An Empirical Test on the Validity of China's Fiscal Policy

——Based on the Ricardian Equivalence Proposition

Wen Fang

School of Economics and Management, Changchun University of Science and Technology

Weixing Road No. 7989, Changchun 130022, China

Tel: 80-431-8888-9480   E-mail: fangwen8088@163.com

Jing Ma

School of Economics and Management, Changchun University of Science and Technology

Weixing Road No. 7989, Changchun 130022, China

E-mail: majingdoll@hotmail.com

Ye Sheng

School of Economics and Management, Changchun University of Science and Technology

Weixing Road No. 7989, Changchun 130022, China

E-mail: walt19860829@yahoo.com.cn

Abstract

The Ricardian Equivalence Proposition is the essential proposition relevant to fiscal policy, which arouses general discussions on the research of macroeconomic policies. Its establishment is rather difficult in reality as it requires comparatively strict hypothesis. All the empirical studies on the Ricardian Equivalence Proposition have not come into agreement so far. The purpose of this paper is to analyze the dynamic effect of China's fiscal policy by utilizing impulse response function on the basis of establishing SVAR model which contains China's fiscal variables. Consequently we make an empirical conclusion that the Ricardian Equivalence Proposition is untenable on China's economy.

Keywords: Ricardian equivalence, Fiscal policy, Government bonds, Tax

1. The Ricardian Equivalence Proposition

With regard to the effects of fiscal policy, universal points of view bear Keynesian aggregate demand theory for a long period. They commonly think that consumption demand could be stimulated effectively through expanding public expenditure or reducing tax-collection by government. Simultaneously interest rate rises so that the investment demand of some private sectors is extruded. However the Ricardian Equivalence Proposition holds an opposite idea which claims that current national debt is only future tax, so government debt issue or tax-collection associated with financing can not increase demand, that is to say, fiscal policy is ineffective.

The Ricardian Equivalence Proposition was firstly brought forward by David Ricardo in early 19th Century. He expressed for the first time that government taxation and borrowing have the same effects on the economy. Until 1974 Barro published his representative paper "Are government bonds net wealth?" in which he developed and deepened Ricardo's old theory of "debts and taxation equivalent" through complex mathematical reasoning. And famous "Barro—Ricardo Equivalence Proposition" was formed.

The Ricardian Equivalence Proposition could be described as: on condition of given government expenditure approach, whether government adopts bonds issue or tax-collection associated with financing has no effects on the economic individual consumption behavior and capital deposits (Barro R. J, 1974). Its key point is that public debts is only future tax, so tax reduction by debts issue can't influence the consumption demand of economic subjects although it may affect current disposable income. The economic subjects can anticipate rationally that the principal and interest of public debts for offsetting current fiscal deficit will be refunded by taxation in the future. Moreover the present value of tax is equal to current fiscal deficit, therefore they will not

increase present consumption but save reduced tax in order to refund future deferred tax-collection. Thus expansion of fiscal policy is ineffective.

The Ricardian Equivalence Proposition is a sort of neutral proposition essentially. It indicates the choice of imposing one-time total tax or issuing public debt for government expenditure financing has nothing to do with inhabitant consumption and capital formation (national savings). If economy reaches full employment, debt financing neither influences price approach nor interest rate approach, and also capital density under long-term and stable situation either. Obviously, the strongest meanings of this proposition are that bonds financing instead of tax reduction and related deficit will not occupied private capital formation. Holding the hypothesis of "given government purchase approach", Barro consider the deviation of infinite life of economic person in the Ricardian Equivalence Proposition, i.e. infinite period, perfect capital market, definite future income and tax and one-time total taxation. He thought strict Ricardian Equivalence form may not exist, but Ricardian Equivalence Proposition is true basically, so that he denied the validity of Keynesian deficit fiscal policy.

