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Foreign Exchange Rate and Economic Growth: The Case of Hong Kong

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Abstract

The relationship between the exchange rate and the real GDP of Hong Kong in the long period from 1955 to 2015 is investigated using a structural VAR model. The mutual effect of the two variables is studied in three periods: The results indicate that there is no obvious relationship between the exchange rate and real GDP before Hong Kong's economy booming. However, a significant positive correlation is found in the sample of 1975–1998, which is associated with the output increases. The direction between the exchange rate and real GDP becomes negative after 1998. In addition, based on Granger causality test, we found the exchange rate could Granger causes GDP after 1975, but there is no Granger causality connection between the two variables before 1975.

Keywords: Hong Kong Dollar Exchange Rate; Economic Growth; Structural VAR Model.

1. Introduction

The topic of the relationship between foreign exchange rate and economic growth has been investigated in the literature for a long time. After the 1998 Asian Financial Crisis, Hong Kong's economic growth is slowing down. There is a trade-off between exchange rate depreciation and economic growth. On the one hand, low exchange rate may stimulate the economic growth it can improve domestic products' global competitiveness. On the other hand, exchange rate may impede the economic growth because high foreign exchange reserves have negative influence on the steady growth of economy. If the relationship between the exchange rate and the output are not well understood, the improper policy may induce the instability of Hong Kong's economy. However, yet to date the literature is unclear on their relationship. The disputes range from the causal effect between the two variables to the sign of the relationship between them (see Kiguel and Liviatan, 1992). In this paper, we analyze the relationship between the exchange rate and the real GDP of Hong Kong in the long period from 1955 to 2014 using a structural VAR model. We contribute to the existing literature from the following two points. First, combined with Hong Kong's policy background, the long-run analysis on this issue makes our results be more convincing and be with high reference value for policy makers. Second, our structural VAR model incorporates the endogenous variables such as interest rate, inflation rate, balance of payments and government

budget deficits. It allows us to portray the transmission mechanism between the exchange rate and the output. In addition, our model also incorporates exogenous variables, such as the US interest rate and the international oil price shock. It makes our model to be very close to the realistic situation. We consider three different phrases: from 1955 to 1975, from 1976-1997, and from 1998-2015. The results indicate that there is no obvious relationship between the exchange rate and real GDP before Hong Kong's economy booming. However, a significant positive correlation is found in the sample of 1975–1998, which is associated with the output increases. The direction between the exchange rate and real GDP becomes negative after 1998..

The remaining sections are organized as follows. In section 2, we review the literatures that study the connection between the exchange rate and the output. Section 3 provides a brief discussion of our data. Section 4 presents the empirical results, including bivariable analysis and structural VAR model analysis. Section 5 concludes the paper.

2. Literature Review

The link between exchange rate and output has been one of the controversial topics. There are two aspects scholars focus on: First, the causal relationship between the two variables: Whether the exchange rate movement affects the output or the output affects the exchange rate. Second, the direction between the two variables: Is the exchange rate appreciation or devaluation associated with the output increase. Scholars did a lot of research on the two problems, but there is no consistent answer.

For the relationship between the exchange rate and GDP, Galvoet al. (1993) and Kamin(1996) argue that output influences the exchange rate because of the arbitrage theory. However, others believe that economy is often affected by the exchange rate. For example, Edwards(1988) maintains that the stability of the exchange rate is one of the factors to driver economic growth in developing countries. Razin and Collins (1997) summarize that real exchange rate affects economic growth through trade and capital accumulation. Cottani et al.(1990) consider that exchange rate is the bond between policy and economic growth. Concretely, a stable exchange rate policy can promote economic growth; frequent changes of exchange rate will increase uncertainty of the expected prices, and the uncertainty of the expected prices will increase the risk of economic operation. Copelman and Werner (1996) find that devaluation depresses the level of output because devaluation causes inflation and interest rate rise. Specifically, on the one hand, the occurrence of inflation can reduce the confidence of investors; On the other hand, the interest rate rise can increase the risk of default. These two shocks will significantly reduce credit availability and depress the level of output. Cooper (1971) argues that currency devaluation promotes to the decline in output in the period of payments deficit.

