Ricardo-Barro Equivalence Theorem and the Positive Fiscal Policy in China

Xiao-huan LIU\textsuperscript{1,a,*}, Su-yu LV\textsuperscript{2,b}

\textsuperscript{1,2}Business School of Hohai University, Nanjing, China
\textsuperscript{a}yuer491057285@163.com, \textsuperscript{b}Susie73@163.com
\textsuperscript{*}Corresponding author

Keywords: Ricardo-Barro Equivalence Theorem, National Debt Balance, Financial Policy, Resident Consumption.

Abstract. This paper selects the economic data of Financial Deficit and National Debt Balance during the years of 1983-2013 to make an empirical analysis to see how the positive fiscal policy in China influences the resident consumption and whether the Ricardo-Barro Equivalence Theorem is tenable or not in China. The conclusion is that the issuing of government bonds has positive effects on the increasing of resident consumption in China, as for the growing of financial deficit, it has little effect on resident consumption in the short term, while in the long term, it seems restrain the resident consumption. Empirical results proves that the Ricardo-Barro Equivalence Theorem is untenable in China, the main reason is that Chinese consumers cannot make economic decisions under rational expectations, which means China can implement positive fiscal policy to achieve what it wants.

1. Introduction

Ricardo-Barro Equivalence is established on certain assumptions, some perspectives and empirical studies support its inapplicability. Tobin’s views noted Ricardo-Barro Equivalence does not hold water by refuting the assumptions: Firstly, Ricardo-Barro Equivalence assumes consumers pursue altruism and the net heritage value is positive. This assumption is too strict, which does not reflect the reality. Secondly, Ricardo-Barro Equivalence believes that government bonds rather than taxation levy will not cause the redistribution of national wealth, and the marginal consumption propensity of consumers is the same. Thirdly, Ricardo-Barro Equivalence assumes that government tax is levied in a lump-sum way. Actually, many countries adopt progressive tax system rather than lump-sum tax system. Different tax levy way lead to different effect on consumer behaviors when the government issuing certain amount of bonds as a substitution of levying tax. Based on the views above and some empirical studies, all show that Ricardo-Barro Equivalence does not hold water. Chinese scholars Liu Yanmei [1] used cointegration analysis and error correction model find that the Ricardian Equivalence theorem is untenable in China either in short or long term. The proactive fiscal policy is indeed efficient, the reason is that the preconditions of the theorem does not yet exist in our country. Sun Hanwei and Qiu Shanshan [2] concluded that Ricardian equivalence theorem cannot stand in China through empirical studies, and active fiscal policy has a strong theoretical basis. Yang Yi [3] also verified that the Ricardian equivalence theorem does not apply in China through the VEC model based on the consumption function, reason is that the bond illusion and money illusion exist.

China will continue to conduct positive fiscal policy and further expand deficit rate to promote aggregate social demand in 2016. Issuing more government bonds is the main method. According to Ricardo-Barro Equivalence Theorem, under certain assumptions, financing by issuing government bonds and by levying tax are equivalent. The most important premise of R-B Equivalence Theorem is that the consumers in one country are rational enough. Under this premise, levying taxes will not increase the resident consumption, which means the consumers can realize the truth that the government’s tax cuts tend to form a fiscal deficit which need consumers’ future tax obligations to fill. Rational consumers would save rather than consume, so the issuing of the government bonds
will not have any effect on resident consumption. The aim of Ricardo-Barro Equivalence is to prove that the fiscal policy is ineffective, which runs counter to the goal to expand aggregate demand by implementing positive fiscal policy in China. Therefore, whether the conduction of fiscal policy will affect the economic variables of China is the criterion to inspect policy effectiveness.

This paper tries to start from the changes of economic variables included in active financial policy, selecting three variables that meet the goal of active financial policy by using Chinese economic data of year 1983-2013 [4], to test whether the active financial policy with tax cuts can increase residents consumption or not, then to prove the applicability of Ricardo-Barro equivalence in China. There are two possible results: if it is tenable, it signs that government bonds issuing has the same effect as tax levy. And it cannot increase resident’s consumption and expand aggregate social demands, in this situation, financial policy is invalid; however, if it is not tenable, then, the government’s expansionary fiscal policy is effective, and imposes positive effect both on aggregate demand and consumption, and this paper will find out the reason why Ricardo-Barro equivalence is not valid in China.

2. Empirical Analysis

2.1 Variables selection and data resources

The variables selected in this paper include Financial Deficit, National Debt and Resident Consumption. Empirical studies on the establishment of Ricardo-Barro Equivalence mainly use the unilateral linear model, early method is the least squares estimation, and now the empirical study considers more about whether the nature of the time series is stable or not, whether there is cointegration relationship. Besides, the Euler equation model based on consumption is also used to prove the tenable of R-B Equivalence. In this paper, the single equation linear model of time series is used as the basic model to conduct the empirical analysis.