2. An Empirical Test on the Validity of China's Fiscal Policy Based on the Ricardian Equivalence Proposition

All the empirical studies based on the Ricardian Equivalence Proposition have not come into agreement so far. Bernheim points out some reasons: selecting proper measurement of debt or deficit; selecting appropriate approach to eliminate the inherence of regression variables; finite notability of short-term effects don't blur considerable notability of potential and long-term effects (Bernheim D. B., 1987). Dalamagas made empirical studies on the practical situation of the countries like Italy, South Africa, Canada, Australia, South Korea and Finland, and then made a conclusion that the Ricardian Equivalence Proposition isn't suitable for the countries with low debt rate, while maybe right contrarily (Dalamagas Basil A, 1992a). We are going to make empirical test to China based on the Ricardian Equivalence Proposition in this section.

2.1 Select Model and Variables

There is too much practical difficulty in adopting econometric model to test the Ricardian Equivalence Proposition. For instance, as to dealing with anticipation, the Ricardian Equivalence Proposition assumes economic individual makes consumption decision according to expected future fiscal policy. Thus how to select variables of measuring people's expected fiscal policy becomes a big problem (Leachman Loril L, 1996).

Traditional regression models are restricted by one-way causal relation, which goes against our study on the influential relationship between output and fiscal policy variables. Sims proposed VAR model in early 1980's, in which he constructed variables relations by utilizing non-structural method. It provided us with a new model-construct method for empirical study. However, VAR model has so many parameters that only when contained variables are few enough, satisfactory estimated results could be obtained by OLS and ML. In order to solve this problem, SVAR appeared to reduce to-be-estimated parameters by restricting parameter space.

In this section we are to construct SVAR model including fiscal expenditure, taxation and output, and estimate it accordingly as well. We shall analyze the dynamic response of output to fiscal policy impact by applying pulse response function in order to test whether the Ricardian Equivalence Proposition is right in China.

2.2 Data Description

In order to enlarge sample data, we adopt monthly data from Jan. 1992 to Jun. 2009 (Data Source: www.cei.gov.cn) and make monthly analysis on GDP quarter data. Moreover we utilize X11 addition model to adjust data on seasons. Since nominal variables are highly related to price index, we use real variables which eliminate price factor already to estimate. We make logarithmic transformation on all variables in order to lower sequential integral order.

Figure 1 to 3 show time routes of the logarithm (Y_t) of China's real GDP, the logarithm (G_t) of real fiscal expenditure and the logarithm (T_t) of real taxation separately. We shall implement time sequential H-P filter to obtain this sequential trend element and cycle element (Hodrick P. and Prescott E., 1980). The trend element indicates the flat trend contained in sequence. And the cycle element is the rest of original sequence except trend element. From the following figures we can find out the basic change trend and fluctuation character of the three time sequence.

Figure 1 show real output increases steadily in general. Along with economic "soft-land" in 1996, the fluctuation

on cycle element was also weakened. Influenced by international financial crisis in 2008, China's economy achieved the lowest increase rate since 2003, with real output decreasing suddenly. We could find out from Figure 2 and 3 that fiscal expenditure and taxation greatly match on trend level, but they are quite different on cycle element. The fluctuation of fiscal expenditure went steadily since 1994, which implies China's fiscal expenditure policy maintained continuity and stability in the process of implementation. Comparatively speaking, the fluctuation mode of taxation is quite complex, as it showed a short calm during 1996-2000 only, but increased every year since 2004. So there exist considerable discretionary elements in China's taxation policy.

2.3 Unit Root Test and Cointegration Test

Firstly, we shall make unit root test on the time sequence of the above three variables in order to figure out stability of sequence and integral order. In Table 1 we list PL sequence of variables and ADF (Augment Dicky-Fuller) (Mills T. C., 1999) of unit root test of difference sequence. Lag orders are confirmed by AIC (Akaike Information Criterion) and SC (Schwarz Criterion). Critical values (* means refusing unit root hypothesis; similarly hereinafter) below 1% are given as well. Test results indicate unit roots exist in original sequence, but not in corresponding difference sequence, which proves they are all first order integral process.

Subsequently we shall apply Johansen's Cointegration Test to judge whether long-term equilibrium relations exist among variables (Johansen S., 1988). Table 2 shows the Johansen's Cointegration Test results among Y_t, G_t and T_t. Compare trace statistic with critical values below 5% significance level, we notice there are two significant cointegration relations among the three economic variables.