Moreover, Edwards (1988) believes that the exchange rate positive related to the output based on the theory of exchange rate depreciation stimulate exports. Other scholars reach a similar conclusion through the empirical research (see Cottani et al.,1990; Ghura and Grennies, 1993; Razin and Collins, 1997). However, many scholars hold the opposite view that the exchange rate and output has a negative correlation. Krugman and Taylor (1978) find that devaluation will lead to economic contraction. Morley (1992) finds that currency devaluation can reduce output after the terms of trade, money supply and fiscal deficits are controlled. From the perspective of historical experience, Edwards (1995) believes that keeping exchange rate at a lower level can lead to serious inflation. Rogers and Wang (1995) estimate a five-variable VAR model (the output, the government spending, the inflation, the real exchange rate and the money growth), and they find that positive shocks to the real exchange rate do lead to declines in the output. There are some other breakthrough findings related to exchange rate fluctuations or the Hong Kong financial market, such as in Guo (2017a, 2017b) and the topic in this paper is different from theirs.

3. Data

We collected the data from the Penn World Tables 9.0 and the World Bank. Penn World Tables 9.0 includes macro data from 1952 to 2014. We collect real per capita, GDP and the real exchange rate from this dataset. The rate of inflation, U.S. interest rate, Hong Kong's interest rate, money supply (M2), current account and the international oil price data are taken from the World Bank. Table 1 shows the available data period from our data. "√"means the data is available in the corresponding period.

Before our empirical analysis, we first test the stationarity on the above variables by unit root test, the results show that these variables are all I(1) process. Therefore, in the VAR analysis, all of these variables are used by their first difference.

4. Empirical Results

In this section, we first analyze the correlations between the real exchange rate and output. We next study the causal relationship between the two variables based on the bivariate Granger causality tests.

Table 2 analyzes the correlations between the real exchange rate and the output using different lags of the two variables. e is the real exchange rate, GDP is the de-trended real GDP. The value in parentheses denotes the lag length, indicating that the number of quarters by which the real exchange rate is lagged relative to GDP. For the sample as a whole, the relationship between exchange rates and GDP seems to be ambiguous. We cannot identify a consistent relationship

between exchange rate and output. But for subsamples, the relationship is clear. In the sample of 1955–1975, there is a consistent negative relationship between the exchange rate and the output (Column 2). And the contemporary correlation coefficient is –0.62. This means that the depreciation of the Hong Kong dollar is associated with the output decreases. The direction is different in the sample of 1976–1997, and column 3 shows that the correlation coefficients are all positive. The contemporary correlation coefficient is 0.87. It suggests that the depreciation of the Hong Kong dollar is associated with the output increases. In the sample of 1998–2015, the relationship between the exchange rate and the output becomes negative. And the contemporary correlation coefficient is –0.83. This means that the appreciation of the Hong Kong dollar is associated with the output increases.

Table 1. Summary of Available Data Variables

Variables	First Stage 1955–1975	Second Stage 1976–1997	Third Stage 1998–2015
Exchange rate	√	√	√
Real GDP	√	√	√
Inflation rate	√	√	√
Interest rate(U.S.)	√	√	√
M2		√	√
Current account			√
Oil price			√
VAR model	I	I–II	I–IV

Note: "√"means the data is available in the corresponding period. The last line in the table means the VAR model number.

Table 2: Cross-Correlations of GDP and the Real Exchange Rate

	Whole Sample	1955–1975	1976–1997	1998–2015
$e(-4)$	0.36	–0.09	0.05	–0.09
$e(-3)$	0.25	–0.16	0.29	–0.30
$e(-2)$	0.42	–0.31	0.57	–0.33
$e(-1)$	0.26	–0.50	0.75	–0.52
0	0.08	–0.62	0.87	–0.83
$GDP(-1)$	0.03	–0.74	0.64	–0.63
$GDP(-2)$	–0.06	–0.78	0.47	–0.52
$GDP(-3)$	–0.14	–0.65	0.27	–0.34
$GDP(-4)$	–0.19	–0.64	0.12	–0.19

Note: The value in parentheses is the lag number length, indicating that the number of quarters by which the real exchange rate is lagged relative to GDP. For example: $GDP(-1) = corr(GDP_{t-1}, e_t)$

To address the issue of directions between the real exchange rate and GDP, Table 3 presents the results of bivariate Granger causality tests. *e* denotes the null hypothesis that the real exchange rate cannot Granger causes the real GDP. GDP denotes the null hypothesis that the real GDP cannot Granger causes the real exchange rate. And the inspection includes 6 order lags of explanatory variables.

