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Analysis of financial economic output of Supply Chain Based on IS-LM model

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Abstract: With the continuous reform and innovation of the times, domestic financial related industries have also been developed to a certain extent. Among them, supply chain is an emerging technology in the financial industry, so it is necessary to study the value creation of it. In this paper, we will do some analysis and Research on the supply chain financial innovation. We will use the IS-LM model of financial innovation to study the supply chain finance and its effect on economic output.

1. Introduction

In recent years, supply chain finance is regarded as an important "magic weapon" to solve the financing problem of small and medium-sized enterprises in the supply chain. It is widely used in enterprise financing under different scenarios, and the supply chain finance has developed rapidly. Supply chain finance is different from the traditional capital lending activities, and also different from the financing activities of collective bonds and collective trust. It is a kind of financial service activities based on the real business flow, logistics and information flow activities among the enterprises in the supply chain, and taking the whole supply chain as the service object, aiming at the enterprises with specific financing needs in the supply chain. However, from the previous classification, most of the studies are based on the supply chain finance itself, analyzing the process of its emergence, growth and development, while the research on its role in macroeconomic operation is relatively few. Based on the IS-LM model with financial innovation, this paper analyzes the changes of supply chain finance and output, and studies the value creation of supply chain finance.

2. Analysis based on IS-LM model

This paper uses the new IS-LM model after financial innovation to study the impact of supply chain finance on economic output.

1. Model establishment

Before introducing the new model, we give an important assumption that the interest rate elasticity is asymmetric, that is, with the development of financial innovation, the sensitivity of real investment to interest rate decreases, while the sensitivity of financial investment (especially currency speculation) to interest rate increases. Financial innovation has changed the way investors react to interest rate changes.

The IS-LM model with financial innovation proposed is

$$\begin{cases}(1-c)\ Y+\alpha_1\ (A)\ i-\alpha_0=0 \\ \beta_1\ (A)\ Y-\beta_2\ (A)\ i+\left[\beta_2\ (A)\ \bar{i}-\frac{M}{P}\right]=0\end{cases} \quad (1)$$

Among them, C is marginal propensity to consume, 0 < C < 1; Y is income, Y > 0; A means financial innovation; I is the expected equilibrium interest rate level; M stands for money supply, P stands for price level, $\frac{M}{P}$ is the supply of real money balance. The improved model is still in I-Y space, but there is an explanatory variable a in the coefficient. It is this a, which represents financial innovation, that has changed the appearance of the original IS-LM model.

A into $\alpha_1(A)$ shows the impact of financial innovation on the interest rate elasticity of real investment; A into $\beta_1(A)$ shows the impact of financial innovation on transaction efficiency; The entry of A into $\beta_2(A)$ indicates the impact of financial innovation on the interest rate elasticity of financial investment.

2. Model analysis

To obtain the slope of the curve, the simultaneous equation (1) is transformed into:

$$\begin{cases}i=-\frac{1-c}{\alpha_1\ (A)}Y+\frac{\alpha_0}{\alpha_1\ (A)} \\ i=\frac{\beta_1\ (A)}{\beta_2\ (A)}Y+\left[\bar{i}-\frac{1}{\beta_2\ (A)}\frac{M}{P}\right]\end{cases}$$

The slope of IS curve is $-\frac{1-c}{\alpha_1(A)}$ and the slope of LM curve is a $\frac{\beta_1(A)}{\beta_2(A)}$.

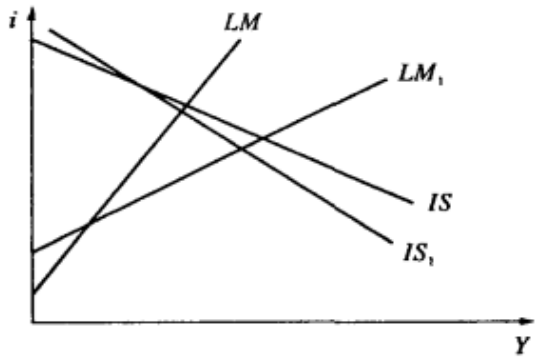

Figure 1: Financial Innovation and the Change of Slope of IS-LM Curve

With financial innovation, IS curve becomes IS_1, LM Curve becomes LM_1. The change of the slope of IS and LM curves means that the effects of different policies will be different. When other conditions remain unchanged, the IS curve becomes steeper, which means that the effect of monetary policy is weakened; Similarly, the LM Curve becomes smoother, which means that the effect of fiscal policy is enhanced.