2.4 Impulse Response Analysis

After confirming cointegration relations among variables, we shall go future to estimate the parameters of SVAR model and construct impulse response function to analyze how fiscal policy impact influences output.

Firstly we need to figure out the lag order of SVAR model to ensure its stability. According to AIC and SC information principle, the lag order of SVAR model is 6.

Structural formula has to be imposed with three restrictive conditions to identify structural impact when ternary and sixth-order SVAR model is constructed. According to China's macroeconomic running currently, we make the following three assumptions: 1. Outputs only influence present taxation, but not fiscal expenditures. 2. Taxation might have effects on fiscal expenditure, but it doesn't depend on corresponding fiscal expenditures. 3. The output elasticity of taxation by means of GLS estimation is 1.372. The regression equation is as follows,

$$T_t = -5.151 + 1.372Y_t$$
$$(-18.65)^* (41.85)^* \qquad R^2 = 0.894 \qquad D.W. = 2.368$$

(1)

Herein we shall evaluate output response function to fiscal policy impact, selecting 20-month lag. In order to reflect the influence of fiscal policy on output directly, we illustrate the impulse response trace of output to fiscal expenditure and taxation impact, as Figure 4 shows. The abscissa represents time interval (month) after impact, and the ordinate represents the effects of one-unit fiscal expenditure on output (%) (Enders W., 1995).

Figure 4 indicates output response to fiscal expenditures in the first three months is not obviously, showing slight decline only, which means China's fiscal policy, is lagged to some extent in practice. Till the fourth month the expansion effects of fiscal expenditures on output begin to emerge, with impulse response curve up rapidly, even to maximum in the eleventh month. Afterward there is a little fluctuation which tends to be stable gradually later on. All the above imply the stimulating effects of expanding fiscal expenditures on output obviously and durably.

We shall analyze the dynamic response process of output to taxation impact. At the beginning, increased tax positively influences output, reaching the highest point in the fifth month, but falling down rapidly later on, probably because inhabitant's response to increased tax is to reduce consumption substantially, which results in decreased output. This is against the Ricardian Equivalence Proposition. The impulse effects of taxation drop to bottom in the eighth month, and then go back up to some extent, approaching zero finally. From long-term perspective taxation policy hasn't noticeable effects on output.

In short, taxation has no long-term effects on output, but shows positive and negative alternatives in short period. Therefore taxation policy easily arouses strong economic fluctuation, which hampers sustainable and stable economic development. By contrast, fiscal expenditure has obvious effects on output expansion without any periodic repetition. So active fiscal policy with expanding government expenditures as main instrument can effectively promote China's economy growth. And the Ricardian Equivalence Proposition is not right in China's economy.

3. Conclusion and Enlightenment

Firstly, the test results of cointegration relation between fiscal policy variables and output indicates there exist multiple long-term equilibrium relations among fiscal expenditures, taxation and output. To some extent it proves the implementation of fiscal policy achieved good performance, which administers to economic equilibrium. At the same time it also reflects it is not independent for Chinese government to implement fiscal policy means, but with combinations, so that high efficient policy is carried out.

Secondly, the impulse response route of output to fiscal impact reflects the real performance of China's fiscal policy. The changes of fiscal expenditure and taxation both have strong effects on output in short period. Stable, continual and positive impact appears to fiscal expenditure, while obvious positive and negative fluctuation to taxation which has little effect on output in long period. All the above indicate fiscal policy with expanding government expenditures as main instrument has stable and durable expansion effects on national economy. But tax reduction only stimulates economy in short term, and is ineffective in long term. So the Ricardian Equivalence Proposition is not right in China's economy.

