Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.5, No.8, 2014

Determinants of Private Domestic Savings in Nigeriam (1970-2010)

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ABSTRACT
This study investigated the impact of selected proximate determinants of domestic private savings in Nigeria for the sample period 1970 to 2010. Ordinary least square (OLS) technique and Johansen co integration were used in the empirical analysis. The variables namely, domestic private savings, gross domestic product, money supply, real interest rate, and inflation rate, from the ADF test conducted exhibited random walk process and became stationary after first differencing. All the series were found to be co integrated. The estimated long run regression indicated that all the variables are highly significant determinants of private domestic savings in Nigeria. The recommendation therefore, is that the government should continue to pursue vigorously macroeconomic policies that will positively impact on these selected variables in order to enhance the levels of investment and output, and hence savings in Nigeria.
Keywords: Domestic savings, Financial deepening, Externalities, Autocorrelation, Short-run, Long-run.

1: Introduction

The declining trend of savings rate and its spread especially among developing countries of the world like Nigeria is a source of worry among researchers and policy makers. This is due to the critical role savings play in maintaining a strong and sustainable economic growth in the world economy.

Over the past three decades, savings rate has doubled in East Asia. Within the same period, statistics have shown that unlike East Asia, savings rates have stagnated in sub-Sahara Africa, Latin America and the Caribbean (Loayza, 2000). This has created a disparity that has made savings a policy concern, especially among the developing countries. Theoretically, nothing stops economies that are faced with different preferences, income streams, and demographic characteristics from choosing different saving rates. In practice, however, the inter-temporal choices that underlie savings depend on an army of market failures, externalities and policy induced distortions that are likely to drive savings away from socially desirable levels.

Development economists have been concerned about the crucial role domestic saving mobilization play in sustenance and reinforcement of the saving-investment growth chain in developing economies. For instance, Agheli et al (1990) found that the saving rates and investment in human capital are indeed closely linked to economic growth. The relationship among saving, investment and growth has historically been very close; hence, the unsatisfactory growth performance of several developing countries such as Nigeria, has been attributed to poor saving and investment.

In Nigeria for instance, the economy witnessed tremendous growth in the 1970s and early 1980s as a result of the oil boom. The oil boom was followed with investment boom especially in the public sector. However, with the collapse of oil market in 1980s, investment fell, thereby resulting in a fall in economic growth. For instance, during the investment boom, gross investment as a percentage of Gross domestic Product (GDP) was 16.8 and 31.4 percent in 1974 and 1976 respectively, whereas it declined to 9.5 and 8.9 percent respectively in 1984 and 1985 (Nwachukwu and Odigie, 2009).

Although the rise in oil prices during the 1990-91 periods was supposed to spark off an investment boom, but that was not the case in Nigeria. To arrest this continued decline, the government adopted the structural adjustment programme (SAP) in 1986 with a view to providing a stable macroeconomic and investment environment. To this end, interest rates, which were previously fixed and negative in real terms, were replaced with an interest rate regime, which was driven more by market forces. This policy shift de-emphasized direct investment stimulation through low interest rates and encouraged savings mobilization by deregulating interest rates.

However, the objective of enhanced investment and output growth was not realized as the country's investment rate failed to rise to anything near the level it had reached in 1970s. Although successive government implemented policies and strategies for deepening the financial sector aimed at raising investment, these policies failed to meet the aspirations of the people.

Available data show that the saving culture in Nigeria has been very poor relative to other developing economies like Malaysia, South Korea, Taiwan, Singapore etc. For instance, during the period 1986 to 1989, domestic saving averaged 15.7 percent of GDP. However, with the distress in the financial sector of the 1990s, the rate of aggregate savings declined significantly. The distress syndrome resulted in a significant fall in domestic saving in the period 1990 to 1994, with the saving to GDP ratio dropping to 6 percent. By 2004, the

figure stood at 6.4 percent. These suggest that in spite of all the efforts by the regulatory authority to build up the level of savings through relevant policy options, in general, savings appear not to be significantly responsive. The question that demands an answer is: Is there any significant relationship between private domestic savings and its determinants in Nigeria between the periods under investigation?

