Estimation of Consumption Function for Developing Economies: China, Turkey, Vietnam and Bangladesh

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Abstract   *This study analyses the determinants of consumption function for four countries: China and Turkey as Upper Middle-Income Economies (UMIE); Bangladesh and Vietnam as Lower Middle-Income Economies (LMIE). It used a model based on the ARDL technique to analyze the time series data for the period of 1985- 2018. The results reveal that wealth and labor income have a similar impact on consumption in UMIE and LMIE since they affect significantly and positively aggregate consumption. Unemployment and real interest rates have an analogous result for UMIE while assorted results LMIE. The real interest rate harms RPAC as evidence of income effect. However, the short-term wealth and real GDP positively affect real RPAC whereas the unemployment rate and real interest rate negatively affect aggregate real private consumption of the selected economies.*

Key Words: Consumption, Wealth, Income, Interest Rate

JEL Classification: F41, E21,R10

Introduction

In the three types of economies, namely developed economies, developing economies and least developed economies, household consumption patterns depend on which the surrounding type of economies. Generally, those household patterns in the developed economies follow Permanent Income Hypotheses (PIH), while the ones in the developing economies and the least developed economies mostly follow random walk; more, their consumption choice patterns are largely inspired by AI H (Khan et al, 2012).

Developing economies across the globe have emerged as the major contributor to the world economy with promising prospects to contribute global economy in the future. The major target of the present study is to investigate the factors that affect the aggregate consumption for China, Turkey, Vietnam, and Bangladesh Considering the potential of those countries, this study aims to understand the growth key characteristics and its main determinants in order to: assist policy-makers to acknowledge and promote the roles and contribution of developing economies. And help the least developing economies growth path initiatives.

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Since economists have been attempting to identify the important aspects that may influence the economic growth model key components, private consumption has become progressively significant. This, because of its greater contribution to the economy. In developing economies, the ratio of private consumption and GDP is around 65% and 75%; in low developed countries, this ratio is less than 55% (Khan et al, 2015).

The aggregate private consumption has important policy implications for policy-makers to determine the direction of GDP. Policymakers use private consumption as a tool to achieve the optimum economic growth and boost economic growth. Every economy operates in different socio-economic conditions. Therefore, for a better understanding and effective policy-making, it is noteworthy to know which type of consumption hypotheses are predominant in a specific economy (Khan et al, 2011).

Around the world, countries realized the noteworthiness of the aggregate consumption and its sizeable impact on aggregate economic activities and influence on GDP. Similarly, the aggregate consumption is likewise the main component of total demand in UMIC, and LMIC. It is a significant factor that accelerates general economic activities in a country and later contributes to the economy by generating more employment and wealth. Moreover, it plays a crucial role particularly during the economic cycle recession and for economy strengthening while contributing to its recovery. Especially, during inflation pressure, it also works to control aggregate economic activities to maintain sustainable economic growth (Manzoor et al, 2017).

In Macroeconomics the area of aggregate consumption is quite rich in literature. Many researchers have empirically tested the consumption function for different types of economies. Lavi (2003) projected the private consumption for Israel, with the help of future income. The author uncovered that future income affects the aggregate consumption in the country. Likewise, Singh (2004) proposed a model that assesses the major factors which are responsible to spur private consumption in Fiji. The study results revealed that the current income and wealth are the most decisive and significant factors which strongly impact consumption growth. Manitsaris (2006) tested the hypothesis of permanent income for 25 countries through cross-section data. The study found out that households are not capable to smooth their preferences of consumption. Habibullahet et al. (2006) demonstrated in his study the liquidity constraints for ten Asian economies. He established that liquidity constraint is affected by monetary liberalization mainly for the South Korean, Taiwani and Sri Lankan economies. In 2006, Dejuan Ay investigated the permanent income hypothesis for eleven German States. Nevertheless, the study results supported the hypothesis constructed for the eleven German states and discovered that in each State, households' consumption patterns were subject to the hypothesis of permanent income. Rao (2007) used the hypothesis of permanent income and Random Walk Hypotheses to investigate household spending behavior for Fiji and Australia. Liu et al. (2007) reviewed the consumption data of HSP for Hong Kong from 1984 to 2006. Siberia et al. (2008) checked the Permanent Income Hypothesis for Italy, France, Canada, and the United Kingdom. Hence, keeping in view the significance of aggregate consumption, this study is intrigued to evaluate the factors which are responsible for variation in aggregate consumption in China, Turkey, Vietnam, and Bangladesh. However, these countries have randomly been selected from UMIE, and LMIE. Whereas China and Turkey are the part of UMIE while Vietnam and Bangladesh are part of Lower Middle-Income Economies. Moreover, the rest of the study is structured as follows. The

upcoming part offers data and methodology while sections three and four are based on results interpretation and conclusion, respectively.

