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Analysis of the Impact of New Finance on Credit Revenue and Expenditure, Monetary Policy and Benchmark Interest Rate

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Abstract: Under effective supervision and industry self-regulation, the new financial model of Internet finance has entered a stage of stable development. As a representative of new finance, in the first half of 2023, the market scale of China's online lending industry reached 10.85 trillion yuan. At the same time, the impact of new finance on the financial field has always been the concern of the academic community. This paper uses monthly data in recent years to establish a VECM model and empirically analyzes the degree of impact of Internet finance represented by online lending platforms on traditional finance. The results prove that online lending has a significant impact on monetary policy, the impact on bank credit (loans) changes from negative to positive, has a significant negative impact on the bank's benchmark interest rate, and the long-term cointegration binding force is strong. Thus, it provides a certain empirical basis for traditional financial institutions to implement effective financial policies.

1. Introduction

After experiencing explosive development in the early stage, China's Internet finance industry has entered a policy adjustment stage. Ten ministries and commissions including the central bank jointly issued the "Guiding Opinions on Promoting the Healthy Development of Internet Finance", which fully affirmed the development of Internet finance from the regulatory level and formulated a clear boundary and identity for Internet finance, making the industry develop more healthily. In June 2023, five departments including the People's Bank of China issued the "Guiding Opinions on Financial Support for Comprehensively Promoting Rural Revitalization and Accelerating the Construction of a Powerful Agricultural Country", proposing to improve financial services such as rural e-commerce financing and settlement, optimize the credit approval and risk control management for county consumers, and improve the availability of consumer finance.

Under the conditions of market demand and policy support, the transaction scale of China's online lending service market continues to maintain a growth trend. At present, there are about two thousand online lending platforms registered in China. Financial enterprises represented by Lufax Holding and JD Group provide many inclusive financial products and services for financial consumers. According

to statistical data, in the first half of 2023, the market size of China's online lending industry reached 10.85 trillion yuan. At the same time, under the active support of policies and the continuous promotion of market demand, the future scale of China's online lending service market will continue to maintain steady growth and provide efficient and convenient financial services for more users.

At the same time, the research on the impact of Internet finance on traditional finance and the relationship between Internet finance and traditional finance has always been concerned by the academic community. Zhou Li [1] explored the influence mechanism of the development of Internet finance on the transmission channels of monetary policy. She believes that the scale of online lending platforms shows an inverted U-shaped trend and has an impact on the transmission of monetary policy through monetary channels and credit channels. Li Wei et al. [2] concluded from the empirical analysis of the impact of Internet finance on monetary policy that the rapid development of Internet finance has had a strong impact on monetary policy, forcing traditional financial institutions to reform and reducing market interest rates and financing costs. Peng Chunfang et al. [3] concluded from the research on the impact of Internet finance on the loan scale of banking financial institutions that the expected yield rate of online lending and the platform risk level will have a certain fluctuating impact on the loan scale of financial institutions in the short term; in the long run, there is no obvious substitution relationship between Internet finance and traditional financial institutions. Regarding the impact of online lending models on traditional financial industries and their influence on the transmission of monetary policy, Tang Junyu[4] and Zhou Geng etc. [5] believe that after the emergence of online lending models, the impact of changes in benchmark interest rates on loans in traditional financial industries is reduced, the interest rate transmission effect of monetary policy is weakened, and at the same time, it prompts a reduction in the deposit balance of traditional financial institutions and affects the deposit and loan effects of financial institutions regulated by benchmark interest rates, thereby reducing the effectiveness of the monetary policy transmission mechanism.

Wang Juan [6] found in the research on the impact of online lending on the money supply that the impact of online lending on the money supply is manifested as online lending having a short-term impact on the total money M0 and M1 and a long-term impact on the total money M2. Zou Xinyue [7] et al. found through the analysis of the impact of Internet finance on China's monetary policy that Internet finance can promote the public's investment motives and increase the channels of money demand and money supply. It also interferes with the accuracy of monetary policy formulation and the effectiveness of implementation. Liu Lin [8] stated in the outlook for online lending platforms that the existence of online lending models is necessary. In China's current financial system, such personal microloan platforms with both commercial and social characteristics are needed as a supplement to bank credit. However, Li Wei et al. [2], Tang Junyu [4] and others did not test the stability of the model before directly modeling in the empirical analysis. The results obtained in this way are not of much significance. Wang Juan [6] and Peng Chunfang [3] both concluded that there is a cointegration relationship between variables after conducting cointegration analysis, but they did not model the vector error model. Instead, they directly conducted empirical analysis through vector autoregression tests. The results obtained in this way will not be the most direct and effective.

