Testing the Classical Inflation Theory in Pakistan

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ARTICLE INFO	ABSTRACT
	The study is about the examination of classical theory of inflation in Pakistan. The data covered, time period from 1972-2020. Time series data is used and collected from World Bank. The ARDL model estimation technique is used to analyze the data. The study shows research gap based on testing the classical inflation theory in Pakistan which is different from previous related studies. The novelty of this research is to test the positive and direct linkage of doubling the money supply will double the price level in case of Pakistan believing the classical model of inflation. The stationarity of data is checked through unit root test. The results shows that there is positive relationship between nominal money supply and inflation in Pakistan, as classical believe that doubling the money supply will double the price level and value of money become half. The findings of the study support that classical inflation theory is valid in case of Pakistan. Inflation is taken as a dependent variable as a proxy of GDP deflator and list of independent variables are such as per capita income, nominal money supply, interest rate, taxes and government current expenditures. The empirical, theoretical and historical facts are supporting this study. The Study has explored the existence of inflation in Pakistan. It is observed that inflation is a monetary phenomenon and it is connected with money supply which leads to increase the general price level. In order to curtail inflation government should control money supply that will help to reduce prices.

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1. Introduction

Inflation is purely a rise in normal price level; price shows the degree to exchange money for goods and services. Money is store of assets that could be freely expended to have transactions in form dollars in people's hands that build the overall supply of money. Inflation a biggest challenge faced by many developing countries especially in Pakistan. High prices are indicating higher rate of inflation that leads to devaluation of currency that further reduce purchasing power of people and decrease investment as well (Greenidge & DaCosta, 2009). Pakistan is facing high inflation rate now a days, it is a great task for the economy as well. Today in Pakistan inflation is rising continuously. Inflation rate is 10.74% reported in 2020, it is a huge rise in price level. It was 6.74 in 2019 and below this in previous years was reported. The classical said that "other things remaining equal the double the money supply will double price level and the value of money will be half" and in other case it will be opposite case. Pakistan is facing this situation now a days, which is obviously due to increase in price level. Pakistan now a days is facing a challenge of rising price level and on the other hand real output growth is decreasing, through this channel demand for investment faces adversative results (Kandil, Berument, & Dincer, 2007). Investigation on the current inflation rate in country Pakistan was linked with the economic growth of country. The existing CPI of inflation

is verified as 11.0 percent in month April 2021. It is analyzed that inflation had adverse control on overall economic progress of Pakistan (Iqbal, Nadim, & Akbar, 2022).

The study focuses on to test classical theory of inflation in Pakistan, based on time series analysis. The first section contains introductory analysis and inflation trends. The second section explains literature related, theoretical support to this piece of research and trends of inflation from rest of the world. In section three methodology and material representing data description are included. The section four represents the estimation results of study. In final section, conclusion of the study is added.

2.   Literature review

Feliz and Welch (1997) empirically analyzed the classical idea based on inflation in countries, Peru, Argentina, Brazil, Bolivia, and Mexico. The data base covered decades from 1970s to 1990s. The core objective theme of study was to find relationship between long term monetary growth and inflation. On the other hand the short term relationships apply momentary and stochastic disturbances from the equilibrium. The model estimation technique included ADF (Augmented Dickey Fuller) test of unit root for the purpose of stationarity. The ADF technique applied to check validity of the rational expectation model based on future looking anticipation. Some critical analyzed concepts included failure points regarding forward looking behavior of people to anticipate monetary changes. Gokal and Hanif (2004), highlighted the central bankers, Macroeconomists and policymakers has sometimes stressed on the costs linked with high inflation. Inflation laid down negative externalities on the economy, when it interfered with any economy's efficiency. The support to these inefficiencies was not difficult to find even least at some theoretical level.

