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The Relationship between Gross Disposable Income and Consumption and Estimating the Consumption Function for Palestine

Mr. Wisam A. Samarah[1,*]

[1]Planning Department, Al-Quds Open University, Ramallah, State of Palestine

*** Corresponding author**
e-mail address: wsamarah@hotmail.com

Abstract

The purpose of this paper is to analyze the relationship between Gross Disposable Income (GDI) and consumption, and estimate the consumption function for Palestine. Three econometric models were constructed to estimate the consumption function. A time series and a regression analysis were performed. The data was collected from the Palestinian Central Bureau of Statistics. The time series analysis found that GDI and growth of consumption are co-integrated, that is they have long term relationships and GDI granger causes growth of consumption. The three regression models estimated both the short run and long run consumption functions. The results will help the policy makers to direct fiscal policy in a manner that will improve the standard of living for the Palestinian people.

Keywords:
Consumption Function, Cointegration, Granger Causality.

العلاقة بين الدخل المتاح الإجمالي والاستهلاك وتقدير دالة الاستهلاك لفلسطين

الهدف من هذه الدراسة هو دراسة العلاقة بين الدخل المتاح الإجمالي والاستهلاك وتقدير دالة الاستهلاك. تم بناء ثلاث نماذج انحدار من أجل تقدير دالة الاستهلاك في فلسطين. ثم أجرى تحليل الانحدار والسلاسل الزمنية. أخذت البيانات من الجهاز المركزي للإحصاء الفلسطيني. وقد تبين من نتائج التحليل السلاسل الزمنية أن الدخل المتاح الإجمالي ونمو الاستهلاك بينهما تكامل مشترك (Co-integrated). أي أنه يوجد علاقة طويلة الأمد بين المتغيرين والدخل المتاح الإجمالي جرانجر السبب نمو الاستهلاك. تم تقدير دالة الاستهلاك على المدى القصير والطويل باستخدام نماذج الانحدار الثلاثة. سوف تساعد هذه النتائج صانعي القرار في اتخاذ القرارات السليمة بخصوص السياسات النقدية التي تؤدي إلى تحسين المستوى المعيشي للمواطن الفلسطيني.

كلمات مفتاحية:
دالة الاستهلاك، علاقة طويلة الأمد، تأثيرات جرانجر.

Introduction:

The Palestinian economy is classified as a small open economy, subject to a number of constraints. These constraints prohibit its ability to grow and maintain a sustainable development. These constraints include the continued Israeli occupation, the dependence on the Israeli economy, the dependence on the politically-influenced foreign aid, and the increasing levels of both economic and political uncertainties. Thus it is important to try and understand the effects of these instabilities on the consumer's consumption behavior. The purpose of this paper is to analyze the relationship between consumption and Gross Disposable Income (GDI), and estimate the consumption function in both the short run and long run for Palestine.

In 2012, the Palestinian economy registered a slower growth rate and a rising unemployment in both the West Bank (WB) and Gaza Strip (GS). This was due to a number of factors. The most important of which are the absence of political prospects, Israeli blockades, closures, restrictions on access and movements, and the considerable decline in foreign aid. In spite of these challenges, the Palestinian economy had continued to experience a positive growth rate for the six consecutive years. Nonetheless, this growth had continued to decrease, especially in the past two years. In 2011, the growth rate in the real GDP was 12.2 percent, which decreased to 5.9 percent in 2012 (Economic and Social Monitor, 2013, p. 21).

According to a standard life-cycle permanent income model, consumption is proportional to lifetime disposable resources or permanent incomes. Therefore, all consumers respond in a similar way to changes in disposable income. This is why we will take a closer look at the Palestinian real aggregate demand which is the sum of total expenditures which are consumption, investment, government spending and exports minus imports. The real aggregate demand had experienced different degrees of growth in 2012. Both consumption and government spending grew by 12 percent and 14.4 percent respectively. Taking into consideration the past government spending, we notice that there was a reduction in the amount of spending. In 2010 the government spending increased by 31 percent which was considered as a significant up surge, when compared to a 16.4 percent rate in 2009 (Economic and Social Monitor, 2013, p. 27).

Consumption behavior is influenced by government spending. So it is important to assess and better understand the financial situation of the government. The Palestinian Authority (PA) – which is the governing body of the West Bank and Gaza- had faced various political and economic obstacles as a result of the substantial shortages in foreign aid in 2012. In addition, revenue collection was lower than expected. This led to the inability of PA to fulfill its obligations especially towards the employees of the public sector, private sector, and suppliers (Economic and Social Monitor, 2013, p. 45).