The objective of this paper is therefore to determine if there is any significant relationship between private domestic savings and its determinants in Nigeria in the period 1970 to 2010. The forgoing introduces the subject matter. The remainder of the work is structured as follows: Section two briefly reviews related literature; section three presents the methodology, section four analyzes and discusses the results while the conclusion is presented in section five.

2.1 Theoretical Review

The Life-Cycle Model (LCM)

The life-cycle hypothesis is the principal theoretical underpinning that has guided the study of savings behavior over the years. It is the theory upon which this paper is based. Each of the determinants of saving is articulated in the context of the life-cycle hypothesis.

In the LCM, accumulation for retirement is the prime motive for saving. The model is built around the consumption/saving behavior of a representative agent who is assumed to maximize the present value of lifetime utility, subject to a budget constraint. The budget constraint is equal to the current net worth plus the present value of expected labor income over the remaining working life of the agent. Under the simplifying assumption of perfect capital markets and perfect foresight of the agent about the "true" income-generation process, the model predicts that consumption in a particular period depends on expectations about lifetime income (not on the income in that period, as postulated by the Keynesian model). As income tends to fluctuate systematically over the course of a person's life, saving behavior is crucially determined by one's stage in the life-cycle. Individuals smooth consumption over their lifetimes, and are consequently, net savers during their working years and dis-savers during retirement (Modigliani, 1986). When the model is extended to national level, the major determinants of the saving rate (over time in a given country or across countries) are the rate of growth of per capita income, and the age structure of the population. With respect to the rate of growth of per capita income, the simple version of the LCM predicts that an increase in the later will unambiguously increase the aggregate saving rate, because it increases the lifetime resources (and saving) of younger-age groups relative to older age groups. But when wealth is introduced in the LCM as an additional explanatory variable, the model yields ambiguous conclusions about the relationship between saving and growth.

The empirical application of the basic LCM raises a number of issues: The first issue has to do with the key premise of the life-cycle hypothesis that the saving rate is related to the growth of per capita income, not the level of per capita income. The absence of a link between current saving and current income in the LCM theory of consumption is an implication of the assumption that individuals are forward-looking, and therefore base their saving decisions on lifetime income rather than current income. The validity of this premise is, however greatly in doubt for low-income countries such as India, Nigeria, etc. For these considerations, the growth rate and the level of per capita income respectively are included as explanatory variables in the savings function.

A second issue relates to the role of inflation in determining saving. In the standard LCM, the only impact of inflation on saving is through its role in determining real returns to saving (the real interest rate). This postulate is based on the implicit assumptions of inflation neutrality (the absence of money illusion) in saving behavior and the absence of the real balance effect of inflation. There are, however, good reasons for doubting the validity of these assumptions. First, inflation could influence saving through its impact on real wealth. If consumers attempt to maintain a target level of wealth or liquid assets relative to income, saving will rise with inflation. Second, inflation brings about uncertainty in future income streams and can thus lead to higher saving on precautionary grounds. This may be particularly true for households in developing countries whose income prospects are much uncertain than their counterparts in developed countries (Deaton, 1989; Kaldor, 1990). For these considerations, we include the inflation rate (INF) as an additional explanatory variable to capture its impact on the saving rate operating through the real balance effect over the role in determination of the real interest rate (RIR).

The third issue relates to the effect on saving behavior of changes in the external terms of trade (the ratio of an export price index to an import price index), popularly known as the terms of trade. The traditional explanation of the relationship between the terms of trade and private saving rests on the Harger-Laursen-Metzler hypothesis according to which deterioration in terms of trade, that is, a reduction in the price of domestically produced goods relative to that of foreign goods, reduces real income and hence saving (Harbeger, 1950; Laursen and Metzler, 1950). This hypothesis is based on the Keynesian theory of consumption that assumes myopic expectations on the part of consumers. When we assume forward looking behavior on the part of private agents in the face of volatile and unpredictable changes in income, terms of trade changes could impact on savings through consumption smoothing, over and above the impact operating via the growth or the

level of real income. This effect of terms of trade changes on private savings can go either way, depending on whether movements in terms of trade are perceived to be temporary or permanent (Gersovitz, 1988; Frankel and Razin, 1992; Chete, 1999). By contrast, a term of trade deterioration that is perceived to be temporary may lead to an increase in absorption (that is, an increase in expenditure measured in terms of domestic goods) as consumers attempt to offset the decrease in purchasing power of domestic goods so as to keep real expenditure constant. By contrast, terms of trade deterioration that is perceived to be permanent may induce domestic residents to increase their savings at the current period in order to sustain their real standard of living in the future.