That is, this paper will start from two aspects of theory and empirical research. Taking the online lending platform, one of the representative models of Internet finance, as an example, it will study the impact and shock of the development of Internet finance on traditional finance.

2. Theoretical Background

In order to analyze the impact relationship of Internet finance on traditional finance, it is necessary to conduct theoretical division and deduction of various regulatory indicators in the traditional financial system. However, due to the large number of indicators in the traditional financial system,

this paper divides it into the basic credit business (loans) of financial institutions, monetary policy, market interest rates, etc. for theoretical deduction.

2.1. The impact of online lending on the credit of traditional financial institutions

General financial institutions mainly lend the savings (current and fixed-term) of residents to enterprises or individuals in need of funds and purchase financial securities (government bonds or corporate bonds) to expand financial leverage and the money multiplier to increase their own income. Online lending platforms attract idle private capital for investment in those in need of funds by guaranteeing relatively high return rates for individuals or enterprises through their own platforms. Therefore, the relatively high return rate and high currency liquidity make the online lending model one of the new investment models in addition to financial institutions such as banks. Secondly, in the online lending industry, in order to avoid the risk of misappropriation of funds, the government stipulates that platforms must manage investors' funds through banks [9], referred to as online lending bank depository (including margin, risk reserve, etc.). In this way, as the transaction volume of online lending increases, the deposit volume of traditional financial institutions will also increase slightly. Thirdly, since online lending platforms solve the limitation problem that traditional financial institutions cannot meet some long-tail customers and provide loan services to groups that cannot obtain loans from traditional financial institutions due to poor credit, and expand residents' loan and financing channels, it may also increase the scale of social financing. In conclusion, the rapid development of online lending will to a certain extent reduce the deposit capacity and long-term and short-term stock ratios of banks, divert the sources of funds of traditional banks, and greatly reduce the deposits and loan amounts of banking institutions [10]. Similarly, due to the expansion of bank depository business, the deposit ratio of traditional institutions increases. There may be a complementary relationship between the two.

2.2. The impact of P2P on monetary policy

(1) M=mxB=cr+1/cr+rr

In the formula, cr: currency deposit ratio, which is the ratio of the amount of currency c held by residents to the amount of demand deposits d. rr: reserve requirement ratio, which is the ratio of the reserves held by banks to deposits.

According to the currency function formula, when the base currency in the market remains unchanged, if the reserve requirement ratio tends to 0 infinitely, then the money multiplier will increase infinitely. Since online lending platforms only perform the function of platform information intermediary and do not have the function of traditional financial institutions to provide reserves to the central bank (although the latest rectification and filing plan involves the platform compensation risk reserve, but due to the just implementation of the policy, the effect is not ideal, that is, it is ignored here). That is, the total investment of investors on the platform will be directly converted into capital output. Secondly, due to the relatively high annual return rate of online lending (now basically maintained at about 9%), a large number of investors will invest capital in online lending platforms, so that the amount of currency in circulation in the market and the amount of cash held by residents will decrease. That is, the emergence of online lending platforms may reduce the holding rate of cash currency and currency in circulation. Since the cash ratio is negatively correlated with the money multiplier, it can be said that the emergence of online lending has increased the money supply and money multiplier. On the contrary, the increase in the money supply expands the space for the circulation speed of money and the opportunity for asset investment in online lending. That is, there may be a complementary relationship between the two.