Literature Review:

A number of economists had tackled the relationship between consumption and income in Palestine to try and solve the problems of the Palestinian economy. Two of these where Paul de Boer and Marco Messaglia, were they studied this relationship in their paper titled "Estimation of income elasticities and their use in a CGE model for Palestine". The Linear Expenditure Systems (LES) was utilized to estimate the consumption block for the computable general equilibrium model (CGE). In the LES, the Engel curves are straight lines. The LES did not allow the presence of inferior commodities, elastic demand, and for gross substitution. To represent reality –where non-straight Engel curves, inferior commodities, elastic demand, and gross substitution exist- the use of the Indirect Addilog System (IAS) was suggested. Thus the income elasticities of the IAS were estimated from the 1998 Palestinian Expenditure and Consumption Survey (PECS). Calculating the income elasticities using the IAS model helped in trying to explain the consumption behavior (Boer and Missaglia, 2006, p. 1).

Another economist that talked about the consumption was Dr. Majed Sbaih in his paper the "Savings Gap and the Policies that Limits its Increase in the Palestinian Economy for the Period the 1994 to 2009". The main objective of the paper was to study the savings gap and how it developed. The paper also identified the most important factors affecting it. The descriptive analysis of the variables of the national accounts, the general budget, and the balance of trade was used. The research attempted to use the regression analysis approach, but it showed no significance. Nonetheless, the study showed that the savings gap was positively correlated to the final consumption expenditure, budget deficit and trade deficit (Sbeih, 2011, p. 13).

A more regress approach was adopted by Samir Safi and Khalil Elnamourty in their paper "Building Logistic Regression Model to Identify Determinants of Poverty in Palestine". This paper aimed at determining the key determinants of poverty status of a household since the implementation of the economic reform program in Palestine. Through the utilization of Logistic regression model, the study found that the chance of a household to fall into poverty increases due to the unemployed adults, large number of children less than 18 years old, and the large dependency ratio (Elnamourty and Safi, 2012, p. 85).

A different approach to stimulate the Palestinian economy was adapted by Dr. Omar Abu Eideh in his paper "Palestinian Exports Performance and Its Impact on Economic Growth: An Econometric Study during the Period (1994 – 2011): One of the issues that the paper studied is the relationship between the exports and economic growth. An Econometric model was utilized to capture this relationship. The results revealed that there is a positive relationship between the Palestinian exports and the growth of the GDP. Thus the Palestinian exports have a positive impact on the growth of the GDP. One of the recommendations that the research proposed as a result of his findings was, more policies should be aimed at developing and strengthening the manufacturing sector (Abu Eideh, 2013, p. 347).

The final paper in this literature review is entitled "Fiscal Policy and MPC heterogeneity". In this paper a survey of the 2010 questioner of the Italian Survey of Household Income and Wealth was utilized. This survey asked consumers how much of an unexpected transitory income change they would consume. One of the findings of the paper was that the MPC was 0.48 percent on average. In addition, there is a substantial heterogeneity in the distribution. The results of the paper have a vital role in evaluating fiscal policy and predicting household responses to both tax reforms and redistributive policies (Jappelli and Pistaferri, 2014, p. 107). .

In this paper we will solve the problems faced by the Palestinian economy based on calculating the MPC and thus building the foundation for a sensible fiscal policy.

Economic Theory:

The relationship between aggregate consumption (and aggregate savings) and aggregate income, known as the consumption function, had occupied a major role in economic thinking. This interest had manifested ever since Keynes published his theoretical structure in "The General Theory", where the consumption function was a keystone in his theory. Keynes considered current consumption expenditure is highly dependable and stable on current income. Thus taking this relationship for granted, "The amount of aggregate consumption mainly depends on the amount of aggregate income (both measured in terms of wage units)." (Keynes, 1936, p. 96). He identified this relationship as a "fundamental psychological rule of any modern community that, when its real income is increased, it will not increase its consumption by an equal absolute amount," (Keynes, 1936, p. 97), and stated somewhat less definitely that "as a rule, a greater pro-portion of income … (is) saved as real income increases." (Keynes, 1936, p. 97).