The Fourth issue stems from the debate on the possible impact of the fiscal policy stance on national saving rate (Peaton and Paxson (2000); Loayza et al; 2000). While the government can choose the level of its own savings directly, a change in this variable need not imply a one-for-one change in household or national saving. This is because private agents may respond in such a way as to offset the government action, at least to some extent. At the extreme, the Richardian equivalence proposition of Barro (1974), postulates that a government issue bonds to finance its dis-saving which results in an equal increase in private saving, because the private sector saves in anticipation of a future increase in taxes to service the bonds. The proposition assumes perfect capital markets and the absence of uncertainty on saving behavior. If either or both of these assumptions do not hold, then private and public saving may not be perfect substitutes.

The fifth consideration relates to the role of financial intermediation in promoting saving in developing countries. A notable example is the Indian financial system following the nationalization of commercial banks in 1969 which led to reduction of bank branches in the country (Shaw, 1973). Population per bank branch declined persistently from 90,000 in mid-1950s to around 14,000 in the early 1990s. This would have contributed to increase in private saving rate through encouragement in financial saving, both by improving the accessibility of banking facilities of the general public and by reducing the cost of banking transactions of the general public (through reduced transport cost). As Lewis (1995), has put it, "if they (savings institutions) are pushed right under the individual's nose…. People save more than if the nearest savings institution is some distance away". Thus, a negative relationship can be assumed between population per bank branch (bank density), and household financial saving. But, whether increased financial intermediation itself significantly raises the overall propensity to save depends also on the degree of substitution between financial saving and other items in the household's asset portfolio. Thus, the expected sign of this relationship in the private saving function is ambiguous.

One more explanatory variable is chosen in the light of the debate on the determination of domestic saving in Nigeria. This is the inward remittance by expatriate Indians relative to income. Since the mid-1970s, there has been a significance increase in inward remittances by expatriate Indians employed in the oil-rich Gulf countries in response to the oil boom and, more recently, in high-performing economies in East Asia. It is generally asserted that most of remittance income is frittered away as wasteful consumption, and the demonstration effects of ostensible consumption by families of migrant workers also have a profound unfavorable effect on the saving behavior of other households as well, resulting in a negative effect on the domestic saving rate (Wirmark, 1983). But data relating to the remittance utilization patterns of migrant households for India and some other labor-exporting countries in the region suggest that the share of remittance income spent on consumption is much lower than the national average propensity to consume.

This is presumably because most migrants are, "target savers" who seek temporary overseas employment (normally at a considerable cost in terms of agency fees and overseas travel) and considered this as a lifetime opportunity to improve their economic status on return. Thus, a priori, it is not possible to state whether a higher inflow of remittances will lead to higher or lower saving. Other long run determinants of savings of the lifecycle model are; income, growth per capita, interest rate, fiscal policy, external debts, terms of trade(TOT), financial development etc.

The Bequest Model

The bequest model assumes that individuals have a multigenerational time horizon and that they maximize not only their own utility but those of parents and children, giving rise to bequest motive. The most common explanation for this is altruism, in which it is held that the disposer gains some form of satisfaction from knowing that his/her heirs will enjoy their inherited wealth. Another common explanation is accidental bequest, developed by the great economists; Weil (1965), and Davies (1980). Here, it is not assumed that the disposer gains any specific benefit from leaving a bequest, but rather that lifetime is uncertain, and so, she/he holds precautionary savings to insure him/herself against the risk of living too long.

Finally, exchange bequest occurs where disposers engage in sort of strategic game in which potential beneficiaries must render a (non-marketable) service in exchange for the promise of inherited wealth. However, the problem with this model is that attempts to test the theories empirically especially in developing country like Nigeria are mired by poor availability of data about wealth holdings.