Bashir et al. (2011) empirically pointed out the determinants of inflation in Pakistan. The analysis emphasized on to scrutinize supply side and demand side factors related to inflation in Pakistan based on econometric criterion. It also helps to explore contributory associations between some macroeconomic variables. The utmost detectable impact of inflation about in current periods is on relative prices, interest rates, real output and taxes. The study had commenced data based on time series. It covered the period of 1972 to 2010. Using Johansen Co-integration and VEC (Vector Error Correction) approaches, long run and short run assessments has been considered. The causative associations had experimental by means of the test of Granger causality. The results disclosed the long run CPI causation to be surely prejudiced by, gross domestic product, imports, money supply and government expenditures. On the other flank government income has reduced the general prices in Pakistan. Advancement in government expenses and gross domestic product was obligatory. It was also recommended to the optimum level for all of the factors for the purpose to stable the price level. Ahmed and Ullah (2013) empirically examined the determinants of inflation in Pakistan. The key objective of the study was to discover the short run and long run subtleties of the inflation in case of Pakistan. The study covered area from 1971-2012. The methodology of Johansen co integration was applied to test long-run equilibrium. On the other hand the Error Correction (ECM) Model was applied to stipple the short-run crescendos. Findings emphasized M2, energy crises, GDP, current government expenditure, import, output cavity and the adaptive expectancy which generates inflation. The development spending indirectly correlated with the inflation. The analysis established the base of supply and demand side inflation in Pakistan.

Jalil, Tariq, and Bibi (2014) examined the fiscal deficit, inflation and monetary policy in the region. It was tested that price relation with the monetary policy was independent. Although it was outcome of interdependency of the monetary and the fiscal policies, the article aimed to check the fiscal assistance of price for the case of Pakistan. There is used an ARDL methodological framework. The data covered period from1972–2012. The findings showed that that fiscal discrepancy was main component of the prices along with some other variables. Mohseni and Jouzaryan (2016) empirically examined the impact of unemployment and Inflation on economic growth. This study based on Iran economy and covered the time period of 1996-2012. The theme of the analysis was to show upshots of inflation and unemployment on Iran's economic growth. There were analyzed two short term and long term phases, using Autoregressive Distributed Lag Model. It was analyzed that Inflation and unemployment has negative impact on Iran's economic growth. The results of this study were useful to solve inflation and unemployment problem in different countries.

Ewald and Geißler (2017) empirically studied the optimal contracts for central bankers. The special effects of marketplaces for inflation interconnected calls on central bank's financial policy. The study offered a framework emphasizing the central bank, financial and private negotiators and also the financial market. In this piece of research paper the central bank was supervisor for the inflation and in addition to dispensed inflation connected calls. These models studied had copied equilibrium price level and quantity for inflation associated calls. The objective of the model presented rational expected for the private agents. The predictable inflation in classical scenario deprived of inflation allied calls was 0.05. The research study showed, the summary of the inflation interconnected calls could be reduced the inflationary bias of central banks. The study implemented the kind of inflation agreements considered according to classical works, exclusive of the prerequisite of the classical primary mediator connection among central bank and government.

Félix and Belo (2019) highlighted the inflation was a key macroeconomic problem that had continued to dominate. It was the intriguing fact about the inflation rate that it was both of effect and cause of specific policy actions of government. The paper aimed at identifying major factors which were cause of inflation in region. The technique of autoregressive distributed lag (ARDL) was used in estimation method. Ellington and Milas (2019) empirically investigated universal liquidity. The money growth and UK inflation was discussed in this study. This piece of the research paper has used tools from the classical theory of inflation for UK and data covered Consumer Price Inflation from 1970Q1 to 2017Q4. In actual, we accept augmented Phillips curve type equations within a linear and command transferring framework where commands are administered by prior inflation rates. The non-linear models exhibited that a monetary explanation of inflation is projecting during phases of high inflation. However, these models suggest that during periods of high inflation, The Bank of England essentially display monetary settings in aggregation with monetary policy posture. All these would help dampened inflation perseverance.

Fasanya and Awodimila (2020) empirically highlighted the predictors of inflation based on commodity prices. The study was based on African perspective. The data for model building was taken monthly for Nigeria and South-Africa from period 1980-2017. The core inflation was taken for Nigeria from 1995-2017 and for South-Africa from 2002-2017. The key objective of the study was to check predictive capacity of commodity prices for inflation. The classical Phillips curve and natural rate of unemployment were theoretically discussed in detail as a support study. The Feasible Generalized Least Square (FQGLS) estimations techniques were used. The findings of the study showed that commodity prices were not good predictor for inflation. The piece of research paper specifically focused on commodity prices, but it was not rationale to used merely commodity prices for inflation analysis although there were many indicators for inflation to predict well.