The theoretical work had stimulated the empirical work. In order to test Keynes hypothesis two kinds of data where used to estimate the consumption function. One is the time series on consumption, savings, income, prices, and similar variables for the time period after World War I; the second, budget data on consumption, savings, and income on both individuals and families from a number of sample surveys carried out during the past one and a half century. The two data sets confirmed Keynes's hypothesis giving the following results:

1. Current consumption expenditure and income were highly correlated.
2. The marginal propensity to consume was less than one.
3. The marginal propensity to consume was less than the average propensity to consume.

Thus the percentage of income saved had to increase with the increase in income (Friedman, 1957, p. 3).

As a result the following consumption function was developed:

$$C = a + b(Y - T) \quad (1)$$

where C is consumption, a is autonomous consumption, b is MPC, Y is income, and T is taxes. The autonomous consumption is the level of consumption that is not related to changes in disposable income (Y-T). MPC is the amount by which consumption rises when disposable income rises by $1. Equation (1) resembles the equation of the line.

Nonetheless, Kuzents carried out estimates of savings for the United States using data starting from the period since 1899. The study showed no rise in the percentage of savings from the income during the past half-century despite the substantial increase in the real income. This of course conflicted with the Keynesian hypothesis. This conflict gave rise to a number of theories most famous of which is the permanent income hypothesis by Milton Friedman (Friedman, 1957, p. 3).

In its general form, the permanent income hypothesis is given by the following three equations:

$$c_p = k(i, w, u)y_p \quad (2a)$$
$$y = y_p + y_t \quad (2b)$$
$$c = c_p + c_t \quad (2c)$$

Equation (2a) defines the relationship between permanent consumption and permanent income. In this equation, it is clear that the ratio between the two variables is independent on the size of permanent income, however, it is dependent on the following variables: (1) interest rates (I) or the rates at which the consumer unit can borrow or lend; (2) the property and nonproperty income given by the symbol (w) which represents the ratio of nonhuman wealth to income; and (3) the factors that represents the consumer's tastes and preferences for consumption versus addition of wealth which is represented by (u). These factors include (a) the number of consumers in the unit and their characteristics, in particular their ages; and (b) the level of importance of the transitory affecting both the consumption and income (Friedman, 1957, p.30).

In equation (2b) y represents the consumer unit's measured income of a given period of time, y_p represents permanent income, and y_t represents transitory income. This equation states that income is the sum of the permanent and transitory income. The permanent income represents the income generated by the unit from factors that determines the unit's capital value or wealth. These factors include the nonhuman wealth it owns, the personal attributes earners in the unit – an example of this is training, ability, personality -, and the attributes of the economic activity of the earners –this includes the occupation followed and the location of the economic activity. The transitory income includes all the "other" factors. These factors might be either accidental or by chance occurrences. However, from another point of view, this might be the predictable effect of specifiable forces such as cyclical fluctuations in economic activity.

Similarly, equation (2c) represents the components of the consumer unit's expenditure. Where c represents the consumer unit's expenditure for some given period of time, c_p is the permanent consumer unit's expenditure, and c_t is the transitory consumer unit's expenditure. This equation indicates that consumer unit's consumption is the sum of the permanent and transitory components. The same logic applies to the consumption, where some of the factors that result in the transitory component are specific to the consumer unit such as unusual sickness, a good favorable opportunity to purchase a commodity, and so on. Meanwhile, other factors may affect a group of consumers. For example, an excellent harvest.

The transitory component in either equations – equation (2b) and (2c) - include the errors in measurements. In its general form, the following assumptions apply to the permanent income hypothesis:

$$Corr(y_p,y_t) = Corr(c_t,c_p) = Corr(y_t,c_t) = 0$$

where Corr represents the correlation coefficients between the variables with the given subscripts (Friedman, 1957, p.26) .

Now we will further assume that:

$$y_p = (1 - \lambda) \sum_{T=0}^{\infty} \lambda^T y_{t-T} \quad 0 \leq \lambda < 1$$

and add c_t on both sides of equation (2a), we will write the consumption function using Koyck's transformation as follows:

$$C_t = \beta_1 Y_t + \beta_2 c_{t-1} + w_t \qquad (3)$$

Where,

$\beta_1 = k(1-\lambda)$

$\beta_2 = \lambda$

$w_t = c_{tt} - \lambda\, c_{tt-1} = c_{tt} - \beta_2\, c_{tt-1}$

(Singh and Ullah, 1976: 96). According to the theory $\frac{\beta 1}{1-\beta 2}$ should equal to one.