In fact, the hypothesis of the Ricardian Equivalence Proposition is not consistent with China to a great extent, which necessarily causes its error in China. At first, one of the hypotheses of the Ricardian Equivalence Proposition is that rational economic persons clearly realize government bonds are future tax, so they won't change present consumption. However Chinese people regard government bonds as a kind of safe investment channel without any risk, but getting more investment return than bank deposits. "Fiscal illusion" occurs to stimulate people's consumption. Second, the Ricardian Equivalence Proposition assumes equal tax reduction is out of reality. Taxation adjustment is generally for definite economic behavior, so it is very difficult to achieve equivalence to economic individuals. Furthermore, China has a good tradition of thrift and frugality which restricts inhabitant's consumption level to a great extent. So government bonds issue results in suppressed consumption demand, which affects the development of government expenditure effectiveness.

Simultaneously we should realize owing to imperfect insurance system of housing, education, medical care and so on, Chinese people consume rather carefully, so the balance of government bonds can't stimulate inhabitant's consumption obviously. Therefore when implementing expansion fiscal policy, the government also should enhance the construction of social insurance system and raise the income level of low-income populations. This is very significant to stimulate consumption and promote economy growth.

References

Barro R. J. (1974). Are government bonds net wealth. *Journal of Political Economy*, 82(6): 1095-1117.

Bernheim D. B. (1987). Ricardian equivalence: an evaluation of theory and evidence. NBER Working Paper, 2330.

Dalamagas Basil A. (1992a). How rival are the Ricardian Equivalence Proposition and the fiscal policy potency view?. Scottish Journal of Political Economy, 39. Testing Ricardian Equivalence: a reconsideration. *Applied Economics*, 1992b, 24.

Enders W. (1995). Applied Econometric Time Series. *John Wiley & Sons Inc.*, 139-149.

Giorgioni G., and Holden K. (2003). Ricardian equivalence, expansionary fiscal contraction and the stock market. *Applied Economics*, 35.

Hodrick P., and Prescott E. (1980). *Post-War U.S. Business Cycles: An Empirical Investigation.* Carnegie Mellon University, Manuscript, 32-58.

Leachman Loril L. (1996). New evidence on the Ricardian equivalence theorem: a multicointegration. *Applied Economics*, 28.

Mills T. C. (1999). *The Econometric Modeling of Financial Time Series.* Cambridge: Cambridge University Press: 372.

Sims C. A. (1980). Macroeconomics and reality. *Econometrica*, 48: 1-48.

Appendix

Table 1. Unit Root Test on Time Sequence

Original Sequence	**ADF**	Critical Value	Difference Sequence	**ADF**	Critical Value
Y_t	-0.430	-4.005	ΔY_t	-7.327*	-4.005
G_t	-3.856	-4.003	ΔG_t	-13.28*	-4.003
T_t	-2.155	-4.005	ΔT_t	-7.498*	-4.005

Table 2. Johansen Cointegration Test

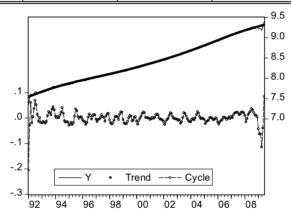| Characteristic Root	Trace Statistic	Critical Value	Assumed Cointegration Equation Number
0.305	102.6*	29.80	None*
0.117	27.00*	15.49	At most 1*
0.005	1.143*	3.841	At most 2

Figure 1. Time Route of the Logarithm of Real GDP and its H-P Analysis
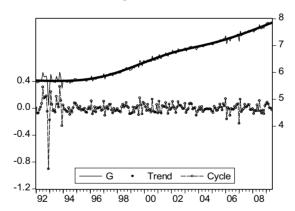

Figure 2. Time Route of the Logarithm of Real Fiscal Expenditure and its H-P Analysis
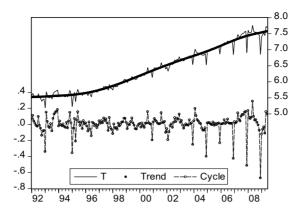
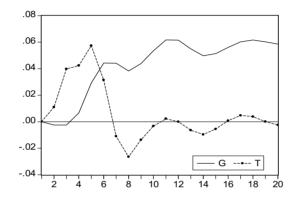Figure 3. Time Route of the Logarithm of Real Taxation and its H-P Analysis

Figure 4. Impulse Response of Output to Fiscal Policy