2.3. Impact on benchmark interest rates

MV=PY

M: amount of money in circulation, V: currency circulation speed, P: price, Y: total income

Online lending is a new model established through the Internet as an information intermediary platform to meet the lending requirements of both borrowers. The currency (digital currency) circulation speed and conversion efficiency of this model are higher than those of general traditional institutions (Zou Xinyue et al., 2014)[7]. According to the Fein theory formula, assuming that the price of goods and total income remain unchanged, and due to the increase in the circulation speed of money, the amount of money in circulation in the market will decrease. In this way, the government often adjusts the RMB loan and deposit interest rates or cuts interest rates through the central bank (the People's Bank of China) to solve the financing cost problem of enterprises, thereby expanding the investment intensity of the market and saving the market economy. It can be concluded that the increase in online lending transaction volume indirectly affects the benchmark interest rate of banks to a certain extent. Secondly, due to the relatively high investment return rate in online lending platforms, and the average return rate of the platform is also basically maintained at about 9%. Therefore, investors will transfer some bank deposits to online lending platforms for asset operation management [11], which will lead to a small decline in the demand deposits of commercial banks. When the deposit ratio of traditional financial institutions declines, the central bank often raises deposit interest rates to attract deposits or cuts interest rates to expand capital space to ensure the demand for loan amounts. That is, in summary, the increase in the transaction volume of online lending platforms may affect the benchmark interest rate of traditional finance, and there may be a competitive relationship between the two.

According to the above review, the emergence of online lending platforms can not only divert the sources of funds of traditional financial institutions, but also increase the deposit ratio of banks slightly, cause an increase in the amount of money and affect the basic interest rate of traditional financial institutions. That is, this paper puts forward the following research hypotheses:

H1: The increase in the transaction volume (loan volume) of online lending platforms reduces the loan scale of traditional financial institutions.

H2: The increase in the transaction volume (loan volume) of online lending platforms increases the amount of money.

H3: The increase in the transaction volume (loan volume) of online lending platforms reduces the basic interest rate of traditional financial institutions.

3. Selection of Index Data and Model

As one of the important new Internet financial service models, online lending not only expands financing channels and the money multiplier, reduces transaction costs, but also has a strong ability to attract deposits. Therefore, the development of online lending plays an important role in promoting the development of China's financial system. In order to study the impact of Internet finance on traditional finance and the impact on traditional financial institutions, this study selects the vector autoregressive model (VAR), which can study the interrelationships between time series and the dynamic responses of multivariate systems to random disturbances through impulse analysis, as the main model method.

3.1. Model Construction Selection of indicators and data

This paper selects the monthly data of the total transaction volume of online lending from January 2016 to September 2022 provided by Wangdaizijia as the sample data for empirical research to

measure the development degree of online lending refer to Table 1 for details. Secondly, the monthly data of RMB credit revenue and expenditure, monetary policy, bank benchmark interest rate and other indicators provided by the People's Bank of China in the same period are used as the development goals of measuring traditional financial institutions, with a total of 57 samples.

Table 1: Selection of indicators

	Indicator	Data	Indicator Interpretation	Data Source
Development of Internet finance	Total transaction volume of online lending	2016.1-2022.9	Volume	WangdaiZhiJia
Development of traditional financial institutions	RMB credit revenue and expenditure of financial institutions	Total RMB loan amount in the same period	Lending	People's Bank of China
	Monetary policy	Total amount of M2 in the same period	M2	People's Bank of China
	Benchmark interest rate	Weighted average interest rate of interbank lending (%)	Weighted Average Interest Rate (%) WAIR	People's Bank of China

3.2. VAR model

Vector autoregression builds a model based on the statistical properties of data. This model constructs a model by taking each endogenous variable in the system as the lagged value of all endogenous variables in the system, thus generalizing the univariate autoregressive model to a vector autoregressive model composed of multivariate time series variables. Based on the above description, the vector autoregressive model constructed to study the impact of online lending on traditional institutions is as follows:

$$\text{Volume}_t = \alpha_0 + \alpha_1 \text{Volume}_{t-1} + \alpha_2 \text{Lending}_{t-1} + \alpha_3 \text{M2}_{t-1} + \alpha_4 \text{Rate}_{t-1} + \epsilon_{1t}$$

$$\text{Lending}_t = \gamma_0 + \gamma_1 \text{Volume}_{t-1} + \gamma_2 \text{Lending}_{t-1} + \gamma_3 \text{M2}_{t-1} + \gamma_4 \text{Rate}_{t-1} + \epsilon_{1t}$$

$$\text{M2}_t = \rho_0 + \rho_1 \text{Volume}_{t-1} + \rho_2 \text{Lending}_{t-1} + \rho_3 \text{M2}_{t-1} + \rho_4 \text{Rate}_{t-1} + \epsilon_{1t}$$

$$\text{Rate}_t = \varphi_0 + \varphi_1 \text{Volume}_{t-1} + \varphi_2 \text{Lending}_{t-1} + \varphi_3 \text{M2}_{t-1} + \varphi_4 \text{Rate}_{t-1} + \epsilon_{1t}$$