Brown suggested a similar consumption function to that of Friedman's in 1952. Where the implications of his "habit persistence" hypothesis was given by the following function:

$$C_t = \beta_0 + \beta_1 Y_t + \beta_2 c_{t-1} + u_t \qquad (4)$$

Brown used the lag consumption as one of the regressors to represent the slowness in the consumer demand to respond to a change in income. The slowness in the reaction of consumers to the changes in income, is a result of the inertia caused by the "habits, customs, standards, and the levels associated with real consumption previously enjoyed" are likely to formulate the "the human physiological and psychological systems" (Singh and Ullah, 1976, p. 97).

At the first glance one might think that the two consumption functions are the same. However, a careful analysis of the two hypotheses would show the differences. One of the major differences between the Habit Persistence hypothesis (HPH) and the Permanent Income hypothesis (PIH), is that if income falls by a $100, consumption will fall by K*100. Meanwhile, in the HPH, the fall in income by $100 will result in a less than fall in consumption. Thus consumption will fall in a less than proportionate amount to income. This is simply due to the hysteresis in consumer's habits. Due to the fact that the hysteresis is a short run phenomenon, and the rational consumer will adjust –rather slowly- his consumption behavior in the long run. One would interpret HPH as a short run hypothesis and PIH as a long run hypothesis (Singh and Ullah, 1976, p. 97).

A second major theoretical difference is that in the PIH model the consumer takes into account both the past records of his income and the expected future income when planning his consumption. Nonetheless, in the HPH only the past records of consumption that are based on current income are taken into consideration. Thus we can assert that Friedman's rational consumer carefully plans his consumption given that he has both the prudence and farsightedness, whereas Brown's consumer has neither and dictated by his habits. This is why in this paper we will calculate the two consumption functions for the sake of comparison between the long run and short run. However, Friedman's model will be adapted (Singh and Ullah, 1976, p. 97).

Econometric Model:

The Least Square model will be used to estimate the consumption function for Palestine. Here we will use the Classical Regression Model represented by the equation

$$Y = \alpha + \beta x + €$$

where, Y is the dependent variable, α is the y intercept, β is the coefficient that represents the slope of the line or the rate of change, X is the independent variable, and € is the error term (Greene, 1995, p. 143).

The Ordinary Least Square model is the best linear and unbias estimator. Nevertheless, in order for these properties to be acquired, there are certain assumptions that must be satisfied. In other words, the following assumptions must hold for the classical regression model:

1. The explanatory variable X is non-stochastic.
2. Linearity: the functional form is $y_i = \alpha + \beta X_i + €$ for I = 1…n.
3. Zero mean of the disturbance: $E(€_i) = 0$ for all i.
4. Homoscedasticity: $Var(€_I) = E(€_I - E(€_I))^2 = E(€_I 2) = \sigma^2$ =constant for all i.
5. Nonautocor relation of the regressor and disturbance: $Cov(x_I, €_j) = 0$ for all i≠j.
6. Each $€_I$ is normally distributed .

Thus these are the basic assumptions that make up the general linear regression model (Greene, 1995, p. 143).

The simple regression model can be expanded by adding more explanatory variables. This will further add to the accuracy of the model. Adding more explanatory variables will aid in further explaining the variations in the Y variable. This makes the model more powerful.

The multiple regression model has the following form:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + €$$

where Y is the dependent variable; α is the y intercept; X_1, X_2, …, X_n are the independent variables; β_1, β_2,, and β_n are the coefficient of the X variables; € is the error term (Greene, 1995, p. 170).

To be able to allow the regression model to take into consideration qualitative variables, we will introduce the concept of dummy variables. A dummy variable is a variable that can take into consideration a quantitative property. This can be done by quantifying the property, 1 to the presence of the property and equating 0 to indicate the alternative. For example, D = 1 can represent a male and D = 0 represent a female. This example demonstrates how the variable D quantifies the sex. Thus variables that assume such values as 0 and 1 are called dummy variables. These variables are essentially a way to classify data in mutually exclusive categories such as level of educational attainment and marital status (Griffiths, Hill, Judge, Lee, and Lutkepohl, 1988, p. 421).

The dummy variable increases the ability of the regression model to not only take into consideration the quantitative variables, but also the qualitative variables. This is demonstrated by the equation below

$$Y = \alpha + \beta_1 D + \beta_2 X + \beta_3 (DX) + €$$

where α is the intercept, β_1 is the coefficient of the dummy variable, β_2 is the coefficient of the explanatory variable, β_3 is the coefficient of the product of the dummy variable and explanatory variable, D is the dummy variable, X is the explanatory variable, and € is the error term. Here D takes the value of either 1 or 0 (Griffiths, et al…., 1988, p. 426).