Data and Methodology

According to the ranking of countries, developing countries are separated into two groups: UMIE, and LMIE. Therefore, the enlisted countries; China, Turkey, Vietnam and Bangladesh were randomly selected from the groups of UMIE, and, LMIE as reported in Table I. The variables which have been used for empirical estimation of the model of the study, is applied time series data since 1985-2018. The World Development Indicators (WDI) and numerous CD of the International Financial Statistics (IFS) have been used to extract the data for the present study. Furthermore, the brief description of the variables is as under:

Table 1. Features of all Randomly Selected Countries

County	Income Level	Data Quality	Status
China	UMIE	B	Developing
Turkey	UMIE	C	Developing
Vietnam	LMIE	C	Developing
Bangladesh	LMIE	C	Developing

Note: The data and the classification of the economies on the basis their income and development status are obtained from the website of The World Bank https://www.worldbank.org/

Aggregate Consumption

The real private aggregate consumption represents the market value of total final services and goods that households are able and willing to buy e.g. households' demand for food, housing, clothing, education, and medical services etc. Durable goods were considered as a part of household saving and wealth (Bimal, 2004). Durable goods such as houses and cars not only provide consumption utility but also increase households' savings. Moreover, durable goods are also the source of wealth; if liquid they can be easily converted to cash when needed. Moreover, the aggregate consumption in the applied econometric model is used as a dependent variable; the real GDP, unemployment, real interest rate and wealth are the explanatory variables of the study.

Gross Domestic Product (GDP)

GDP measures the monetary worth of all final services and goods created during a particular period, typically it is one year. Moreover, GDP is vastly connected with labor current income; therefore, used in the study as a proxy of labor income (Khoon, L. G. and Richard, D., (2002); Kuznets, S., (1946); Khan, K., et al (2015)). Data on labor income is not available for all randomly selected countries. The AIH postulates that when the disposable income of household increases, his current consumption also increases but not in the same amount. Therefore, in the light of AIH, GDP is positively correlated with real private consumption, thus GDP is expected with a positive sign in the analysis.

Quasi Money

Quasi money is a liquid asset, easily convertible to cash. A type of near money which includes bank deposits, money market assets, bill of exchanges, time and saving deposits

and foreign currency deposits (Zeldes, S.P., (1989); Shirvani et al, (2008)); Hsich et al, (1994)). The wealth has been proxied by using Quasi money. This money is also positively associated with aggregate real private consumption; thus, expect a positive sign in the analysis.

Interest Rate

Presently, due to the development and liberalization of financial markets, the interest rate is considered as an essential factor in households' consumption decisions. The aggregate real private consumption of households extensively depends on credit availability and cost of credit (Campbell et al, (1989); Dejuan, (2006); Drakos, (2002)). Therefore, the cost of credit in the form of rate of interest has become one of the significant determinants for the consumption function since the low cost of borrowing encourages consumption spending and vice versa. In other words, the interest rate is the reward of postponing current consumption. However, we can also define the interest rate is the amount charged by the lender from the borrower as a %age of the principal amount or rent for the usage of an asset.

Empirical Framework

Unit Root Test

Table 2 offers the result of Augmented Dickey-Fuller (ADF), which indicates that nearly all the variables of the model are non-stationary at the level in case of China, Turkey, Vietnam, and Bangladesh. However, at the first difference, they are stationary integrated. Consequently, the results of the unit root test suggest that in the given situation the Autoregressive Distributed Lag (ARDL) approach to co-integration can be used for estimation of consumption function for Turkey, China Vietnam, and Bangladesh. Moreover, ARDL has several advantages over other approaches to co-integration. First, it gives robust results and better performance in the case of a small sample size. Secondly, the Autoregressive Distributed Lag method can be used to estimate one single reduced form equation. Thirdly, it solves the problem of endogeneity between the variables more effectively and efficiently. Fourthly, the Autoregressive Distributed Lag model produces results that are more robust and reliable in the short-run and long run. Fifthly, the Autoregressive Distributed Lag model does not need variables' pre-testing for the unit root test. Therefore, considering all the above advantages of the estimation method, we consider that ARDL for the estimation of our model.

