

The RMB Exchange Rate Fluctuations Impact on the Export of Labor-Intensive Industry Research

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Abstract

The RMB real effective exchange rate has different impact on the export of labor-intensive industries. In this paper, based on the different way of trade, through the Granger causality test and generalized impulse response function, analyzed the RMB real effective exchange rate change on the influence of the export of general trade and processing trade exports. The research results show that RMB real effective exchange rate appreciation for general trade export and processing export labor-intensive industry all have inhibitory effect, but the impact on the general trade are greater than processing trade.

Keywords: Exchange rate volatility; Labor-intensive; General trade; Processing trade; Textile and garment industry

Introduction

In recent years, China's economy has undergone new changes, the most prominent is the trend rate of economic growth showed a slowdown, the positive effects of economic restructuring are emerging, enhanced dynamic economic transformation, the pressure increased. In the long term, the continued appreciation of the renminbi pressure increase, facing the labor intensive industry export competitiveness is becoming increasingly fierce, therefore, the optimization and upgrading of industrial structure, enhance its market competitiveness has become necessary to the development of economy.

Due to the textile and clothing industry is a typical labor-intensive industry, and the development of textile and clothing industry in our country is longer, so it can be more significant to representative the characteristics of labor-intensive industry's development in our country. Therefore, this article represented by labor-intensive industries in the textile and garment industry, through the exchange rate changes to empirical research to analyze the different ways of trade, to provide rationalization proposal in order to speed up the industrial upgrading.

Literature Review

In recent years, domestic and foreign scholars on exchange rate volatility and trade balance of payments continue to grow. In the import and export of currency fluctuations and trade: the domestic scholars on the exchange rate have the effect of export trade in our country such as a large number of empirical studies.

The main scholars of Zhu Zhenli^[1] (2002); Lu Jian^[2] (2007); Xu Hui^[3] (2010), while the research are mostly from exports and exports perspective, it lacks of research subdivision commodity industry. In the study of foreign exchange rate changes and labor-intensive industries areas: Li Yanli^[4] (2011) believes that the RMB exchange rate changes had no significant effect on China's exports, while its main competitors EU monetary exchange rate changes had greater influence on China's exports; Lu Xiangqian, Dai Guoqiang^[5] (2005) used cointegration vector auto regression analysis on the relationship between the 1994 ~ 2003 RMB real exchange rate fluctuations and Chinese import and export between the analysis found that, RMB real exchange rate fluctuations have a significant impact on China's import and export; Pingfan Hong^[6] and Rob Vos^[7] suggest that ,China should be improve the current global economic imbalances by RMB appreciation and stimulate domestic consumption.

In terms of the influence of RMB exchange rate fluctuation and the specific mode of trade also have related researches: Du Yunsu^[8] (2009) uses the distributed lag model, cointegration, vector auto regression method, studied three main trade way of export prices transfer to the RMB exchange rate change, and the result shows, the general trade export price transmission elasticity is greater than the feed processing export prices; Yang Biyun^[9] (2012) from the theoretical modeling and empirical analysis of RMB appreciation of the import and export price transfer effect from the point of view of different trade mode, concludes that the appreciation of the renminbi has little effect on China's general trade price and not significant, but the impact on prices of China's processing trade is large and significant.

The research about RMB exchange rate fluctuations on domestic or international trade are mostly from the overall trade exports' affect, and less trade specific research studies from the impact of exchange rates on labor-intensive industries results.

Model and Data Selection

(1) Model Construction

A country's exports will be affected by many factors, this paper mainly from exchange rate factors to study. According to the general demand theory, assumes that consumer preferences are identical, and do not consider the impact of domestic complementary products imported, the demand function can be expressed as importer of the imported goods of actual income levels and the relevant alternatives to price of a commodity and import prices of function. On the demand function with the assumption of homogeneity, the demand for the imported goods can be expressed as the demand for exports of commodity-exporting countries. The exchange rate as a relative price, will also have an impact on the export trade. Therefore, the specific function of the form can be expressed as follows:

$$\text{Log}y = a_1 + b_1 * \log x + \mu_1 ; \text{Log}t = a_2 + b_2 * \log x + \mu_2 ; \text{Log}z = a_3 + b_3 * \log x + \mu_3$$

Which, $\log x$ said the RMB real effective exchange rate; $\log y$ said general trade exports; $\log t$ said feed processing trade exports; $\log z$ said processing trade exports (a is a constant; b_1 , b_2 and b_3 are different trade export exchange rate flexibility).