β_1 is called the differential intercept and β_3 is called the differential slope coefficient. The differential slope coefficient shows the change in the slope coefficient due to the presence of the dummy variable. Notice how the introduction of the dummy variable in the interactive or multiplicative form (D multiplied by X), enables us to differentiate between the coefficient of the X variable β_2 and β_3. Thus showing the effect of the dummy variable on the explanatory variable. This is similar to the introduction of the dummy variable in the additive form, which enabled us to differentiate between the intercepts of the two categories, thus showing the effect of the dummy variable on the intercept (Griffiths, et al…., 1988, p.429).

Dummy variables are a flexible tool that can deal with a number of issues. Consider the following example

$$Y = \alpha + \beta_1 D_1 + \beta_2 D_2 + \beta_3 X + \beta_4 (D_1 D_2) + €$$

where α is the intercept, β_1 is the differential intercept, β_2 is the differential intercept, β_3 is the differential for both the dummy variables, and € is the error term (Griffiths, et al.., 1988, p.431).

In the above equation, the interaction dummy (the product of the two qualitative or dummy variables) modifies the effects of the categories that are considered individually. Thus the product of the two dummy variables gives different combinations of the two categories. That is, if each of the two dummy variable has a value of 1 or 0, when interact the two dummies the result is 1 1, 1 0, 0 1, and 0 0. This enables the regression model to take into consideration more possibilities.

The following econometric model is constructed in order to derive Brown's consumption function:

$$c_2 = \beta_0 + \beta_1 (GDI) + \beta_2 (c_1) + €$$

where c_2 is present consumption, β_0 is the intercept, β_1 is rate of change for the GDI, GDI is the Gross Disposable Income, β_2 is the rate of change for the previous consumption, c_1 is the consumption level for the previous year, € is the error term. However, two dummy variables are added to our model in order to estimate the effects of the Second Intifada and the Hamas led unity government arriving at the following model:

$$c_2 = \beta_0 + \beta_1(GDI*D1*D2) + \beta_2(c_1*D1*D2) + D1 + D2 + €$$

where D1 equals to zero for the period of the Second Intifada and one for no Intifada, and D2 equals one for a united non-Hamas government and zero for a united Hamas government. By multiplying the two dummy variables by the GDI and c1 we remove the effects of both the Second Intifada and the united Hamas government from the data.

In order to remove the intercept term from the regression equation, we standardize the variables. Thus we use the z-score equation in order to transform the values of the variables into the standard normal distribution. The following equation is used for the transformation process:

$$z = \frac{x - \bar{x}}{s}$$

where s is the standard deviation and n is sample size. This formula will be used for both the dependent and the independent variables. By doing so, all the variables will have a mean of 0 and a standard deviation of 1. By applying the new mean values to the intercept formula we obtain a zero value for the intercept term. Thus the regression equation will have no intercept term. Hence we have the following regression model:

$$Y = \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + €$$

This will result in an econometric model that represents Friedman's consumption function:

$$c_2 = \beta_1 GDI + \beta_2 c_1 + €$$

Now let us relax the first and six assumption of the Least Squares regression model, where the regressors are stochastic and the disturbances are autocorrelated. The existence of autocorrelation in the disturbances will take us to the topic of time series analysis. This brings us to the general form of

$$y_t = \beta_1 + \beta_2 x_t + \beta_3 y_{t-1} + \ldots + €_t$$

where y_t is the dependent variable, x_t contemporaneous (and perhaps lagged) factors, $€_t$ is the disturbances, and y_{t-1} is its own past. Thus the path of the dependent variable y_t is described by the above variables including the disturbances. Here the time series is a single occurrence of a random event (Greene, 1995, p. 413).

In a stochastic time series model the generating process is a combination of a starting value and a sequence of a purely random component, hence, a zero-mean "innovations" $€_t$ in a dynamic structure that produces the y_t variable. Thus unlike the deterministic models, y_t is not dependent on the t or the y(t), but rather it is dependent on an initial value of y_0 and a purely random component of a history of innovations of $€_1$, $€_2$,… In other words, observations of the variable y_t are realizations of a random variable where we assume these random variables are a part of an infinite sequence of random variables. This sequence is called a stochastic process (Greene, 1995, p. 414).