Table 2. Results of the ADF Test

Variables		Test at Level			
		China	**Turkey**	**Vietnam**	**Bangladesh**
CON	WOT	-0.09	2.46	-0.86	1.53
	WT	-3	-1.94	-1.16	-2.59
GDP	WOT	-0.1	3.42	-0.44	4.35
	WT	-2.31	-2.16	-1.72	-1.17
QM	WOT	1.4	0.48	-0.55	-138
	WT	-2.14	-1.62	-2.52	-1.62
RIR	WOT	-7.63*	-2.12	3.7**	-3.95*
	WT	-2.6	-2.98	-3.4*	-3.92*

Variables		Test at Level			
		China	Turkey	Vietnam	Bangladesh
UR	WOT	0.06	-1.88	-1.79	-0.51
	WT	-4.54*	-1.78	-1.76	-2.62
Results of ADF test at First Difference					
		China	Turkey	Vietnam	Bangladesh
CON	WOT	-3.23**	-5.01**	0.58	-4.57**
	WT	-3.38*	-2.08	-7.63***	-4.79***
GDP	WOT	-3.96**	-3.92**	-2.35	-0.41
	WT	-3.91**	-4.48***	-3.84**	-3.29*
QM	WOT	-4.23**	-3.47**	---	-4.23**
	WT	-5.21**	-3.88**	----	-4.18**
RIR	WOT	---	---	----	----
	WT	---	----	---	---
UR	WOT	---	-5.15**	-6.62***	-7.26***
	WT	---	-3.20*	-6.24**	-7.51**

Note: Here, (***p-value <0.01), (**p-value <0.05), (* p-value <0.10) Where: WOT (without Trend) and WT (with trend)

Econometrics Model

Since, the long-run consumption function (Hall, 1978; Hall, 1981; Friedman, 1947; Engle et al., 1987) are ;$CONS_t = f(Y_t, W_t, R_t, UR_t)$ (1). Whereas; 'Y' represents the real GDP, 'R' is the real rate of interest 'W' represents wealth while 'UR' is used for unemployment rate. Accordingly, the Autoregressive Distributed Lag (Pesaran et al., 1997; Pesaran et al., 1999; Pesaran et al., 2001) framework of the equation (1) is as under:

$$\Delta \ln C_t = \beta_0 + \sum_{i=0}^{j} \beta_{1i} \Delta \ln Y_{t-i} + \sum_{i=0}^{j} \beta_{2i} \Delta \ln W_{t-i} + \sum_{i=0}^{j} \beta_{3i} \Delta \ln C_{t-i} + \sum_{i=0}^{j} \beta_{4i} \Delta \ln r_{t-i} +$$

$$\sum_{i=0}^{j} \beta_{5i} \Delta \ln UR_{t-i} + \alpha_Y \ln Y_{t-1} + \alpha_W \ln W_{t-1} + \alpha_C \ln C_{t-1} + \alpha_R \ln R_{t-1} + \alpha_{UR} \ln UR_{t-1} + u_t, (02)$$

Whereas: β_i, are the short-run coefficients while $\alpha_Y, \alpha_W, \alpha_C, \alpha_{UR}$, are long-run coefficient. The null-hypothesis constructed for co-integration is: $H_0 = \alpha_Y = \alpha_W = \alpha_C = \alpha_R = \alpha_{UR} = 0$, and the alternative hypothesis is: $H_1 \neq \alpha_Y \neq \alpha_W \neq \alpha_C \neq \alpha_R \neq \alpha_{UR} \neq 0$. To test these hypotheses, the bounds test proposed by Pesaran et al. (1999); Johansen, Juselius (1990); Johansen, (1988); Johansen (1996) have been applied.