Among them, volume is the transaction volume of the P2P industry. Lending is the total amount of RMB loans of financial institutions, reflecting the actual situation of credit revenue and expenditure of financial institutions. M2 is the balance of broad money, reflecting the total money supply. rate is the interbank lending (weighted average interest rate %), which refers to the weighted average interest rate of all transactions of all transaction varieties in each month, reflecting the interest rate of the mixed loan cost.

4. Empirical Results and Analysis

4.1. Unit root test and cointegration test

In order to eliminate the possible heteroscedasticity in the model, it is necessary to take the logarithm of the three variables in this model, which are represented as transaction volume (Lvolume), loan balance of financial institutions (llending), and money quantity (lm2), respectively, as shown in Table 2. At the same time, when directly using time series data with unit roots for regression analysis,

it is easy to cause false regression or spurious regression phenomena. Therefore, it is necessary to judge whether the data is stable through unit root tests before constructing a regression model. When testing the stationarity of time series, the most frequently used test model is the ADF model. That is, this model is selected in this paper for the stability test of time series.

Table 2: ADF unit root test of sequences

Variabe	ADF **Statistic**	**Critical Value (1%)**	**Critical Value (5%)**	**P-value**	**Test Result**
Lvolume	-0.380	-4.110	-3.482	0.9875	Unstable
Llending	-2.756	-4.110	-3.482	0.2137	Unstable
Lm2	-1.996	-4.110	-3.482	0.6036	Unstable
rate	-3.352	-4.110	-3.482	0.0582	Unstable
△Lvolume	-10.073	-4.113	-3.483	0.0000	Stable
△Llending	-10.774	-4.113	-3.483	0.0000	Stable
△Lm2	-9.341	-4.113	-3.483	0.0000	Stable
△rate	-6.834	-4.113	-3.483	0.0000	Stable

Note: △ represents the difference, that is, performing difference on the time series.

As can be known from the ADF test results shown in the table, the four time series variables accept the null hypothesis at the 1% significance level, that is, they can be judged as unstable time series. However, after the first-order difference, the ADF values of the four variables tend to be stable at the 1% significance level. Thus, it can be concluded that the four variables are all first-order integrated stationary time series. This means that there can be a long-term stable equilibrium relationship between these time series variables. It also meets the requirements of cointegration test. That is, a cointegration test needs to be conducted to determine whether there is at least one cointegration relationship, as shown in Table 3.

Table 3: Johansen cointegration test results (January 2016 - September 2022).

	Eigenvalue	Trace statistic	0.05 critical value	Eigenvalue	Trace statistic	0.05 critical value
None*	.	63.9341	54.64	.	38.5693	30.33
At most 1	0.43767	25.3648*	35.55	0.43767	17.0598	23.78
At most 2	0.22479	8.3050	18.17	0.22479	7.1663	16.87
At most 3	0.10144	1.1387	3.74	0.10144	1.1387	3.74
At most 4	0.01685			0.01685		

Note: * indicates rejecting the null hypothesis at the 5% significance level.

From the results of the cointegration test, it can be seen that there is at most one cointegration vector between these variables at the 5% significance level, that is, the hypothesis that there is no cointegration test relationship is rejected. Therefore, it can be judged that there is indeed a long-term equilibrium relationship between these variables.

4.2. Establishment of lag order

Since there is a cointegration relationship between variables, it is necessary to use the vector error correction (VECM) model with cointegration constraints to model non-stationary time series. Before the model, the lag order must be determined. According to the principle that each equation in the VAR model is an autoregressive distributed lag model, this paper selects the VAR representation

corresponding to the system to determine the lag order. The results are shown in the Table 4 as follows.