(2) Data Selection

The data used in this article are the 2005 to 2013 monthly data. On the choice of RMB exchange rate, although in practice after the reform of the system of exchange rate system, RMB is pegged to the dollar for quite a long time, But other than the United States is China's national and regional important export object whose frequent fluctuations against the U.S. dollar, will indirectly lead to the changes of these countries or regions on the value of money, With the real effective exchange rate can reflect the comprehensive influence, the RMB real effective exchange rate data from the BIS database; The general trade and processing trade of textile and apparel industry exports data comes from the research network.

Analysis of Exchange Rate Changes Affects Different Export of Labor-Intensive Industries from Elastic Angle

(1) Analysis of Exchange Rate Fluctuation on Different ways of Export Trade

Elastic refers to a variable degree of change caused by the ratio of another variable degree; elastic analysis method is also called the imperfect substitute model. This model has the following assumptions: First of all, the elasticity of supply of commodity needs to be infinite; Secondly, in ensuring full employment and income stability under, These products or its substitute price function and its import and export demand for the product is equivalent to; Once again, the international balance of payments and trade balance without considering capital flows are equivalent. In addition, as discussed in this paper is the influence between back and labor intensive industry relations, So the assumption the last one as in the other conditions remain unchanged, Consider the impact between exchange rate and labor intensive industry import and export product quantity and the total amount .

Therefore, setting the exchange rate change rate is $\frac{dR}{R}$, The export of labor-intensive industry which caused by the rate of $\frac{dX}{X}$, The flexibility of the exchange rate and export is $\frac{(\frac{dX}{X})}{(\frac{dR}{R})}$. So the exchange rate changes on labor intensive industry theory models of different ways of export trade:

Assuming that P_0 is the domestic currency price of export commodities, P_1 is the foreign currency price of exports. R is a direct quotation of exchange rate ($R = \frac{P_0}{P_1}$), D is the export demand, S is the supply. If the balance of import and export, then $D = S$, $D = D(P_1)$, $S = S(P_0) = S(R * P_1)$, Export is X , $X = D * P_0$, η is the elasticity of export demand, ε is the supply elasticity of export. The A and B respectively:

$$\eta = \frac{(dD/D)}{(dP_1/P_1)}$$

$$\varepsilon = \frac{(dS/S)}{(dP_0/P_0)}$$

Gradually derived :

$$\begin{aligned} \frac{dX}{dR} &= \frac{d(D * P_0)}{dR} \\ &= \frac{[D * d(P_1 * R) + P_0 * dD]}{dR} \\ &= \frac{[D * R * dP_1 + D * P_1 * dR + P_0 * dD]}{dR} \\ &= D * R * \frac{dP_1}{dR} + D * P_1 + P_0 * \frac{dD}{dR} \end{aligned}$$

(1Formula)

Among them ,

$$\begin{aligned} P_0 * \frac{dD}{dR} &= P_0 * \frac{D * R * dP_1 * dD}{D * R * dP_1 * dR} \\ &= D * R * \frac{dD * dP_1 * \frac{1}{D}}{dR * dP_1 * \frac{1}{P_1}} \\ &= D * R * \frac{\frac{dD}{D} * dP_1}{\frac{dP_1}{P_1} * dR} \\ &= D * R * \frac{dP_1}{dR} * \eta \end{aligned}$$

(2Formula)

Put (2 Formula) into(1Formula) can be obtained:

$$\begin{aligned} \frac{dX}{dR} &= D * R * \frac{dP_1}{dR} + D * P_1 + D * R * \frac{dP_1}{dR} * \eta \\ &= D * R * \frac{dP_1}{dR} * (1 + \eta) + D * P_1 \end{aligned}$$

(3 Formula)

By the assumption we know that $D(P_1) = S(P_0)$, derivation the supply and demand of the two functions can be obtained :

$$D' = \frac{dD}{dP_1}, \quad S' = \frac{dS}{dP_0} \quad (4 \text{ Formula})$$

Get the Equation Derivation on both sides of $D(P_1) = S(P_0)$: $S'(P_1 + R * \frac{dP_1}{dR}) = D' * (\frac{dP_1}{dR})$

and it turns to $\frac{dP_1}{dR} = \frac{S' * P_1}{(D' - S' * R)}$

Get (4 Formula) into this formula, and continued the derivation, that is:

$$\begin{aligned} \frac{dP_1}{dR} &= \frac{S' * P_1}{(D' - S' * R)} \\ &= \frac{(P_0/S) * (dS/dP_0) * P_1}{(P_0/S) * [(dD/dP_1) - (dS/dP_0) * R]} \\ &= \frac{(dS/S) * (P_0/dP_0) * P_1}{R * [(dD/D) * (P_1/dP_1) - (dS/dP_0) * (P_0/S)]} \\ &= \frac{P_1 * \left[\frac{(dS/S)}{(dP_0/P_0)} \right]}{R * \left[\frac{(dD/D)}{(dP_1/P_1)} - \frac{(dS/S)}{(dP_0/P_0)} \right]} \\ &= \frac{P_1 * \varepsilon}{R * (\eta - \varepsilon)} \quad (5 \text{ Formula}) \end{aligned}$$

Put (5Formula) into (3Formula) can be obtained:

$$\begin{aligned} \frac{dX}{dR} &= D * R * \frac{P_1 * \varepsilon}{R * (\eta - \varepsilon)} * (1 + \eta) + D * P_1 \\ &= (X/P_0) * \frac{P_0 * \varepsilon}{R * (\eta - \varepsilon)} * (1 + \eta) + (X/P_0) * (P_0/R) \\ &= (X/R) * \left[1 + (1 + \eta) * \frac{\varepsilon}{(\eta - \varepsilon)} \right] \\ &= (X/R) * \eta * \left[\frac{(1 + \varepsilon)}{(\eta - \varepsilon)} \right] \end{aligned}$$

Get the exchange rate elasticity of exports is $\frac{dX/X}{dR/R} = \eta * \frac{(1 + \varepsilon)}{(\eta - \varepsilon)}$ (6 Formula)

The analysis, Elasticity of export demand is $\eta < 0$, elasticity of export supply is $\varepsilon > 0$, Therefore, the exchange rate elasticity of exports is greater than zero. So in theory, the impact of RMB exchange rate and trade export volume is certain, the opposite direction. When the RMB exchange rate at the appreciation time ($dR < 0$), trade export volume reduction ($dX < 0$), while, trade export volume increase ($dR > 0$).

(2) Analysis of Exchange Rate of Export of Labor Intensive Industry

For labor-intensive industry in developing countries, Influence of exchange rate on the export is more important. Developing the overall level of development is still a certain gap compared with developed countries. Reflected in the economy is, Both the technology and capital and other inputs are relatively low. In the above trade export mode, Input technology level in some developing countries in general trade exports is not high enough, Money is not enough, The overall quality of workers have to be improved. Therefore, for the developing countries, Products in general trade and processing trade export value is increased, But because the factor input proportion, General trade export products are still in low level. And a considerable part of the processing trade export has been more mature, become a system, it result in some developing countries, The general trade exports level, To a certain extent, much lower even than the processing trade exports level, This makes the effect of exchange rate changes on the labor intensive industry of different export trade mode will have a certain change.

The influence of exchange rate on different trade modes, we can solve it by the hypothesis. Suppose that a country produces only two products a and b for export. The product of a by the way of processing trade to export, The product B export in general trade. In general. For the two kind of trade way, the general trade export products its value is higher than the export processing trade products, so product a affected by price will be slightly higher than the product b, that is to say the export demand elasticity of a products is greater than b, that is $\eta_a < \eta_b < 0$; As for the elasticity of supply, Two types of product flexibility on the contrary, that is $0 < \varepsilon_b < \varepsilon_a$. When the appreciation of the RMB exchange rate, the export about the two kinds of products are as follows:

$$\begin{aligned} \frac{dX_a/X_a}{dR/R} - \frac{dX_b/X_b}{dR/R} &= \eta_a * \frac{(1 + \varepsilon_a)}{(\eta - \varepsilon_a)} - \eta_b * \frac{(1 + \varepsilon_b)}{(\eta - \varepsilon_b)} \\ &= \frac{(\eta_b \varepsilon_a - \eta_a \varepsilon_b) + \eta_a \eta_b (\varepsilon_a - \varepsilon_b) + \varepsilon_a \varepsilon_b (\eta_b - \eta_a)}{(\eta - \varepsilon_a) * (\eta - \varepsilon_b)} \end{aligned} \quad (7\text{Formula})$$