Test of Co-integration

Prior to the assessment of the model of this study, testing the hypothesis of co-integration is very important. The null hypothesis constructed for co-integration assumes that there is no correlation among the variables in the long-run and vice versa for the alternate hypothesis. The outcomes of the ARDL bound test show that in each case calculated F-statistics are larger than at 90% and 95% of the upper and lower limits. Henceforth, on the basis of bound test, we reject the null hypothesis. Thus, we are in a position to estimate the model through the ARDL approach.

Results and Discussion

Table 03 shows the long-term associations amongst the explanatory variables. The GDP parameters for Turkey & China are greater at 0.68 and 0.79, respectively. Thus, the labor income of these economies has a noteworthy encouraging effect on aggregate consumption. However, Bangladesh and Vietnam have registered an upsurge of 0.57 and 0.59 with regard to the 1 % upsurge in the income of labor.

Table 3. Long Run ARDL Results for UMIE and LMIE

Variables	Test at Level			
	China	**Turkey**	**Vietnam**	**Bangladesh**
Log GDP	0.6800**	0.2700**	0.0606*	-0.0500*
Log W	0.7929***	0.1088*	0.0994*	-0.0593*
Log RIR	0.5737***	0.1930***	-0.0091*	-0.0410**
Log UR	0.5936*	0.1182*	-0.0361	0.02147
Model	ARDL (1,0,1,0,1)	ARDL (1,0,0,0,0)	ARDL (1,0,0,0,0)	ARDL (1,0,0,1,0)

Note: Here, (***p-value<0.01), (**p-value<0.05), (* p-value <0.10)

Turkey and China lies in UMIEs and have positive coefficients for real interest rates, while the coefficients are negative for Vietnam and Bangladesh. The unemployment rate negatively affects aggregate consumption for China, Turkey, and Vietnam, while Bangladesh has a positive effect as the result indicates. The interest rate coefficient demonstrates a 1 % rise in the real rate of interest have a reduction effect on the real aggregate consumption by 0.009 % and 0.036 % for Vietnam and Bangladesh, respectively. For China and Turkey, there will an increase in real aggregate private consumption by 0.06 % and 0.099 %, respectively. Likewise, a 1 % increase in the unemployment rate causes a reduction in real private aggregate consumption by 0.050 %, 0.059 % and 0.041 % for China, Turkey and Vietnam, respectively. It is noteworthy that although coefficient of Bangladesh is significant statistically, yet it has an opposite signs.

Table 4. Short Run ARDL Results for UMIE and LMIE

Country	China	Turkey	Vietnam	Bangladesh
Log GDP	0.6914*	0.1589**	0.0261***	0.0193*
Log W	0.6737**	0.1398*	0.0131***	0.0102*
Log RIR	0.7978*	0.1781*	-0.0718	-0.0229*
Log UR	0.7048*	0.2699*	0.0036**	-0.0021*
ECT (-1)	-0.2435***	-0.327**	-0.5283**	-0.41979**
R^2	0.66	0.62	0.94	0.491
DW	1.9302	1.81	1.71	2.0818
F- Stat:	10.3	8.23	9.2	5.40
χ^2_{LM}	0.0048 (0.99)	0.2683 (0.604)	0.55413 (0.457)	0.2963 (0.586)
χ^2_{RESET}	0.0432 (0.324)	0.641 (0.0426)	0.7231 (0.527)	0.8126 (0.218)
$\chi^2_{Normality}$	0.842 (0.219)	1.856 (0.135)	0.7622 (0.816)	0.714 (0.239)
$\chi^2_{Hetro:}$	0.033 (0.855)	1.1141 (0.285)	0.0151 (0.902)	0.25179 (0.616)

*Note: Here, (***p-values <0.01), (**p-values <0.05), (* p-values <0.10)*

Table 04 offers short run results of ARDL. The coefficients of interest rate have mixed interpretation for the Low Middle Income Economies. For China and Turkey, a 1 % increase in rate of interest inclines to raise aggregate consumption by 0.798 % and 0.178 %, respectively in the short-run. While a reduction in aggregate consumption in the short run by 0.072 % and 0.023 % revealed for Vietnam and Bangladesh, respectively. Similarly, a 1 % increase in the unemployment rate shrinks the aggregate real private consumption only for Bangladesh by 0.002 %. While for China, Turkey and Vietnam, the increase in unemployment augment the real aggregate private consumption by 0.705 %, 0.270 % and 0.003 % respectively in the short run.