For the sample as a whole, the F test for the null hypothesis "real exchange rate cannot Granger causes real GDP" is 2.852， with a small p value 0.021. It means that the exchange rate change may be the Granger causality of the change of the real GDP. The F statistic corresponding to the null hypothesis that the real GDP cannot Granger causes the real exchange rate is 1.147 with p value 0.354. Hence we cannot reject the null hypothesis.

Column 2 to 4 show the results of Granger causality test between the real exchange rate and GDP in each of the sub-sample. For the first subsample (1955–1975), the result shows that the real GDP and the real exchange rate cannot Granger causes each other. Because the exchange rate is strictly controlled in this period, the Hong Kong dollar exchange rate can be set at any level. The results are consistent with the expectations.

Table 3: Granger Causality Tests: Real GDP and Real Exchange Rate

	Whole Sample	**1955–1975**	**1976–1997**	**1998–2015**
e	2.852**	1.044	12.673***	4.847**
	(0.021)	(0.425)	(0.002)	(0.034)
GDP	1.147	0.140	1.206	0.044
	(0.354)	(0.964)	(0.388)	(0.995)

Note: *P*-values are in parentheses, *, **and *** show the significance level in 10%, 5%, and 1%.

During 1976–1997, the exchange rate regime is adjusted several times. In general, the characteristic of Hong Kong dollar exchange rate regime in this period is Hong Kong uses the multiple exchange-rate criteria. Multiple exchange-rate criteria means the government separates the trade exchange rate from the capital exchange rate, and in this case, the capital exchange rate changes will not affect the trade exchange rate. The data show that the depreciation of Hong Kong dollar exchange rate every time in this period are all associated with the rising of exports (the result is not reported). Therefore, we might expect to see the real exchange rate causes the output. The Granger-causality results presented in the third column of Table 3 support our expectation. Specifically, the p value of the null hypothesis "the real exchange rate cannot Granger causes the real GDP is 0.388. We cannot reject the null hypothesis. But P value of the null hypothesis that real GDP cannot Granger causes the real exchange rate is 0.002. Small p value indicates the change of the real exchange rate may be the Granger causality of the change of the real GDP.

In the sub-sample of 1998–2015, though Hong Kong experiences a rapid growth, it encounters several problems, such as foreign trade imbalance, insufficient domestic demand and high inflation rate. Hong Kong's government had to promote the exchange rate to overcome these issues. Therefore, it is difficult to determine the relationships between the exchange rate and GDP from intuition. Table 3 shows the direction of Granger causality test is from the real exchange rate to the real GDP in this period. The null hypothesis "the real exchange rate cannot Granger causes the real GDP" is rejected at the 5% significant level. But the hypothesis that real GDP cannot Granger causes the real exchange rate cannot be rejected at the usual level.

5. Conclusions

This paper analyzes the connections between the real exchange rate and the real GDP of Hong Kong in the long period from 1955 to 2015. The results show that there is no obvious relationship between the real exchange rate and the real GDP before Hong Kong's reform and opening-up. However, a significant positive correlation is found in the sample of 1976–1997, which means that the depreciation of the Hong Kong dollar is associated with the increase of the output. The direction between the real exchange rate and the real GDP becomes negative after 1998, indicating that Hong Kong dollar appreciation is associated with the output increases. The inconsistent finding among different periods may be caused by the different economic policies implemented in the corresponding periods. In addition, based on Granger causality test, we found the exchange rate could Granger causes GDP after 1976, but there is no Granger causality

between the two variables before 1976 (The strict capital controls and closed economy environment in this stage make the two variables are uncorrelated).

However, though we found a negative relationship between economic growth and the exchange rate, we do not suggest stimulate economic growth through exchange rate manipulation. Because it may induce other related issues, for example: a high inflation in the long run. Based on our finding in this paper, two suggestions are proposed: First, the managed floating exchange rate system and Hong Kong's economic development should be coordinated; Second, based on Hong Kong's economic growth and the goal of the stable system of trade and currency exchange, a long-term planning of the reform of exchange rate mechanism should be set up.

Please use a 10-point Times Roman font, or other Roman font with serifs, as close as possible in appearance to Times Roman in which these guidelines have been set. The goal is to have a 10-point text, as you see here. Please use sans-serif or non-proportional fonts only for special purposes, such as distinguishing source code text. If Times Roman is not available, try the font named Computer Modern Roman. On a Macintosh, use the font named Times. Right margins should be justified, not ragged.

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