Morvillier (2020) explained the currency devaluation impact on inflation growth. The devaluated currency was linked with inflation pressures that were rising from the cost-push type of inflation. The findings showed to be vigorous to prohibition of the currency calamities links from the mockup. However, it holed in example of rising countries. It was not applied in embryonic countries. Resultantly, policies supported on undervaluation should not be encouraged. Chiang, Lee, and Liao (2021) empirically explored the sources of inflation dynamics in china. The basic objective of the study was to analyzed national problem of inflation through segmented analysis. The focus of the study was on probable sources of inflation and sector-based inflation towards the national problem. The data set covered time period of 1994-2015.The structural VAR model based on correlation matrix equations was used.

Goyal and Parab (2021) empirically highlighted aggregate expectations of households in India. The quarterly data was used from period 2008-2019. The study objective was to analyzed epidemiologic simulations of knowledge in the anticipation establishment. The comeback factor on rising prices newsflash in outline of central bank's estimates beats quantities predicted for innovative frugalities. The error change erosions of the prospects to surprises in the variables comprised core inflation and commodity. The policy variables and demand in a sequence of the SVAR's showed procedure infrastructures disturbing opportunities

in the short time period. The inflation based on food items has a note worthy short-run upshots on economy prospects. The desired response showed an upsurge in strategy rate fostering potentials. All above magnitudes showed broadcastings as main operative than the strategy rates in persuading inflation level outlooks. Bilal, Khan, Tan, Azam, and Hassan (2022) Highlighted the alternative energy sources and environmental quality. The study was based on inflation dynamics. The some of the core components of eco- logical footprint has not enough covered in findings. The study was employed inflation dynamics, government expenditures and economic growth from the period of 1971 to 2016. It was as median variable to test the effect of alternative energy sources. The research applied advanced methods for empirical testing.

Iqbal et al. (2022) investigated the current inflation rate in country Pakistan. The study was linked with the economic growth of country. The purpose of the study was to construct optimal strategies of macro-economic stability and growth in Pakistan. The existing CPI of inflation was verified as 11.0 percent in month April 2021. It was analyzed that inflation had adverse control on overall economic progress of Pakistan. The data set covered the time span of 1989-2019. The findings of the study exposed that GDP, ER and CPI were non-stationary at the first difference. The other variables OP and M2 were found stationary. The long run findings of the ER show that its influence was negative ad M2 had positive link with CPI.

3.   Theoretical Background of the Model

Inflation is purely a rise in normal price level, price shows the degree to exchange money for goods and services. Money is regular store of assets that could be freely expended to have transactions in form dollars in people's hands that build the overall supply of money (Mankiw, G.). To check the classical model of inflation it is mandatory to put classical theoretical framework into consideration. The father of economics Adam Smith wrote book in 1776 titled "The Wealth of Nations", after that economics emerged as a proper subject. Classical as a traditional school of thought kept a focus on production, distribution, consumption and exchange of the wealth to stabilize the economy. Followers of Classical school of thought were, Ricardo, J.S Mill, Edgeworth, Pareto, J.B. Say and Marshall. The Classical had same insight on monetary theory through the well-known theory of money which is known as QTM (quantity theory of money).

3.1   QTM (Quantity Theory of Money)

According to classical role of money was neutral. Money was just medium of exchange to consume and exchange wealth and make transactions. Money cannot affect real variables like, output, income and level of employment. On the other hand, it can affect the nominal variables like monetary wage and price level. Classical says that price level is positively correlated with monetary wages. It is stated that double the quantity of money double will be the price level, money supply change can carry relative change in the prices (Fisher). The equational identity shows that,

$$M\bar{V} = P\bar{Y}$$

Where, M shows Supply of Money, V shows Velocity of Money, P shows Level of price, Y denotes the Output,

GDP=C+I+G+ (X-M) = MV = PY as an identity.

We can write this equation to show the change in Money supply that will ultimately will brings changes in price level as well.

$$\Delta M\bar{V} \approx \Delta P\,\bar{Y} \qquad \rightarrow \quad \text{Eq. (1)}$$

Changing money supply will change price level in direct proportion but velocity of money and output will not change (V and Y are assumed to be constant). The quantity theory of money also put emphasis on aggregate demand for economy. The above equation shows that how much change in money supply brings changes in aggregate demand and that will change M times constant multiple V.