Financial deficit in t period is the difference between government spending and taxation, \( D_t = -G_t + T_t \), two important variables affecting resident consumption are the financial deficit and national debts level. Financial deficit reflects the level of government spending, and the balance of the national debts can not only reflect the government spending, but also can be used as the proxy variable of the residents’ wealth. Government tax cuts \((T_t)\), then the government will issue state bonds \((B_t)\) to make up for the fiscal deficit. At this moment, \( B_t = T_t \) then the fiscal deficit \( D_t = G_t - T_t \). In order to reflect the impact of government bond and financial deficit imposed on resident consumption, the data of financial deficit and the amount of bonds is introduced in the model. As for resident consumption, the data include rural and urban residents’ spending.

Set the model:

\[
C_t = \alpha + \beta_2 D_t + \beta_3 B_t + \varepsilon_t \tag{1}
\]

In the formula, \( C_t \) means the resident consumption, \( D_t \) is the financial deficit, \( B_t \) represents the balance of government bonds, \( \varepsilon_t \) is the disturbance. These three variables are presented as RC, DEFICIT and BOND in the economic data. The data of resident consumption is the number of the social aggregate consumption subtracts that of government spending, and the financial deficit is the difference between government spending and government revenue. All data comes from the statistical yearbook of China in 2014 and some literatures.

2.2 Variable stability test

To prevent the false regression phenomena, the stability of the sample data obtained from the random time series should be tested to determine the stability of the sequence, and the method is the unit root test.
Table 1. Unit Root Test of Variables.

<table>
<thead>
<tr>
<th>Variables</th>
<th>ADF Value</th>
<th>Prob.</th>
<th>1% Threshold Value</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC</td>
<td>2.443609</td>
<td>0.9951</td>
<td>-2.566542*</td>
<td>0.2968</td>
</tr>
<tr>
<td>BOND</td>
<td>0.775211</td>
<td>0.9995</td>
<td>-8.016128*</td>
<td>0.0000</td>
</tr>
<tr>
<td>DEFICIT</td>
<td>-0.782224</td>
<td>0.9528</td>
<td>-6.500299*</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Note: *signs refuse the null hypothesis under the 1% threshold level.

In the test of the original sequence, the results of the three variables accept the null hypothesis, that is, the time series exist unit root, the sequence is not stable, however, after the first order difference, the test results indicates the sequence is stable as there is no unit root, therefore, \( [R_{C_t}] \sim I(1), \ [BOND_{t}] \sim I(1), \ [DEFICIT_{t}] \sim I(1) \).

2.3 Cointegration test

The unit root test shows that the three variables are first order differential, and the sequence is a single one, then the cointegration test can be carried out. Johansen method was used to analyze the cointegration relationship, and to test the long-term equilibrium relationship between Chinese resident consumption, government bond and the financial deficit.

Table 2. Results of Johansen Cointegration Test.

<table>
<thead>
<tr>
<th>Hypothesized</th>
<th>No. of CE(s)</th>
<th>Eigenvalue</th>
<th>Trace Statistic</th>
<th>0.05 Critical Value</th>
<th>Prob.**</th>
</tr>
</thead>
<tbody>
<tr>
<td>None *</td>
<td></td>
<td>0.826669</td>
<td>71.30743</td>
<td>29.79707</td>
<td>0.0000</td>
</tr>
<tr>
<td>At most 1 *</td>
<td></td>
<td>0.412668</td>
<td>20.48347</td>
<td>15.49471</td>
<td>0.0081</td>
</tr>
<tr>
<td>At most 2 *</td>
<td></td>
<td>0.159839</td>
<td>5.050684</td>
<td>3.841466</td>
<td>0.0246</td>
</tr>
</tbody>
</table>

The results show that there are three cointegration relationships among the residents consumption, the financial deficit and the debt balance, which means the consumption of the residents may be influences by the other two variables in the long-term development. Therefore, the model can be further obtained by linear regression:

\[
R_{C_t} = -1.506565408 \times DEFICIT + 1.35913656502 \times BOND + 14984.0355609
\]

\[
(1.4064) \quad (11.829) \quad (6.722) \quad (2)
\]

R-squared = 0.9505; DW = 0.3089

The t-statics value of the fiscal deficit is -1.4064, which is not significant, the interpretation of the resident consumption is not obvious, besides, DW test value of the model is small, which means that the model has a serious self-correlation. Then the generalized difference method was used to transform the variables to eliminate the autocorrelation. Specifically, the generalized differential equation is:

\[
R_{C_t} - 0.8162 R_{C_{t-1}} = 14984.03(1 - 0.8162) - 1.5065(DEFICIT - 0.8162 DEFICIT_{t-1})
\]

\[
+ 1.3591365(BOND - 0.8162 BOND_{t-1}) + \nu_t
\]

The output results of the equation can be got after the regression of generalized difference equation:

Table 3. Results of the Regression of Generalized Difference Equation.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>t-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>4280.919</td>
<td>1140.072</td>
<td>3.754954</td>
<td>0.0008</td>
</tr>
<tr>
<td>DEFICIT-0.816294*</td>
<td>-0.451577</td>
<td>0.552521</td>
<td>-0.817304</td>
<td>0.4209</td>
</tr>
<tr>
<td>BOND-0.816294*BOND(-1)</td>
<td>1.309205</td>
<td>0.125211</td>
<td>10.45598</td>
<td>0.0000</td>
</tr>
</tbody>
</table>
After eliminating the model’s autocorrelation, the final model is obtained:

\[
RC = -0.451577 \times DEFICIT + 1.309205 \times BOND + 4280.919  
\]

\[(-0.8173) \quad (10.4559) \quad (3.7545)\]