For LMIEs, the ECT values are; -0.2435, -0.327, -0.5283 and -0.4197 in the case of China, Turkey, Vietnam and Bangladesh respectively. The speed of convergence towards equilibrium is different among China, Turkey, Vietnam, and Bangladesh, however, remain suitable in all cases. In the case of China and Turkey, the rate of convergence is -0.2435 and -0.327, which is quite a suitable rate of convergence from disequilibrium towards equilibrium. However, it has been observed that the rate of convergence in case of Vietnam and Bangladesh is relatively higher in the group.

Diagnostic Tests

The CUSUM and CUSUMsq tests show the stability of the parameters of the projected model. The graph of the CUSUM and CUSUMsq for China, Turkey, Vietnam, and Bangladesh are reported on figures 01, 02, 03, and 04. Henceforth of the figures, 01, 02, 03, and 04 revealed that that parameter of the estimated model stable and within the given limits of the stability. Henceforward the diagnostic tests confirmed that the projected model of the study is not having any type of econometric issues. Moreover, the projected model of the study qualifies the CUSUM and CUSUMsq tests respectively. Henceforth, on the basis of the stability tests, we can conclude that all selected countries qualify the tests.
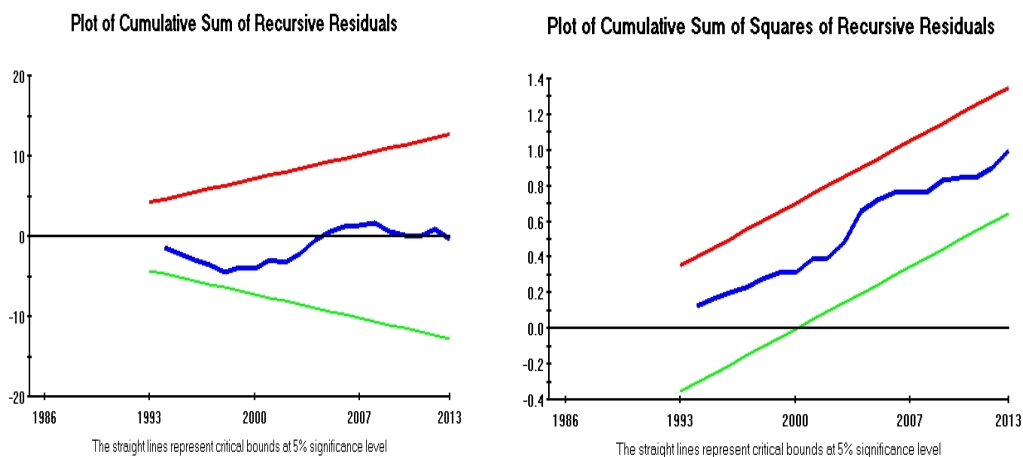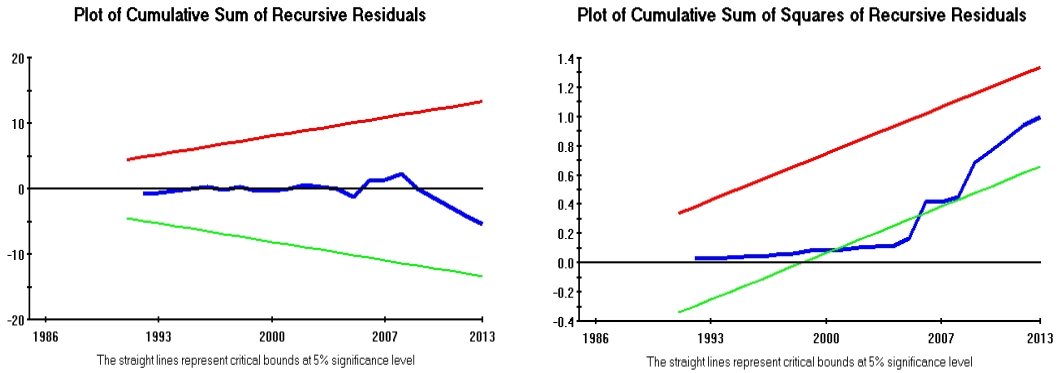