3.2 Fisher Effect

Fisher effect reveals that the market interest rate will equal to real interest rate and added to expected rate of change of prices.

$$i = r + P^e \quad \rightarrow \quad \text{Eq. (2)}$$

Where, i is nominal interest rate r shows real interest rate, P^e is expected inflation rate There is direct link among nominal interest rate and expected inflation rate. Fisher equation presents clear picture of lenders and borrowers in form of capital gain and losses. During inflation lenders lose, the reason is that during inflation the real value of money falls, so lenders face loss in form of principle plus interest amount received to them, on the other hand during inflation borrowers gain due to repayment easiness of their loan to lenders in form of their previous interest rate. The real value of capital goods that have purchased from loans rises in nominal value with overall price increase. Fisher started to study the commodity prices change effect on market interest rate. Inflation anticipations of lenders and borrowers about inflation are same. The nominal interest rate will exceed real interest rate by anticipated inflation rate. On basis of the Fisher equation lenders and borrowers have perfect knowledge about future price level movements (Delorme, Jansen, & Ekelund Jr, 1994).

3.3 Monetarist Hypothesis and QTM

Contemporary Monetarist view about long run effects of money stock on price level was same as classical' point of view is. The monetarists believe that in long run monetary expansion will lead to increase price level as doubling the money supply will double the price level in long run and real interest rate will not change. Monetarists also believe that monetary expansion can affect economic activity in short run only. In the long run real variables like, production and employment are unaffected by the change in the rate of monetary expansion. The key nexus regarding monetarists theory about inflation is between total expenditures involved in adjustment process and real money balances held by individuals. This step can be set in form of nominal money supply be expressed as;

$$Md = mdP,$$

$$md = \frac{Md}{P} \quad \rightarrow \quad \text{Eq. (3) is real money demand}$$

Where, Md = level of money stock demanded, md= The real money stock demanded, P= Price level. Real money demand is not merely fraction of money income in this formulation. Money income is also related with cost of holding money balances in saving account or in some interest bearing form of assets. Therefore, demand for money can be expressed as;

$$md = f(Y,i), \text{ y shows real income, i is nominal interest rate}$$

Quantity theory is also dynamic by expressing in terms of rate of change proportionally. Irving Fisher identity equation of exchange can be written as; MV≡PY. Simple static theory can be written as;

$$\frac{\Delta M}{M} + \frac{\Delta V}{V} = \frac{\Delta P}{P} + \frac{\Delta Y}{Y} \quad \rightarrow \quad \text{Eq. (4)}$$

$$\frac{\Delta P}{P} = \left[\frac{\Delta M}{M} + \frac{\Delta V}{V}\right] - \frac{\Delta Y}{Y} \quad \rightarrow \quad \text{Eq. (5)}$$

Equation 5 shows the level of difference in the level of prices in percentage is identical to summation of percentage rate of difference in money stock and definite velocity minus proportion rate of variation in real income. It concluded that long run static formation of quantity theory hold (Delorme et al., 1994).

3.4 Cambridge Version of QTM

Pigou, Roberston and Marshall offered Cambridge equation regarding QTM. It is stated as

$$M = kPY$$

Where, k denotes money demand for purpose of transaction purposes. It is inversely linked to velocity of circulation of money V. Cambridge economists keep k and the level of output and full employment static. In such conditions there exist direct and relative connection among Money supply and Price. It revealed the fact that when money supply increases it will lead to increase prices (Froyen, 1996).

4. Data, Model Specification and Methodology
On the basis of related literature model is specifically designed in following form.

Inflation= f (Per Capita Income, Money Supply, Interest Rate, Taxes, Govt. Expenditures)

$$INF= f (PCI, NMS, IR, TAX, GE) \quad \rightarrow \quad Eq. (6)$$

$$INF= \alpha + \alpha_1 PCI + \alpha_2 NMS + \alpha_3 IR + \alpha_4 TAX + \alpha_5 GE + Ui \quad \rightarrow \quad Eq. (7)$$

Where α is intercept term, $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5$ are slope coefficients, Ui is error term, PCI= per capita income, NMS= nominal money supply, IR= interest rate, TAX= taxes, GE= Govt. current expenditures.