Suppose that a country produces only two products c and d for export. The product of d by the way of processing trade to export, the product c export in general trade. In general. For the two kind of trade way, the general trade export products its value is higher than the export processing trade products, so product d affected by price will be slightly higher than the product c, that is to say the export demand elasticity of c products is greater than d, that is $\eta_c < \eta_d < 0$; As for the elasticity of supply, Two types of product flexibility on the contrary, that is $0 < \varepsilon_d < \varepsilon_c$. When the appreciation of the RMB exchange rate, the export about the two kinds of products are as follows:

$$\begin{aligned} \frac{dX_c/X_c}{dR/R} - \frac{dX_d/X_d}{dR/R} &= \eta_c * \frac{(1 + \varepsilon_c)}{(\eta - \varepsilon_c)} - \eta_d * \frac{(1 + \varepsilon_d)}{(\eta - \varepsilon_d)} \\ &= \frac{(\eta_d \varepsilon_c - \eta_c \varepsilon_d) + \eta_c \eta_d (\varepsilon_c - \varepsilon_d) + \varepsilon_c \varepsilon_d (\eta_d - \eta_c)}{(\eta - \varepsilon_c) * (\eta - \varepsilon_d)} \end{aligned} \quad (8\text{Formula})$$

In (8Formula) molecules, $\eta_d \varepsilon_c - \eta_c \varepsilon_d > 0$, $\eta_c \eta_d (\varepsilon_c - \varepsilon_d) > 0$, $\varepsilon_c \varepsilon_d (\eta_d - \eta_c) > 0$. While the denominator must be greater than 0, So a must be greater than 0. That is to say When the appreciation of the RMB exchange rate, the export demand elasticity of c products is greater than d.

The two products are respectively represent different trade modes, So get in the appreciation of the RMB exchange rate under the premise of, The two kind of trade way of export volume will decrease ,but the general trade export volume reduction is higher than the processing trade exports.

This conclusion indicates, For labor-intensive industry in developing countries, due to technical and capital investment is lacking, the development way of general trade exports is still in low level, trade structure is not reasonable, the development of economy needs to adjust gradually to get healthy and stable development.

The Empirical Analysis

(1) Inspection Methods

As a result of macroeconomic time series are often not smooth, so we need to test the stability of time series data, and whether there is a co-integration relationship between them. Now with the ADF method of the variable stationary time series of test, while on the lag period of choice, referring to AIC and SC guidelines, the variable values of ADF test results of concrete as shown in table 1:

Variable	Test type	The ADF statistics	The critical value		
			1%	5%	10%
$\log x$	(0,0,1)	1.74	-2.59	-1.94	-1.61
$\log y$	(c,t,1)	-5.38	-4.05	-3.45	-3.15
$\log t$	(c,t,1)	-5.21	-4.05	-3.45	-3.15
$\log z$	(c,t,1)	-5.78	-4.05	-3.45	-3.15
$D(\log x)$	(c,0,1)	-6.62	-3.5	-2.89	-2.58

Note: the significance level is 1%

Results show that, without the difference of the first sequence of logarithmic ADF statistics in the form of absolute value is less than 5% critical value, the sequences are non-stationary series, continue to a test on the first difference sequences are units of the sequence, the ADF statistic the absolute value is greater than the critical value 5%. As a result, the sequence of first-order single whole sequence. Time series are for stationary series.

(2) Granger Causality Test

Granger causality test between the two variables, the profits of a variable, to what extent can be used to explain the other variables. If add a variable lag value can make the interpretation of the increased, that is, the variables are helpful for the forecast of another variable, or number of the relationship between the two variables are statistically significant, it is called "variable is Granger cause another variable."

We first establish three vector autoregression model, the first set of variables included in the VAR model contains $D(\log x)$, $\log y$; the second set of variables included in the VAR model contains $D(\log x)$, $\log t$; the third set of variables included in the VAR model contains $D(\log x)$, $\log z$. We conduct Grainger causality test at the 5% level of significance. As shown in table 2:

Table 2 : Granger Different Trade and Real Exchange Rate Test

Null Hypothesis	Obs	F-Statistic	Prob.	Accept / Reject
LOGX does not Granger Cause LOGY	103	5.74598	0.0044	Reject
LOGY does not Granger Cause LOGX		6.45108	0.0023	Reject
LOGX does not Granger Cause LOGT		2.7922	0.0662	Accept
LOGT does not Granger Cause LOGX		5.53977	0.0053	Reject
LOGX does not Granger Cause LOGZ		4.00027	0.0214	Accept
LOGZ does not Granger Cause LOGX		2.72541	0.0705	Accept

Note: the significance level is 1%

Granger causality test results show that, China's real exchange rate is the labor-intensive industry of general trade exports change's Grainger reason, that exchange rate changes have a certain impact on China's exports of general trade; Granger of China's labor-intensive industry, feed processing and processing are not the actual exchange rate change of our country; China's real exchange rate is not the cause of labor intensive type industry Granger processing export trade, the real exchange rate movements on China's labor intensive type industry have a certain effect of processing trade exports, but not very significant.