We notice that in a stochastic time series models the $€_t$ no longer represents error terms or unexplained deviations of y_t from a predetermined time path of y(t), but instead they are unexpected new changes or innovations in the level of y_t which will influence the new levels of y_{t+n}.

Stochastic processes are said to be stationary if the following holds true:

1. A constant mean, $E(y_t) = \mu$ for all t.
2. A constant and finite variance, $var(y_t) < \infty$.
3. A constant covariance, $cov(y_t,y_{t+n}) = E[(y_t-\mu)(y_{t+n}-\mu)] = y_n$ for all t and n. Nonetheless, if n = 0, then $var(y_t)$ is time invariant. A constant covariance implies a constant autocorrelation.

Stationary is an important concept to be examined, it guarantees that there are no fundamental fluctuations in the structure of the process. Thus, this property allows the possibility of predicting future values, i.e. the absence of this property for a variable would make it either impossible or difficult to predict future values.

Results:

The data was collected from the Palestinian Central Bureau of Statistics covering the period from 1994 to 2013, and the Statistical Analysis System (SAS) was used to run the regression models. Now we will run a unit root test to determine whether the variables are stationary or non-stationary. We will start by testing the consumption variable. Thus we have the following hypothesis:

H_o: C2 has a unit root

H_A: C2 has no unit root

Using α= 0.05 and the p-value of the t-test for the Augmented Dickey-Fuller test is 0.0021 – thus α > p-value, we reject the null hypothesis and thus c2 has no unit root at lag length of 1.

Now we will repeat the unit root test for the GDI variable.

H_o: GDI has a unit root

H_A: GDI has no unit root

Using α= 0.05 and the p-value of the t-test for the Augmented Dickey-Fuller test is 0.0164 – thus α > p-value, we reject the null hypothesis and thus GDI has no unit root at lag length of 0. In this case the cointegrated test is the most appropriate. Thus we want to see whether the growth in consumption and GDI share a common stochastic drifts. Running the trace test indicates that 1 cointegrating eqn(s) at the 0.05 level. Thus the growth in consumption is cointegrated with GDI.

This leads us to our final test, which is Pairwise Granger Causality Test. So we have the following null and alternative hypothesis:

H_o: GDI does not Granger cause growth in consumption

H_A: GDI does Granger cause growth in consumption

Using α= 0.05 and the p-value of the f-test from the software output is 0.0343 – thus α > p-value, we reject the null hypothesis.

Now we test the other way around:

H_o: Growth of consumption does not Granger cause GDI

H_A: Growth in consumption does Granger cause GDI

Using α= 0.05 and the p-value of the f-test from the software output is 0.8231 – thus α < p-value, we fail to reject the null hypothesis.

Model 1:

We will now test whether the parameters are significant. When we say the parameters are significant, we mean that all the beta coefficients do not equal to zero, i.e. it is significantly different from zero. We will start with the f-test with the following null and alternative hypothesis:

H_o: $\beta_1 = \beta_2 = 0$

H_A: At least one of the $\beta s \neq 0$

Using α = 0.05 and the p-value of the f-test is <0.0001 –thus α > p-value, we reject the null hypothesis. Thus at least one beta is significant.

Now we carry out the t-test, were we test each of the betas individually.

H_o: $\beta_0 = 0$

H_A: $\beta_0 \neq 0$

Using σ= 0.05 and the p-value of the t-test is 0.3665 – thus α < p-value, we fail to reject the null hypothesis and thus the beta is not significant.

We repeat the procedure for β_1 and β_2 using α= 0.05 and the p-value of the t-test is 0.0025 and

0.0005 respectively – thus α > p-values in both cases. rejecting the null hypothesis and thus the betas are significant. Hence, the GDI and past consumption do explain the fluctuations in the present consumption.

We know have the following model:

$$c2 = 0.44GDI + 0.62c1$$

This model has an R^2 of 0.992, thus 99.2 percent of the variations in the present consumption is explained by the regression model. This is considered to be an excellent fit, i.e. the model is an excellent fit for the data.

