		
1983																		
1984																		
1985																		
1986									0.117							0.641		
1987																		
1988																		
1989																		
1990																		
1991																		
1992																		
1993														0.286		2.39		
1994																	0.479	
1995	0.046									0.026			0.296					
1996															0.562			0.546
1997																		
1998																		
1999																		
2000																		
2001				0.292				0.317										
2002													0.2					
2003			0.198															0.5
2004												0.34			1.0			
2005		0.265													0.42		0.47	
2006															0.456			
2007													0.405					
2008										1.17		0.364						
2009							1.17											
2010																		
2011						2.383												
2012			1.00								2.28							
2013								6.65										
2014					2.626													
2015																		
2016																		
2017																		
2018																		

Table A5. Map of the annual average increase of energy cost (L E / Year) for 144-194 kWh/Month.

kWh	164	169	176	180	184	187	188	190	193	194
1980										
1981										
1982										
1983										
1984										
1985										
1986										
1987										
1988										
1989										
1990										
1991										
1992										
1993				0.793			2.33			
1994			0.934			000			1.243	
1995		0.776						0.641		
1996										
1997										
1998	0.742									
1999						0.248				0.254
2000			0.167		0.419					
2001										
2002										

kWh	164	169	176	180	184	187	188	190	193	194
2003										
2004										
2005										
2006										
2007										
2008										0.863
2009										
2010								1.483		
2011				1.088	0.46					
2012										
2013										
2014										
2015										
2016										
2017				8.1						
2018										

Table A6. Map of the annual average increase of energy cost (L E / Year) for 195-470 kWh/Month.

kWh	195	198	200	206	208	214	220	230	240	250	274	286	300	470
1980														
1981														
1982														
1983														
1984														
1985													1.262	
1986							000							1.262
1987			000											
1988														
1989								0.899						
1990									0.675					
1991														
1992			1.128				1.461			1.26				
1993					1.072									
1994	000												1.335	
1995											0.998	0.763		
1996														
1997		0.782												
1998														
1999							000	000						
2000										000				
2001			000										000	
2002				1.277										
2003					0.469	1.85		0.88					1.077	
2004							0.68							
2005														
2006	8.412					1.038								
2007							1.42		0.78					
2008														
2009								0.666						
2010														
2011														
2012														
2013														
2014														
2015														
2016														
2017														
2018														

Table A7. The Exchange official equivalence of EGP and USD.

Date	Official Equivalence	Date	Official Equivalence
1789-1799	EGP 0.03	2003	EGP 4.82 - EGP 6.25
1800 -1824	EGP 0.06	2004	EGP 6.13 - EGP 6.28
1825 -1884	EGP 0.14	2005 -2006	EGP 5.75
1885 -1939	EGP 0.20	2007	EGP 5.64 - EGP 5.5

Date	Official Equivalence	Date	Official Equivalence
1940 -1949	EGP 0.25	2008	EGP 5.5 - EGP 5.29
1950 -1967	EGP 0.36	2009	EGP 5.75
1968 -1978	EGP 0.40	2010	EGP 5.80
1979 -1988	EGP 0.60	2011	EGP 5.95
1989	EGP 0.83	2012	EGP 6.36
1990	EGP 1.50	2013	EGP 6.5 -6.96
1991	EGP 3.00	2014	7.15 EGP
1992	EGP 3.33	30 Jan 2015	7.55 EGP
1993 -1998	EGP 3.39	14 March2016	8.95 EGP
1999	EGP 3.40	30 March2016	8.88 EGP
2000	EGP 3.42 - EGP 3.75	03 Nov 2016	13.00 EGP
2001	EGP 3.75 - EGP 4.50	19 Jan 2017	EGP 18.85
2002	EGP 4.50 - EGP 4.62	7 June 2018	EGP 17.86

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