Precautionary Motive

The precautionary motive for saving has been recognized by economists since the time of Keynes (1936). Moreover, Alfred Marshal stressed the importance of saving to secure against future risks. As the theory states, precautionary savings occurs in response to uncertainty regarding future income. The precautionary motive to delay consumption and save in the current period rises due to the lack of completeness of insurance markets. Accordingly, individuals will not be able to insure against some bad state of the economy in the future. They anticipate that if bad state is realized, they will earn lower income. To avoid future income fluctuations and smooth consumption, they set aside a precautionary reserve, by consuming less in the current period, and resort to it in case the bad state is realized in the future.

Some examples of events that create the need for precautionary savings include health risk, business risk, unavoidable expenditures, and risk of labour income change, saving for retirement and child's education (Carrol, and Kimball, 2001). Furthermore, it has been observed that precautionary savings are intimately associated with investments. For instance, Skinner (2000), confirmed that if earnings are not used for purchasing commodities and services, there is a probability that the precautionary savings can be invested to generate fixed capital and achieve economic growth. As a result, higher precautionary savings would reflect in higher wealth of an individual or a growth in a net worth.

2.2 Empirical Review

Table below summarizes the related empirical literature on determinants of private savings and their expected direction of impact in Nigeria and beyond.

Table 1: Summary of Related Empirical Literature

Author	Sample and method	Findings	Weakness
Hussian 1996	Error correction and Co integration app-roach.	The study revealed that ratio of private saving to income rose by 8 percent. Financial deepening and development accounted for increase in savings. Population growth also found to be negatively related to private savings.	The variables used did not cover the major determinant of savings identified in the literature.
Ozcan, Gunay and Ertac 1996	Ordinary least Square method	Income levels has a positive impact on the savings rate and growth rate of income is not statistically significant, government savings does not tend to crowd out private savings and Ricardian Equivalence does not hold strictly.	The study did not test for the long run relationship of the variables and the nature of the time series to know whether they are stationary or not.
Loayza, Hebbel and Serven (1999)	Generalized method of moments (GMM)	Income at both level and growth rate had positive	The study did not apply modern econometric

		influence on private savings, interest rate and public saving showed negative impact on private saving.	methodology in his analysis and hence cannot be relied upon for sound decision making.
Paiva and Jahan, 2003	Ordinary Least Square estimation Technique.	The study found an inverse relationship between private and public saving. The study also shows that external terms of trade have a positive impact on national savings.	The study did not include inflation rate as an explanatory variable.
Attukorda and Sen 2004	OLS, Langrangian Multiplier for residual correlation, Engel's autoregressive conditional heteroscedasticity	The study shows that real interest rate, spread of banking facilities and inflation had positive impact on savings.	The study ended in 1998. Thus, may not be used to assess current developments.
Uremadu, 2007	Ordinary Least Square Method	The result show a positive influence of GDP growth per capita income (PCY), (SLS, broad money supply (M2), and debt service ratio (DSR) and negative influence of both real interest rate (RIR) and domestic inflation rate on Nigerian economy.	The study did not take into consideration the need to test for the structural break in the economy during the structural Adjustment program introduced by Nigerian government between 1986 and 1990.
Nwchukwu and Egwaikhide, 2007	Error Correction Model (ECM)	The result reveals that the savings rate rises with the level of disposable income. It also reveals that the real interest rate on bank deposits has a significant negative impact while public saving seems not to crowd out private	The variables included for the co integration analysis were found not to be stationary at the same order, thus the possibility of having estimated spurious relations.

		saving.	
Nwachukwu and Odigie, (2009)	Error correction modeling procedure	The results of the analysis show that the savings rate rises with both the growth rate of disposable income and the real interest rate on bank deposits. Public savings seems not to crowd out private saving. Finally, the degree of financial depth had a negative but insignificant impact on saving behavior in Nigeria.	There was an evidence of positive serial correlation in the regression result and no attempt was made by the researchers to remedy that, thus casting doubt on the policy prescriptions made.

3. METHODOLOGY AND DATA

Data set for the estimation of the equation of this paper is mainly secondary data and comprises annual time series spanning from 1970 to 2010 0n GDP, real interest rate, broad money supply and inflation rate, sourced from CBN statistical bulletin for various years.