Model 2:

Know we add our dummy variables to remove the effects of the political instabilities. After running the regression with dummy variables. Using α = 0.05 and the p-value of the f-test is <0.0001 –thus the α > p-value, we reject the null hypothesis. As before we will conduct the t-test for each of the individual betas. Starting out with β_0 and using α = 0.05 and the p-value of the t-test is <0.0001 – thus α > p-value, we reject the null hypothesis and thus the beta is significant. Hence, the intercept value is $11,819,000,000. β_1 , β_2 , β_3 ,and β_4 are tested using an α = 0.05 and the p-values of the t-tests are 0.0464, 0.0003, <0.0001, and <0.0001 respectively – thus α > p-values, we reject the null hypothesis and thus the betas are significant. Thus we now have the following model:

$$y = 11819 + 0.30x1 + 0.76x2 - 4746.87D1 - 70271D2$$

where y = c2, x1 = GDI*D1*D2, and x2 = c1*D1*D2. This model has an R^2 of 0.9936, thus 99.36 percent of the variations in the present consumption is explained by the regression model. This is an excellent fit.

Model 3:

We standardize all the variables –with a mean of 0 and a standard deviation of 1, and we run the regression. Using α = 0.05 and the p-value of the f-test is <0.0001 –thus the α > p-value, we reject the null hypothesis. Thus at least one of the beta is significant. Conducting a t-test for β_0 with a p-value of 1 – thus α < p-value, we fail to reject the null hypothesis and thus the beta is not significant.

We repeat the procedure for β_1 and β_2, using α= 0.05 and the p-values of the t-tests are 0.0025 and 0.0005 respectively – thus α > p-value, we reject the null hypothesis and thus the betas are significant. Hence, we have the following model:

$$c2 = 0.45GDI + 0.55c1$$

The GDI, c1, and c2 variables are all standardized with a mean of 0 and a standard deviation of 1. This model has an R^2 of 0.9920, thus 99.2 percent of the variations in the present consumption is explained by the regression model. This is an excellent fit.

Discussion:

Our time series analysis found that consumption has no unit root at the second difference and the GDI has no unit root at the first difference. Then a cointegration test was conducted and found that GDI and growth in consumption are cointegrated, that is they have long term relationship. In addition, GDI does Granger cause growth in consumption. In other words, the information of past and present GDI variable, helps to improve the forecasts of the growth in consumption variable.

To measure the magnitude of the relationship between consumption and GDI we look at model 1. According to model 1. The intercept term was not significant. In addition, a one unit increase in GDI will result in a 0.44 increase in present consumption, i.e., one dollar increase in GDI will result in a 0.44 dollar increase in present consumption. Meanwhile, a one unit increase in last year's consumption will result in an increase of 0.62 unit increase in present consumption. In other words, a one dollar increase in last year's consumption will result in an increase of 0.62 dollar in the present consumption.

To find the MPC we take the derivative of the consumption function with respect to GDI. Thus we have,

$$\frac{dc2}{dGDI} = 0.44$$

This yields an MPC of 0.44. Thus in Palestine people consume 0.44 dollar of an increase in their

GDI by one dollar. According to Brown, this is the value of the MPC in the short run.

Model 2, the addition of the dummy variables, removed the effects of the extreme variations in the data due to the political instability.

Thus the autonomous consumption is $11,819 billion. That is, the nation of Palestine will consume products in an amount of $11,819,000,000 regardless of the amount of GDI, previous consumption, and political situation. In addition, a one unit increase in GDI will result in a 0.30 unit increase in present consumption, i.e. one dollar increase in GDI will result in a 0.30 dollar increase in present consumption. Meanwhile, a one unit increase in last year's consumption will result in an increase of 0.76 unit in present consumption. In other words, a one dollar increase in last year's consumption will result in an increase of 0.76 dollar in the present consumption.

To find the MPC we take the derivative of the consumption function –in model 2- with respect to GDI.

$$\frac{dc2}{dGDI} = 0.30$$

This yields an MPC of 0.30. Thus in Palestine people consume 0.3 dollar of an additional one dollar increase in their GDI in the short run given no income shocks due to the political instability which is created by the Israeli occupation.

Let us know now use the MPC –from model 1- to calculate the multiplier using the following formula:

$\frac{1}{1-MPC} = \frac{1}{1-0.44} = 1.79 \approx 1.8$ rounded to first decimal place

This means that every one dollar spent by the government will multiply to 1.8 dollars in the short run, resulting in a 1.8 increase in the total expenditure over the short run.