Table 4: Results of establishing lag order

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	439.305				1.8E-11	-13.394	-13.3412	-13.2602
1	867.681	856.75	16	0.000	5.5E-17	-26.0825	-25.8185	-25.4134*
2	893.005	50.649	16	0.000	4.2E-17	-26.3694	-26.8942*	-25.1651
3	913.747	41.483	16	0.000	3.7E-17	-26.5153	-25.8289	-24.7758
4	932.56	37.627*	16	0.002	3.5E-17*	-26.6019*	-25.7043	-24.3271

Using the AIC and BIC information criteria (the one with more * is better) to analyze the above data results, it is concluded that the optimal lag period of this model is the latter four periods. Secondly, in order to avoid autocorrelation in the residuals of the VECM model, it is necessary to conduct an LM test on whether there is autocorrelation in the residuals of the model. If there is autocorrelation, it means that the lag order of the model needs to be increased. According to the results in the Table 5, it can be concluded that the null hypothesis of "no autocorrelation" is accepted. Therefore, it can be judged that the lag order of this model does not need to be increased and variance decomposition can be directly carried out.

Table 5: LM test of residual autocorrelation

Lag	**LM Statistic**	**P-statistic**
1	17.3952	0.36048
2	23.8760	0.09225
H0:no autocorrelation at lag order		

4.3. Stability test of VECM model

After establishing the VECM (vector error correction model) based on sample data, it is necessary to measure the stability of this model immediately. This paper selects the unit circle test method for measurement.

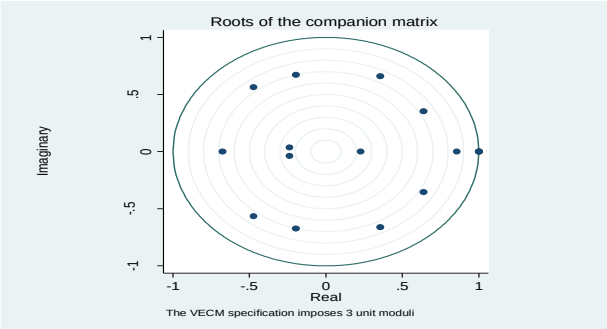

Figure 1: Test results of reciprocal of eigenvalues.

As shown in the results in Figure -1, the reciprocals of all eigenvalues are within the unit circle. According to the principle that the reciprocal of the eigenvalue is less than 1, that is, within the unit circle, it can be known that the vecm model established above is relatively stable.