3.1 Model Specification

The model takes the form: private domestic saving as a function of GDP, real interest rate, broad money supply and inflation rate; ie

PDS =f (GDP, RIR, M2 INFR)…….. 3.1
Where,

PDS is private domestic Saving represented by private sector deposit, GDP is gross Domestic product, a proxy for output growth, RIR is the real interest rate, defined as the nominal interest rate from savings deposits minus inflation rate, M2 is broad money supply defined as the degree of financial deepening captured by broad money (M2) as a ratio to GDP. Finally, INFR is inflation rate defined as change in consumer price index.

Equation 3.1 above is structurally expressed in linear form as:

$PDS = b_0 + b_1GDP + b_2RIR + b_3M_2 + b_4INFR + u_t$ ……. 3.2
Where,

PDS is the dependent variable; b_1, b_2 …., b_4 are the estimated linear coefficients of the independent variables; b_0 is the autonomous estimate of the savings function and u_t is the error term. i.e u_t is the variable that explains the proportion of the variables in PDS that is not explained by the model. It takes account of the influence of other less important factors that can influence dependent variable due to chance

4 Data Analysis and Interpretation of Empirical Results

4.1 Time series properties of the data

Table 2 below presents the test of the long-run characteristic of the variables in order to avoid the problem of spurious estimates. This was done by conducting unit root tests to determine the stationarity or otherwise of the variables, using the Augmented Dickey-Fuller (ADF) statistics.

Table 2: ADF Statistics for Testing Unit Roots in the Variables

Variables	*Levels*	*First Differencing*
PDS	- 9.675701	- 3.583196
GDP	0.810735	- 8.388920
M_2	-3.512819	- 9.466568
INF	-1.615085	-3.569390
INT	-1.414120	-9.332212
CRITICL 5%	-3.5279	-3.5348
VALUES 10%	-3.1949	-3.1988

The table above indicates that all the variables exhibit unit roots or are non-stationary at their levels and only became stationary after first differencing. Being stationary implies that their mean, variance and covariance are constant overtime. Since all the series are stationary after first differencing, they are said to be integrated of order one, that is, 1(1).

4.2 Co-integration Test Results.

Since the unit root tests indicate that the series are integrated of the same order, the researchers are motivated to test for the co integration of the series. When two or more variables are co integrated, they share a common stochastic trend, in other words, there exist a log run equilibrium or stable relationship among the variables.

Table 3 below presents the Johanson co integration tests for the variables.

Table 3: Johanson Co integration Tests

Eigenvalue	*Likelihood Ratio*	*5% critical Value*	*1%critical Value*	*Hypothenizes No of CE(s)*
0.978425	364.0408	87.31	96.58	None $^{x\,x}$
0.921238	225.9377	62.99	70.05	At Most 1 ^{xx}
0.849942	134.4500	42.44	48.45	At Most 2 ^{xx}
0.748287	66.16768	25.32	30.45	At Most 3 ^{xx}
0.367784	16.50686	12.25	16.26	At Most 4 ^{xx}

Source: Data Analysis
Series: PDS, GDP, M_2, INF, INT.
Lag interval: No lags
Note: ^{x} (^{xx}) denotes rejection of the hypothesis at 5% (1%) significant levels
L R test indicates 5 co integrating equations

4.3 ERROR CORRECTION MECHANISM

Having established, by applying Johansen's co integration test that all the series are co integrated, the error correction mechanism was applied to tie the short run dynamics of the co integrating equations to their long run static values. The ECM is a measure of the speed of adjustment of short run relation to unexpected shocks. The table below is the empirical result of the error correction model:

Table 4: Empirical Results for Error Correction Mechanism

Dependent Variable	:	PDS		
Method	:	Least Square		
Date	:	11/08/13 Time 10.04		
Sample (Adjusted)	:	1971 2010		
Included observations	:	40 after adjusting endpoints		
Variable	Coefficient	Std.Error	t-statistic	Prob.
GDP	0.109452	0.009361	11.69293	0.0000
M_2	0.006874	0,003199	2.148447	0.0387
INF	-517.0675	421.1719	-1.227687	0.2278
INT	310.5402	1235.444	0.251359	0.8030
ECM (-1)	-0.907059	0.200919	-4.514544	0.0001
R^2	0.956326	Mean dependent Variable		188606.8
Adjusted R-Squared	0.951335	S.D dependent Variable		363713.2
S.E of Regression	80236.03	Akaike info criterion		25.53980
Sum of Squared resid	2.25E + 11	Schwarz criterion		25.75
Log likelihood	-505.7960			

The above results show that short run changes in the explanatory variables have significant positive effects on PDS. The sign for the error correction term appear with the a priori expected negative sign. The ECM of -0.907059 is approximately one, which implies that any deviation from the long run equilibrium resulting from any shock on the explanatory variables will be corrected almost instantaneously.