To find the long run MPC, we will use the Friedman model, estimated by model 3. It is given by the following function:

$$c2 = 0.45GDI + 0.55c1$$

According to the above model, a one dollar increase in GDI will result in a 0.45 dollar increase in present consumption, i.e. an additional one unit increase in GDI will result in an additional 0.45 unit increase in present consumption. Meanwhile, a one dollar increase in last year's consumption will result in an increase of 0.55 dollar in present consumption. In other words, a one unit increase in last year's consumption will result in an increase of 0.55 unit in the present consumption. Let us know take the derivative of the consumption function with respect to GDI.

$$\frac{dc2}{dGDI} = 0.45$$

This yields an MPC of 0.45. Thus in Palestine people consume 0.45 unit of an additional one unit increase in GDI. Thus this is the value of the long rum MPC.

Conclusion:

In the short run the MPC in Palestine is 0.44. However, removing the effects of the political instabilities that caused shocks in the GDI decreased the MPC to 0.3 i.e. consumers spend around 0.15 units more of an additional one unit increase in the GDI due to the political instability. In other words, the political instability had caused an inward shift of the aggregate demand. This shift is the result of a change in the transitory income component, which in turn resulted in an increase of 0.15 units in the MPC. That is the MPC had an original value of 0.3, the decrease in the transitory income component due to the shift in aggregate demand had resulted in an increase of 0.15 units in the MPC. This increase in consumption causes a decrease in savings rate, i.e. the Marginal Propensity to Save had decreased from 0.7 to 0.55.

This of course, has a negative effect on the Palestinian economy due to the decrease in the level of savings.

The decrease in the transitory income during the two shocks –the three year period of the Second Intifada (2000 to 2003) and the one year period of the united Hamas led government (2006 to 2007) - had resulted in an increase in the MPC over the short run. This is due to the fact that consumers try to maintain the same level of consumption that was present before the shock, thus increasing the level of consumption from the

lower GDI. Therefore, we can conclude that the Palestinian society as a whole does respond to shocks in the transitory income component by increasing the level of the MPC in the short run. Nonetheless, we notice that the behavior of the Palestinian consumer does not vary dramatically in the long run, the MPC is 0.45. Thus, there is an increase of 0.01 units in the long run MPC. In other words, there is an approximate 0.01 unit increase in consumption as a result of a change in GDI.

The MPS is 1- 0.45 = 0.55, i.e. an increase in the GDI by 1 unit will result in a 0.55 unit increase in the total savings. Here it is important for us to determine how much of this is financed from an increase in locally generated income compared to income generated from abroad, i.e. who is financing the increase in the savings. The mean percentage of the GDI generated from abroad is calculated to be 23.6 percent, where 16.5 percent is current transfers vis-a-vis non-residents and the rest is coming from income of non-residents. Thus 23.6 percent of the GDI is coming from abroad of this 16.4 percent is coming as a form of foreign aid. That is approximately a quarter of the GDI is coming from abroad.

Given our time series analysis, let us try to understand how the Palestinian consumer behaves. We suspect that the Palestinian consumer's monetary wise is in a flux, and consumers are quiet confused with respect to their status of savings and expenditure decisions. They have income that they need to both consume and save, given that local savings do not mean much due to the occupation. Thus consumers and institutions try to save and invest abroad.

Thus our story follows the following manner, when GDI increases both consumption –shown by our three regression model- and growth of consumption increases. This can be explained by two different ways -although both ways might be related. The first explanation asserts the existence of a large number of unmet consumption demands among the general public. This unmet consumption demands will allow consumption to grow disproportionately, relative to an increase in GDI. Thus when consumers will have extra money, their consumption will grow disproportionately. An alternative explanation has the following logic, if we consider an increase in the GDI as an indicator of relatively peaceful and good period – the economy is experience a boom, then people's expectations regarding the futures' performance of the Palestinian economy's improves. As a result, the consumers will expand their consumption in a higher proportion.

Nonetheless, the disproportionate increase in consumption due to an increase in GDI implies a non-linear relationship. This creates an uncomfortable situation, when dealing with the data.

The fact that Palestinians use three different currencies simultaneously, makes it not unpredictable for them to have difficulties in tracking their transactions, computing their income, expenditure, and other macro-economic variables.

Our results can aid the policy makers in evaluating fiscal policy decisions related to both spending and tax reforms. Thus the policy makers can have a better idea in predicting the response of consumers. It should be further noted that our results that would be used in calculating tax reform changes will have no effect on labor supply. Policy makers should also take into considerations the existence of a very high risk on investments in the Palestinian territories due to the Israeli occupation This is why the Palestinian Monetary Authority demanded that the banks had to invest 60 percent of their deposits inside Palestine in an effort to keep the capital in the territories.

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