4.1 Data source and variable's Description
The data used in this model is taken from World Bank. The GDP deflator is taken as a proxy of inflation as a dependent variable and others are independent variables in the model.

Table: 1 Expected sign and variables

Variable	Description	Data Source	Expected Sign	Measurement Unit
INF	Inflation as a dependent variable	World Bank		Percentage
NMS	Nominal money supply	World Bank	+ve	Percentage
PCI	Per capita income	World Bank	+ve	Current US ($)
IR	Interest Rate	World Bank	-ve	Percentage
TAX	Tax	World Bank	+ve	Percentage
GE	Govt. Current Expenditures	World Bank	+ve	Percentage

4.1.1 Per Capita Income (PCI)
Per capita income is defined as the volume of money earned per head in a country or region. It can be taken as a measure to determine the average per head earning for a region to check the standard of living of population. It is clear in our analysis that per capita income will increase during inflation because the purchasing power of the people will decline and they need to hold more money that tend to increase the wages and salaries of the people as per changes in prices.

4.1.2 Nominal Money Supply (NMS)
The money supply defined as whole stock of currency and other most liquid financial instruments in an economy at a particular time. Classicals believe that nominal money supply will lead to increase prices that will cause inflation. These results are justified by this study.

4.1.3 Interest Rate (IR)
Interest rate is an amount that borrower pay to lender based on loan advanced. Fisher effect shows that nominal interest rate will directly affect inflation, while real interest rate decreases inflation rate.

4.1.4 Taxes (TAX)
Tax is a compulsory payment to state, taken by government on the income of workers and on businesses. Taxes are positively related to inflation, as taxes increases inflation also increases in form of reduced purchasing powers of individuals.

4.1.5 Government Expenditures (GE)
Government current expenditures are public spending on goods and services. It is a major component of GDP. It happens so because when Govt. Current expenditures increase then Investment which is also a major component of Aggregate demand will lead to increase aggregate demand resultantly demand-pull inflation can cause.

The above table shows expected signs of independent variables with dependent variable which is GDP deflator indicating as inflation. The presented variables have positive signs with the dependent variable and negative sign with two variables, the real interest rate and taxes.

5.   Results and Discussions

The descriptive statistics in table 2 shows different values of dependent and independent variables. There are 48 observations included in it. The mean values of inflation, interest rate, nominal money supply, per capita income, government expenditures and taxes are 71.2831, 7.97687, 45.6569, 603.75, 11.12681 and 5.542104 respectively. The median of all the variables id shown above which is 72.98, 7.705, 44.856.445, 11.0025 and 5.5 listed above. The maximum of the values are 112.98 of inflation, 16.63 of interest rate, 58.856 of nominal money supply, 1480 of per capita income, 16.785 of government current expenditures and 6.7 taxes hold. The minimum values are 24.12 of inflation, 3.65 of interest rate, 33.996 of nominal money supply, 150 holds per capita income, 7.347 of government current expenditures and 4.4 of taxes.

Table 2: Descriptive Statistics

	INF	IR	NMS	PCI	GE	TAX
Mean	71.283	7.976875	45.6569	603.75	11.12681	5.542104
Median	72.98	7.705	44.856	445	11.0025	5.5
Maximum	112.98	16.63	58.868	1480	16.785	6.7
Minimum	24.12	3.65	33.996	150	7.347	4.4
Std. Dev.	25.569	3.23732	6.813518	384.5728	1.946965	0.712207
Skewness	-0.181	0.775067	0.398121	0.903035	0.481352	0.117492
Kurtosis	1.976	3.191811	2.203731	2.566002	3.898383	2.032475
Jarque-Bera	2.355	4.879409	2.536092	6.900486	3.467781	1.982644
Probability	0.308	0.087187	0.281381	0.031738	0.176596	0.371086

Source: Authors estimation through E-views Statistical Software.

In table 3, results of ADF – Unit Root Test are presented. The test is applied to test the integration order of the variables. The results shows that Inflation, Per capita income and Interest rate were non stationary but become stationary after first difference. The government expenditures, Taxes and Nominal money supply are stationary at level. These results of all variables tell that Autoregressive Distributed Lag (ARDL) will be applied to this data.