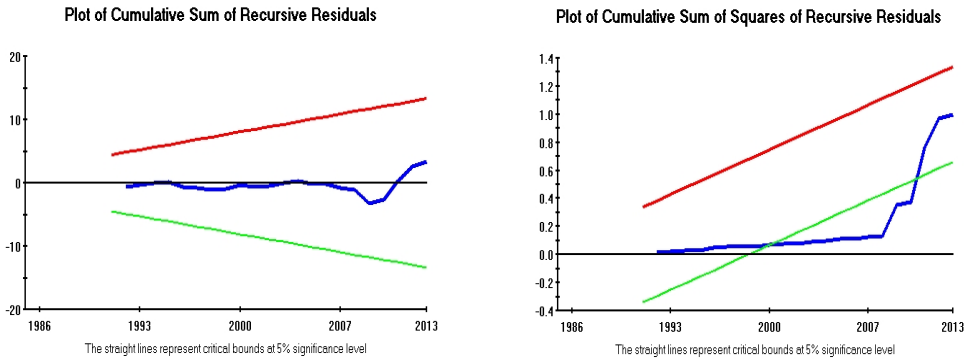**Figure 1.** China

Figure 2. Turkey
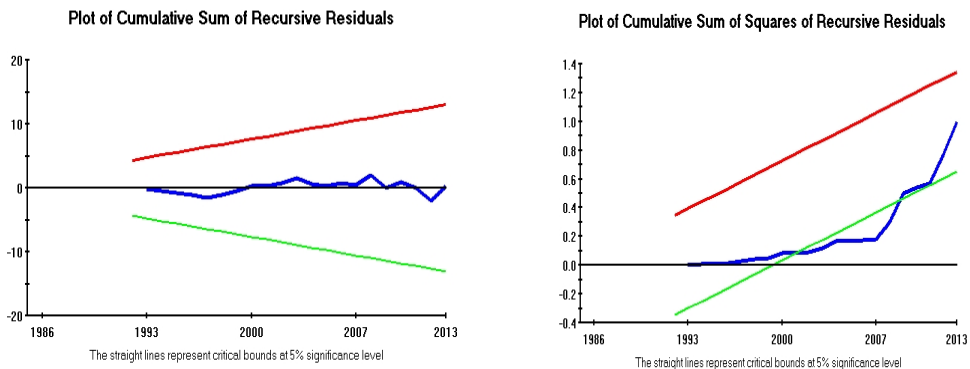

Figure 3. Vietnam

Figure 4. Bangladesh

The diagnostic tests' outcomes confirm that the projected model of the study is not having any types of econometric issues. The study projected model qualifies the CUSUM and CUSUMsq tests which have been reported in Appendix. Henceforth, on the basis of stability test, we can conclude that all selected countries qualify the tests.

Conclusion and Recommendations

The positive impact of the real rate of interest on aggregate real private consumption for China and Turkey (UMIEs) reveals that the monetary policy would be relatively more effective to boost the consumption in the economy. Nevertheless, in Vietnam, and Bangladesh aggregate consumption in the role of current income in more prominent and steady. This suggests that the income effects are positive and greater than the negative substitution effects. However, fiscal policy measures are suggested for the countries of UMIEs because of the support to AIH in the segment. As known, the current income can be easily influenced by a fiscal measure, thus the instrument would be increasingly effective to boost or reduce the aggregate real private consumption.

The fiscal measures such as government expenditure would be increasingly powerful to generate new economic activities, thus would increase employment opportunities to reduce and alleviate poverty. Though, the impact of this fiscal measure largely relies upon consumption behavior. Hence, following the rule of thumb at the household level in the short-run is the ideal scenario for the increase in government expenditures and a more effective tool for generating employment, aggregate consumption, and demand in the economy. The validity of AIH in the selected economies, therefore, would have a higher multiplier effect.

The validity of the Permanent Income Hypothesis (PIH) implies that households respond to future income rather than current income. The households, therefore, do not respond to temporary changes in tax, however, the response can be observed for permanent tax changes. Temporary tax changes would have a significant effect in the cases where AIH is valid for example LMIEs while permanent tax changes would have significance on consumption where PIH is valid, for example, UMIEs.

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