4.4. Result analysis of impulse response function

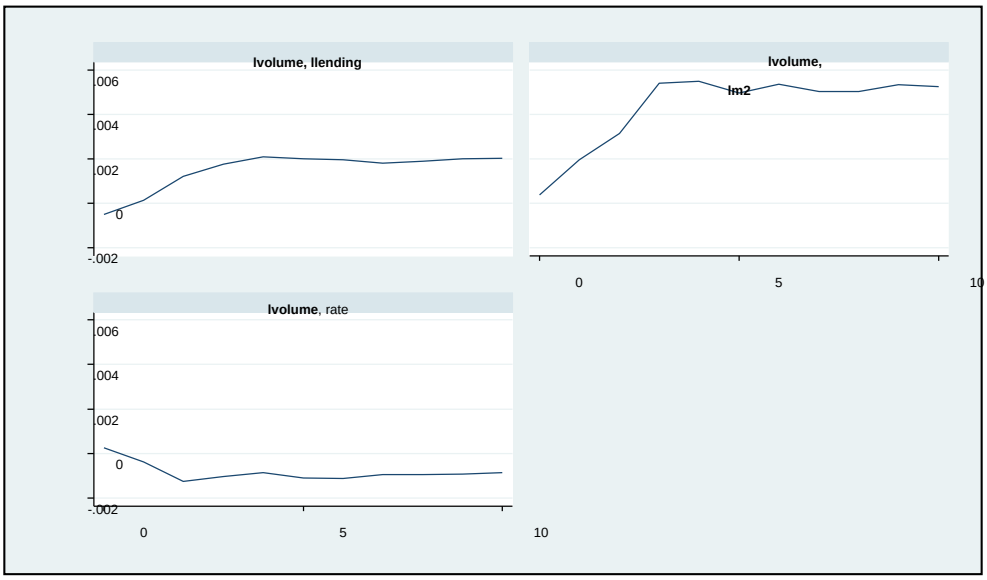

Figure 2: Impulse response function diagram

The impulse response function and variance decomposition are calculated based on the VECM model. As shown in Figure -2, from the trajectory of the impulse response value , it can be found that the impact of the development and changes of online lending on bank credit business turns from negative to positive. That is, when the online lending transaction volume increases by one unit of standard error, under the impact of transaction volume, the initial value of the impulse response value of bank loans is less than 0 in the first cycle. After that, it has been showing an upward trend until it gradually stabilizes at about 0.2% from the fourth cycle. This means that in the stage of the increase of online lending platforms and the rise of transaction volume, it does divert the bank's capital lending business and reduce the loan ratio, causing a certain impact on traditional finance. However, as the number of platforms decreases, national policies tighten, supervision is strengthened, and the effective implementation of inclusive finance in banks, the transaction volume of the platform shows a sharp downward trend, so that the impact on bank lending business is reduced, or even negligible. Eventually, a positive correlation appears and is persistent. From this, it can also be seen that the policy effect of the financial supervision system is obvious.

The impact of the development of online lending on monetary policy is positive, which is consistent with the previous hypothesis. That is, when the online lending transaction volume increases by one unit of standard error, under the impact of transaction volume, monetary policy has been showing an upward trend until it stabilizes around 0.5% after the third period. Thus, it can be known that although online lending cannot act as a financial institution, when the money supply is impacted by the standard unit of online lending, its response curve can clearly show that online lending has the effect of expanding the money multiplier and speeding up the circulation speed of money.

The impact of the development of online lending on the benchmark interest rate of traditional banks is negative, and the result does not reject the hypothesis. First of all, when the online lending transaction volume increases by one unit of standard error, under the impact of transaction volume, although the initial result of the impulse response value of the interbank lending rate is positive in the first half of the first period, it has been showing a negative downward trend afterwards. This means that under the guarantee of high yields, online lending still poses a certain threat to banks. There is a competitive relationship between the two and it is long-lasting. As for the explanation that it tends to

be stable after the second period, it can generally be analyzed that although the China Banking and Insurance Regulatory Commission has strengthened the supervision of online lending and set limits on investment and loan amounts, resulting in a decline in platform transaction volume, according to the current situation of online lending, the platform's yield still remains at a relatively high level of 9%. Moreover, the platform's loans are gradually tending to be small loans, which has a good catalytic effect on the development of inclusive finance in China. On the contrary, in order to expand competitiveness and obtain more customer resources, traditional financial banks will still choose to cut interest rates as the first decision-making method, even if the lending rates between banks continue to narrow.

5. Conclusion

The internet finance industry is favored by the public because of its convenience, innovation, low cost and controllable risks (Ge Qingping) [12].This paper empirically analyzes the impact and shock of new finance represented by online lending on traditional finance. The results show that online lending has a significant impact on monetary policy. That is, the higher the transaction volume of online lending, the faster the circulation speed of money and the larger the money multiplier, and it has a long-term impact. Secondly, the impact on bank credit (loans) changes from negative to positive. That is, the higher the transaction volume of online lending, the larger the scale of bank credit business. Although, in the short term, online lending diverted bank loan business to a certain extent in the early stage, but due to the strengthening of government supervision and tightening of policies, the impact on traditional financial credit business gradually decreases, and the relationship between the two changes from a substitution relationship to a complementary relationship. Finally, it has a significant negative impact on the bank's benchmark interest rate. The larger the transaction volume of online lending, the lower the bank's benchmark interest rate. It can be learned that online lending still poses a certain threat to banks under the guarantee of high yields. There is a potential competitive relationship between the two, and it is long-lasting.

Based on the above research conclusions, this paper believes that Internet finance has a greater impact on traditional finance in the early stage of development, and there is a competitive relationship of mutual substitution.

In the later stage, due to problems in the Internet financial market and the strengthening of government supervision, the status of Internet finance in the market is weakened, so that the impact of Internet finance on traditional finance is weakened. Similarly, this can also reflect that the development of China's financial marketization and interest rate marketization is still not mature enough.

In conclusion, in China's existing financial system, a relatively complete credit evaluation system and supervision system should be established for Internet finance to better serve financial development, thereby increasing financial inclusiveness and expanding the process of financial marketization.

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