R-squared = 0.8351; DW = 1.7771

2.4 Establishment of vector error correction model

As the fiscal deficit in the linear model of OLS regression has no significant effect on the resident consumption, so it possibly indicates the lag effect of the fiscal deficit. The establishment of VECM is as follows:

\[
d(rc) = 0.0220114624567 \times (rc(-1) + 7.25838685864 \times deficit(-1) + 0.465642700389 \times bond(-1) \\
- 43261.7759828) + 0.861553296427 \times d(rc(-1)) - 0.0113086656459 \times d(rc(-2)) - 0.7033278874 \times \\
d(deficit(-1)) - 1.27901781056 \times d(deficit(-2)) + 0.102487651925 \times d(bond(-1)) - 0.25914496195 \\
* d(bond(-2)) + 1165.8436545  
\]

R-squared = 0.9016

The difference reflects the short-term effects, t-statistics value of D (DEFICIT (-2)) is -3.77807, which is significant, it shows that the fiscal deficit has lagged effect on residents’ consumption. Therefore, it is the reason why the fiscal deficit is not significant in the linear regression model. The impact of national debt balance in D (BOND (-2)) has little effect on the resident consumption, which indicates that the balance of government bonds is not significantly affected by the resident consumption when impose 2 lag phases. However, in the original model, the impact of government debt balance on the resident consumption is significant. The vector error correction model is used to analyze the term dynamic relationship among the three variables, and the VECM is good, and the influence of the variables in the model is well explained to prove the Ricardo-Barro Equivalence Theorem is not established in China.

The original linear regression model fitted well the effect of fiscal deficit and national debt balance to the residents’ consumption and the impact of the national balance on the resident consumption is statistically significant. With the national bond increasing by one unit, the resident consumption increases by 1.3092 units, while the fiscal deficit has little effect on resident consumption. But when impose 2 lag phases, the fiscal deficit has a significant effect on resident consumption, with fiscal deficit growing one unit, the resident consumption decreasing 1.2790 units and the restraining effect is strong. This shows that Ricardo-Barro Equivalence holding the view that bonds issuing has no effect on resident consumption is untenable in China. The reason that the issuing of government bonds promotes the level of resident consumption is because at this moment Chinese people do not realize the national debt gap is the future tax burden, but regards the government bonds in hand as the increase in wealth. They do not know the increase of current wealth is actually the taxes in the future. On the other hand, the restraining effect of fiscal deficit on resident consumption needs a long time after a period of time to manifest itself, and the reason is that the fiscal deficit is widening, when the gap is too huge, the residents then realize that the government need levy taxes to fill the gap, at that time, residents will save money instead of increasing consumption.

3. Conclusions and Policy Implications

The economic data in China reflects the Ricardo-Barro Equivalence is not established in the country. First of all, residents know little about the tax incidence, when the tax levy is high, they just restrain consumption, when the tax is low, they hold government bonds and regard it as wealth, and now they will increase consumption. National debt in China has an asset effect, majority of residents hold bonds as a mean of preserving and increasing the value of assets, the investment risk is zero, which also shows the residents lack financial information and the investment channel is single. The asymmetry of information and the weakness of residents’ knowledge lead to low rational expectations of people in China. The government financing by issuing public bonds rather
than levying taxes expands the public fiscal expenditure, people will not have the idea that it is the future tax burden. On the other hand, China’s government spending is mainly used for the supply of public goods, such as enlarging the scale of urban construction so that residents can increase the demand for public goods.

The other factor needs to be considered is that the government makes up for the deficit by issuing government bonds, even though people realize the payment of current debt is at the cost of the future tax burden, it still increase consumption. The reason is that the government may make up for it by changing the issuing amount of money, which may cause inflation. But in that case, consumers will ignore the actual purchasing power of money and relatively increase consumption. Besides, the assumptions of Ricardo-Barro Equivalence Theorem are not established in the real economic situation in China. Considering these factors and the empirical test, Ricardo-Barro Equivalence is not tenable in China, so the positive fiscal policy is valid here.

To sum up, the implementation of fiscal policy can impose strong effect on the economy. In the case of China’s rapid economic growth, the positive fiscal policy makes people feel the expansion of the economic development, people focus more on the policy goal rather than the economic implications of the policy itself. Expansive fiscal policy is of great importance for promoting domestic demand under the situation of rapid economic development. In the short term, national debt issuance will increase resident consumption, but in the long run, the increase of fiscal deficit can restrain the consumption of residents, and the long-term accumulation of the deficit will hinder the sustainable development of the economy. Therefore, the government departments should balance the budget, only when it is necessary can government conduct the deficit policy, but the size of the debt needs to be strictly controlled to reduce the risk of issuing government bonds that causes bad influence on the future economy.

References