3. Supply chain finance and economic output change analysis

Through the improved IS-LM model to analyze the relationship between supply chain finance and output. Specifically to the model, it is to solve $\frac{\partial Y}{\partial A}$. According to the simultaneous equation of

formula (1), we can get

$$\frac{\partial Y}{\partial A}=\frac{\alpha'_1 \beta_2 i+\alpha_1 \beta'_1 Y-\alpha_1 \beta'_2 (i-\bar{i})}{-(1-c)\beta_2-\alpha_1 \beta_1} \quad (2)$$

Among them, $\alpha_1^{'}(A)<$ O means that the elasticity of investment to interest rate weakens with financial innovation; $\beta_1^{'}(A)>$ O means means that with financial innovation, transaction efficiency is improved, and the amount of money used for transaction is reduced. $\beta_2^{'}(A)>0$ means that with financial innovation, the cost of conversion between assets is reduced, and the convenience of conversion is improved, so the speculative demand of money is more sensitive to interest rate and interest rate difference.

If we want to judge whether online lending promotes or hinders output, we should judge whether $\frac{\partial Y}{\partial A}$ is greater or less than 0. In formula (2), if the denominator is less than 0, the symbol of $\frac{\partial Y}{\partial A}$ mainly depends on the symbol of the numerator. Namely:

$$\alpha'_1 \beta_2 i+\alpha_1 \beta'_1 Y-\alpha_1 \beta'_2 (i-\bar{i}) \quad (3)$$

Based on the characteristics of supply chain finance, people tend to overestimate the interest rate, that is, $i>\bar{i}$. According to the model conditions, the other variables are $a_1>0$, $a_1^{'}<0$, $\beta_1>0$, $\beta_1^{'}<0$, $\beta_2>0$, $\beta_2^{'}>0$, $0<c<1$, $Y>0$.

From the values of the above variables, it can be judged that if the numerator denominator is negative, it is $\frac{\partial Y}{\partial A}>0$. This means that financial innovation has a positive effect on output growth in the case of overestimation of interest rates ($i>\bar{i}$).

It can be considered that the interest rate is overestimated and the cost of actual investment is very high. Financial innovation has two functions: one is to make investors have more financing channels, the other is that the financing cost also decreases due to financial innovation. Both of them lead to the weakening of the impact of overestimated interest rates on investment, that is, the elasticity of investment to interest rates is weakened, so that the investment situation is better than that without financial innovation, which is conducive to the improvement of output.

This situation of financial innovation promoting output increase under the situation of overestimation of interest rate can be demonstrated in Figure 2. In Figure 2, the expected equilibrium rate is $\bar{i}$, while the current interest rate (determined by the intersection of is and LM) is i, where $i>\bar{i}$. With financial innovation, the slope of IS curve and LM Curve will change into IS_1 and LM_1. Although the changed is and LM curves will be combined in one way or another, the position of the intersection will be different. However, according to $\frac{\partial Y}{\partial A}>0$, the intersection Y_1 of IS_1 and LM_1 must fall to the right of Y_0, so financial innovation promotes output growth.

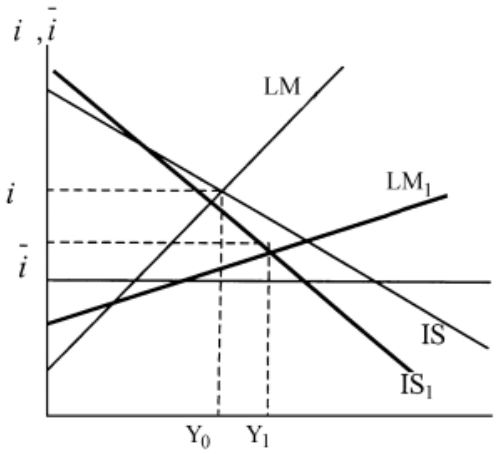

Figure 2: Financial Innovation and Output

3. Conclusion

Generally speaking, it is the research on supply chain financial innovation so far. This paper uses IS-LM model to analyze the impact of Supply Chain Finance on economy. From the analysis, it can be concluded that supply chain finance, on the whole, has a promoting effect on China's economy, and it should be developed. However, it is not difficult to see from the content described in this paper that there are still many problems in this work, such as the lack of guarantee of transaction security. Therefore, relevant staff need to continuously optimize and improve in the follow-up work.

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