Table 3: Findings of ADF Unit Root Test

VAR	Level including intercept	Level including trends and intercept	1st difference including intercept	1st difference including trends and intercept	Conclusion
INF	-1.408617	-3.166514	-3.885908	-4.089825	I(1)
GE	-1.592529	-1.465619	-5.721914	-5.726971	I(0)
PCI	0.058275	-2.430441	-3.378694	-3.179609	I(1)
TAX	-4.017922	-4.017922	-3.980576	-6.933844	I(0)
IR	-0.731615	-3.351765	-4.960008	-4.979781	I(1)
NMS	-1.114873	-4.325199	-5.563982	-5.654218	I(0)

Source: Authors estimation through E-VIEWS Statistical software.

Results of ARDL Bound test are important for the estimation of F-statistics and its result is given in table 4. The bound test is used mainly after the existence of variables with I(1) and I(0) results. It is good technique for small sample size as well. The results show that value of F-statistics is greater than lower and upper bound critical values. The value of F statistics value is 5.102271 at level 5.

Table 4: Bounds Test of ARDL.

Test Statistic	Value	K
F - Statistic	5.102271	5
Critical Value Bounds		

I0 Bound	I1 Bound	Significance
3.41	4.68	1%

Source: Authors estimation through E-VIEWS statistical software.

The short run results are presented in table 5 in which Cointegration equation tells that the short run results would be converged to the long run results. Table 6 provides the long run ARDL estimates. It is observed that all the variables like Govt. current expenditures, nominal money supply, per capita income and tax rate are main source of inflation in Pakistan. We have identified that nominal money supply escalates the inflation as theoretically supported by the classical economists. It is also observed that real rate of interest decreases the inflation rate.

Table 5: Error Correction Model

Variables	Coefficients	Std. Error	t-Statistics	Probability
D(INF)	0.427167	0.13838	3.086913	0.0042
D(INF)	-0.224602	0.151734	-1.480232	0.1486
D(GE)	-0.100729	0.076984	-1.30843	0.2
D(IR)	0.330556	0.078693	4.200588	0.0002
D(NMS)	0.040624	0.027089	1.499631	0.1435
D(PCI)	0.006655	0.002272	2.92848	0.0062
D(TAX)	0.062752	0.099742	0.629138	0.5337
CointEq(-1)	-0.591634	0.158431	-3.734332	0.0012

Source: Authors estimation through EVIES Statistical Software.

Table 6: The Long-run Results of ARDL

Variables	Coefficients	Std. Error	t-Stats
GE	0.105226	0.15837	0.664431
IR	-9.775009	2.151734	-4.542851
NMS	0.181888	0.076983	2.362703
PCI	0.068737	0.03004	2.288106
TAX	7.619859	3.42567	2.224341
C	60.997345	14.7723	4.1291704

Source: Authors estimation through EVIEWS statistical software.

5. Conclusion

The research paper is conducted to test the classical model of inflation in Pakistan. It is a fact that inflation is a disease in an economy and there is no authentic remedy to cure it. Pakistan's economy is facing huge challenge of inflation nowadays. The results of ARDL support the objective and aim of this study to verify the classical model of inflation in Pakistan. Findings report the applicability of classical model of inflation in Pakistan that indicate doubling the money supply will double the price level and the value of money will be half, and in opposite case will be in form of decreasing the money supply will decrease the price level and value of money will be doubled. The Classicals' were in favor of change of money supply on nominal variables not on real variables, i.e., output and employment. They believe on full employment in an economy. The price level can cause inflation to increase in form of monetary channels that affect input prices and resultantly cause price level to increase and purchasing power will reduced. The results shows that per capita income will increase during inflation, government expenditures will have also positive relationship, real Interest rate will have negative relationship with inflation, nominal money supply have positive relationship and taxes have negative relationship. Results of this study show a positive association among overall price level and money supply which is the fundamental cause of inflation in Pakistan. The cure to this issue can be in form of taxes control policy, Controlling Government current expenditures, interest rate stability as well. Policy recommendation can be followed through reducing money supply to reduce price level that will reduce inflation in Pakistan. In Pakistan money supply growth must be checked and controlled by taking proper measures so that price level should be maintained to a certain level.

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