(3)VAR Empirical Results and Impulse Response Analysis

According to the above empirical analysis, get the estimation results of VAR.As shown in table 3、table 4 and table 5:

Table 3: The Real Exchange Rate Fluctuation and General Trade Export of VAR Empirical Results

Endogenous variables	Lagged variables	C	$\log x(n)$	$\log y(n-1)$	R2	A-R2	AIC	SC
$\log x(n)$	Coefficient	0.130	1.182	-3.678	0.984	0.984	-5.853	-5.725
	T value	[1.967]	[12.159]	[-2.055]				
Logy(n)	Coefficient	-1.686	0.013	0.611	0.620	0.605	-0.026	0.101
	T value	[-1.379]	[2.468]	[6.280]				

Note: the significance level is 1%

Table 4: The Real Exchange Rate Fluctuation and Feed Processing and Export of VAR Empirical Results

Endogenous variables	Lagged variables	C	$\log x(m)$	$\log z(m-1)$	R2	A-R2	AIC	SC
$\log x(m)$	Coefficient	0.097	1.212	-1.009	0.984	0.983	-5.837	-5.709
	T value	[1.546]	[12.440]	[-0.801]				
$\log t(m)$	Coefficient	-0.978	0.017	0.728	0.594	0.577	-0.720	-0.592
	T value	[-1.202]	[2.283]	[7.439]				

Note: the significance level is 1%

Table 5: The Actual Exchange Rate Changes and VAR Empirical Results Do Processing Exports

Endogenous variables	Lagged variables	C	$\log x(q)$	$\log z(q-1)$	R2	A-R2	AIC	SC
$\log x(q)$	Coefficient	-0.062	0.232	0.013	0.983	0.982	-5.784	-5.656
	T value	[-0.818]	[2.344]	[2.090]				
$\log z(q)$	Coefficient	4.280	-1.041	1.233	0.205	0.172	-0.263	-0.135
	T value	[3.595]	[-0.676]	[12.665]				

Note: the significance level is 1%

According to the result of VAR, can get $\log x$ and $\log y$, $\log t$, $\log z$ impulse response function. Its impulse response structure is shown below:

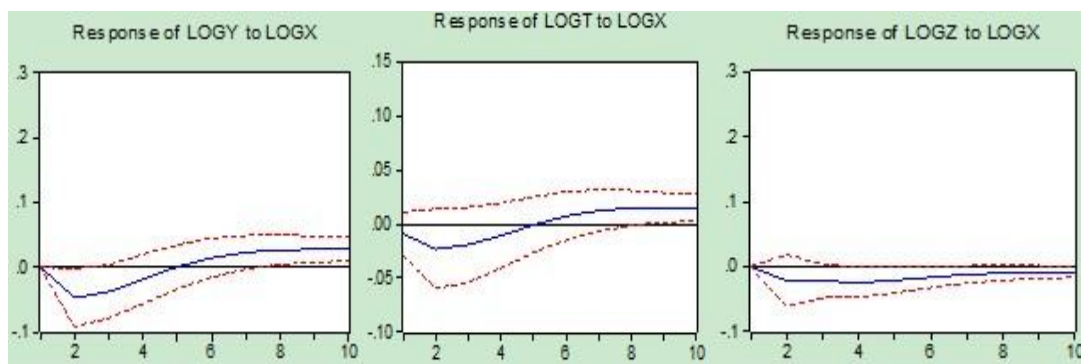


Figure1

Figure 2

Figure 3

From figure 1, for general trade exports, if give the real effective exchange rate a positive impact in the current, it will bring a negative impact for general trade export of China's labor-intensive industry. In the fifth period began for positive effect, and this effect lasts for a long time. This is because in the period which before the appreciation of the renminbi, it will bring certain negative effect to the labor-intensive industry in our country general trade export industries.

In order to improve the international competitiveness of their products, export manufacturers constantly improve the technology and the corresponding competition strategy, etc., gradually improve the product's export competitiveness, improve the disadvantage position in the international trade competition, and improve business efficiency.