The co integration test conducted earlier was mainly to establish whether the ECM term (derived from the residual of the long run regression) is stationary at level or not, and to determine how many of such relationship existed. However, the fact that there was presence of long run relationship among the series included in the

model does not automatically imply that all the variables in the model have significant effects on the dependent variable. Therefore, to determine which variable actually exhibit that long run relationship, we now estimate the long run model and then analyze the estimates. This is as shown in table 5, using ordinary least square regression technique:

Table 5: Regression Results

Dependent Variable: Log (PDS)
Method : Least Squares
Date : 11/05/13 Time: 18:35
Sample : 1970 2010
Included Observations: 41

Variable	Coefficient	Std.Error	t-statistic	Prob.
C	-2.119989	0.884233	-2.397545	0.0218
Log(GDP)	0.440047	0.125224	3.514072	0.0012
Log(M_2)	0.455691	0.094410	4.826696	0.0000
Log(INT)	0.289427	0.102314	2.828815	0.0076
Log(INF)	0.179735	0.078645	2.285408	0.0283

R-Squared	***0.990328***	***Mean dependent Var***	***9.583550***
Adjusted R-Squared	***0.989254***	***S.D dependent Var***	***2.822754***
S.E of Regression	***0.292621***	***Akaike info criterion***	***0.493970***
Sum Squared resid	***3.082566***	***Schwarz criterion***	***0.702942***
Log likelihood	***-5.126378***	***F-Statistic***	***921.5428***
Durbin-Watson stat	***1.366990***	***Prob (F-Statistic)***	***0.000000***

As shown in the above table, all the variables have been expressed in logarithm forms in order to express their relationships in either as percentages, elasticities or propensities. As indicated, all the variables, namely, gross domestic product (GDP), Money Supply (M_2), Interest rate (INT), and inflation rate (INF) are directly or positively related to the dependent variable private domestic saving (PDS). All the series appear with the expected a priori signs.

Holding all the other factors constant, a unit percent increase in GDP increases private domestic savings (PDS) by about 0.44 percent and vice versa. Also, an increase in money supply (M_2) by one percent increases private domestic saving (PDS) by approximately 0.46 percent and vice versa. Furthermore, a unit percent increase in interest rate (INT) or inflation (INF) increases private domestic saving by about 0.28 percent and 0.18 percent respectively.

The adjusted R-squared value of 0.989254 shows that about 99 percent of the variability in private domestic savings (PDS) is accounted for by changes in the explanatory variables. This is a considerably very high fit. All the variables are significant at both 5% and 10% levels of significance as shown by the t-values. An F-value of 921.5428 at the relevant degrees of freedom shows that the joint influence of the regression model is highly significant. Finally, a Durbin-Watson value of 1.366990 for 41 observations and the corresponding upper and lower Durbin-Watson values indicate the presence of positive serial correlation.

5. Summary

This paper is an analysis of the determinants of private domestic savings for the sample period 1970 to 2010. The empirical analysis conducted indicated that all the variables exhibited Random walk process and only became stationary after first differencing. Because all the variables were integrated of the same order, they were tested for co integration by applying the Johansen method. The co integration test actually revealed the existence of a long run equilibrium relationship among all the variables.

On the basis of the t-test conducted, all the individual variables were seen to be highly significance in the determination of private domestic savings in Nigeria. The conducted F-test also revealed that the entire regression plane (or the joint influence of the explanatory variables) is highly significant. The adjusted R-squared value of 0.989254 is considerably very high. The Durbin-Watson value of 1.366990 revealed the presence of positive autocorrelation. This implication is that in the event of any shock on any of the explanatory variables, the effect on the dependent variable does not disappear instantaneously but extends into future periods.

The researchers therefore recommend that in order to encourage savings and increase investment and output, the government should formulate macroeconomic policies that will involve these very important explanatory variables, namely, income, money supply, inflation rates, and interest rate on savings.

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