From Figures 2 and 3 can be learned, for China's labor-intensive processing trade export, if give the real effective exchange rate a positive impact in the current, it will bring a negative impact for processing trade export of China's labor-intensive industry. In the fifth period began for positive effect, and this effect lasts for a long time.

From the above three pictures can be seen, in the labor intensive industry, the effects of real effective exchange rate on general trade export is larger than the impact on the export processing trade industry. The reason may be because due to the impact of RMB appreciation, the general trade due to the impact technology is relatively large, at the beginning of the appreciation of the renminbi, in the short term, it can not have too much technological innovation, so as to affect exports greatly; while processing trade exporters may take some relevant strategies, such as improve the corresponding management strategy and relevant risk aversion strategies to cope with the risks of the appreciation of the renminbi, but if we do not improve the competitiveness of goods from a fundamental way, then the product competitiveness in the market will gradually weaken and eventually out of the market.

Suggestions

Based on the analysis of exchange rate fluctuations and the labor-intensive industry in our country export, it can provide Suggestions from the following two aspects, governments and companies.

(1)The Government

Develop a more rational strategy to optimize the export and industrial structure, expanding domestic demand.

Investment, consumption and net export is the troika of economic growth in China, the main factors of China's economic growth is the growth of domestic demand, the expansion of domestic demand to solve or alleviate the economic pressure. In the national income for certain circumstances, consumption level, depends on the proportion of accumulation and consumption, Accumulation is the source of the expanded reproduction, any social expanded reproduction, must have certain accumulation, the accumulation effect is constant or gradually increased, the growing accumulation of means and strengthen the material and technical basis of society. Know constantly improve people's material and cultural level have reliable material guarantee, in turn, the consumption of the enhancement and improvement of consumption level, and will promote the development of production and the increase of the accumulated. Consumption is one of the national economy indispensable economic indicators, and the strength of a country depends mostly is the national economy level, only constantly and sustained and healthy growth of national economy, the country will be more and more rich and strong (powerful). Fundamentally enhance the competitiveness of a country's economic growth lies in stimulating domestic demand. Therefore, changes in the export structure, and continuously adjust the export strategy of expanding domestic demand for China's economic development is essential.

1) Actively Implement the Construction of Free Trade Zone

Free trade area or will become active in China to open up markets, especially the pioneer of open services markets and capital markets. China (Shanghai) free trade area construction is the national strategy, is the first try, a major measure for deepening reform, expanding opening and far-reaching significance. This major reform to the institutional innovation as the focal point, focus on improving soft power. In the import and export ways, can be more cheap raw materials in China, it is good for our country's processing trade. At the same time, the export of products can be carried out within the basic zero tariff trade, improve the international competitiveness of China's products, etc., The implementation of a free trade area, can better promote the adjustment of the structure of China's exports of labor-intensive industries, to enhance the competitiveness of China's export trade.

2) Encourage Enterprises to Foreign Direct Investment and Increase the Enterprise Scientific Innovation

The continuous appreciation of the RMB, can improve the actual RMB purchasing power, Although due to the appreciation of the renminbi will make our country lost some of its raw materials cost competitive advantage, it is conducive to China's foreign investment, So we can use the timing of the revaluation, expanding overseas investment, encourage enterprises to go out. At the same time, to increase investment in technological innovation to help companies through financing difficulties, and increase efforts to support technology.

(2) The Enterprise

1) Increase the Technological Innovation, Promote Scientific Research Consciousness

Enterprises to increase the awareness of innovation, create benefit by science and technology, to win with quality, can't just blindly pursue quantity, and ignore the quality of the products, enterprises should have the awareness and sense of innovation, encourage technological innovation, and to develop measures and countermeasures, and fundamentally enhance the technological level of products. Thus, even if the RMB appreciation increases China's foreign currency denominated export prices, it will not undermine the competitiveness of products in china.

2) Actively Explore Overseas Markets, Especially in Developing Markets

In recent years, due to the appreciation of the renminbi and rising labor costs in China, our country's comparative advantages weakening of labor-intensive export industries. Compared with the developed countries, China's exports of electronic, automobile and other products are not dominant technology advantage, while compared with developing countries, China's labor costs rise, making the price advantage decline of our country. Therefore, China's labor-intensive export-oriented industry should continue to develop new markets, the gradual conversion of export object, such as, we can open up Africa, Latin America, Southeast Asia and other regions of the market, so as to maintain the stable export.

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