

International Studies Program

Working Paper 02-09
March 2002

The Viability of Fiscal Policy in South Korea, Taiwan, and Thailand

Tsangyao Chang
WenRong Liu
Henry Thompson



Georgia State
University

Andrew Young
School of Policy Studies



The Viability of Fiscal Policy in South Korea, Taiwan, and Thailand

Working Paper 02-09

Tsangyao Chang, WenRong Liu
Henry Thompson
March 2002

International Studies Program
Andrew Young School of Policy Studies
Georgia State University
Atlanta, Georgia 30303
United States of America

Phone: (404) 651-1144
Fax: (404) 651-3996
Email: ispaysps@gsu.edu
Internet: <http://isp-aysps.gsu.edu>

Copyright 2001, the Andrew Young School of Policy Studies, Georgia State University. No part of the material protected by this copyright notice may be reproduced or utilized in any form or by any means without prior written permission from the copyright owner.

International Studies Program Andrew Young School of Policy Studies

The Andrew Young School of Policy Studies was established at Georgia State University with the objective of promoting excellence in the design, implementation, and evaluation of public policy. In addition to two academic departments (economics and public administration), the Andrew Young School houses seven leading research centers and policy programs, including the International Studies Program.

The mission of the International Studies Program is to provide academic and professional training, applied research, and technical assistance in support of sound public policy and sustainable economic growth in developing and transitional economies.

The International Studies Program at the Andrew Young School of Policy Studies is recognized worldwide for its efforts in support of economic and public policy reforms through technical assistance and training around the world. This reputation has been built serving a diverse client base, including the World Bank, the U.S. Agency for International Development (USAID), the United Nations Development Programme (UNDP), finance ministries, government organizations, legislative bodies and private sector institutions.

The success of the International Studies Program reflects the breadth and depth of the in-house technical expertise that the International Studies Program can draw upon. The Andrew Young School's faculty are leading experts in economics and public policy and have authored books, published in major academic and technical journals, and have extensive experience in designing and implementing technical assistance and training programs. Andrew Young School faculty have been active in policy reform in over 40 countries around the world. Our technical assistance strategy is not to merely provide technical prescriptions for policy reform, but to engage in a collaborative effort with the host government and donor agency to identify and analyze the issues at hand, arrive at policy solutions and implement reforms.

The International Studies Program specializes in four broad policy areas:

- **Fiscal policy**, including tax reforms, public expenditure reviews, tax administration reform
- **Fiscal decentralization**, including fiscal decentralization reforms, design of intergovernmental transfer systems, urban government finance
- **Budgeting and fiscal management**, including local government budgeting, performance-based budgeting, capital budgeting, multi-year budgeting
- **Economic analysis and revenue forecasting**, including micro-simulation, time series forecasting,

For more information about our technical assistance activities and training programs, please visit our website at <http://isp-aysps.gsu.edu> or contact us by email at ispaysps@gsu.edu.

Abstract:

The viability of stimulative fiscal policy has become a political issue in South Korea, Taiwan, and Thailand since the Asian financial crisis of 1997. This paper examines historical relationships between government spending, taxes, and output in these countries using cointegration and vector autoregression techniques with data starting in the 1950s. South Korea has had a policy of spend-and-tax, Taiwan tax-and-spend, while in Thailand there has been no apparent approach to fiscal policy. For the three countries, fiscal policy has had zero to negligible effects on output and is not recommended as a way to stimulate output.

**The Viability of Fiscal Policy
in South Korea, Taiwan, and Thailand**

Tsangyao Chang WenRong Liu

Feng Chia University, Taiwan

Henry Thompson*

Auburn University, USA

March 2002

The viability of stimulative fiscal policy has become a political issue in South Korea, Taiwan, and Thailand since the Asian financial crisis of 1997. This paper examines historical relationships between government spending, taxes, and output in these countries using cointegration and vector autoregression techniques with data starting in the 1950s. South Korea has had a policy of spend-and-tax, Taiwan tax-and-spend, while in Thailand there has been no apparent approach to fiscal policy. For the three countries, fiscal policy has had zero to negligible effects on output and is not recommended as a way to stimulate output.

*Corresponding author: Department of Agricultural Economics, Auburn University, AL 36849, 334-844-2910, fax 5639, thomphl@auburn.edu

The Viability of Fiscal Policy in South Korea, Taiwan, and Thailand

The Asian financial crisis of 1997 led to output declines in South Korea, Taiwan, and Thailand and the three countries have turned to fiscal policy to stimulate output. The present study investigates the empirical evidence on the viability of fiscal policy for these three Asian countries using data starting in the 1950s. While fiscal expansion can raise output under certain theoretical conditions, deficit spending implies higher taxes that could eliminate even transitory effects. The present paper investigates the empirical relationships between government spending, taxes, and output in these three Asian tigers.

The tax-and-spend hypothesis of Buchanan and Wagner (1978) and Friedman (1978) is that taxes lead to government spending. According to the spend-and-tax hypothesis of Peacock and Wiseman (1979) temporary increases in government spending lead to permanent tax increases. With the fiscal synchronization described by Meltzer and Richard (1981), spending and taxes would adjust as the public chooses an optimal package of taxes and government spending. The related literature using Granger (1988) causality includes von Furstenberg, Green, and Jeong (1986), Owoye (1995), Hasan and Lincoln (1997), and Darrat (1988). Koren and Stiassny (1998) consider whether taxes and spending are cointegrated.

Dynamic responses of taxes, spending, and income are examined in the present paper with vector autoregression analysis. Impulse response and variance decomposition are included as in Baffs and Shah (1994) and Koren and Stiassny (1998) because coefficients of a VAR are difficult to gauge. Impulse responses trace the reaction of an endogenous variable to an innovation, capturing dynamic interactions and adjustment speeds. Variance decomposition measures the share of forecast error variance due to a shock to the system and own innovations would explain the forecast error variance of exogenous variables.

The present paper focuses on real government spending, taxes, and gross domestic product. Fiscal policy could affect interest rates and in turn investment spending. Interest rates could be included in the study but it is not clear which rate to use and expected inflation clouds the issue. The empirical links between the fiscal variables and output may provide some indication of the viability of more a active fiscal policy stance in these Asian economies.

1. The Recent History of Fiscal Policy in South Korea, Taiwan, and Thailand

South Korea, Taiwan, and Thailand have achieved relatively high growth since the 1960s and macroeconomic policies have focused on export led growth. South Korea and Taiwan have many similarities in terms of economic growth, size, population, and dependency on energy imports. Growth in Thailand was very high during the 1990s.

Mundle (1999) points out that public spending has been under 30% of GDP in Taiwan, 25% in South Korea, and 20% in Thailand relative to an average of about 50% for OECD countries,. The relatively low spending levels in these three countries have been combined with government surpluses or low deficits. Episodes of inflation have generally been followed by fiscal restraint, at least up to the financial crisis of 1997. Along with structural reforms, South Korea and Thailand are pursuing expansionary fiscal policy to revive economic growth.

In Taiwan, the “Forecasters of Aggregate Supply and Demand” of the central government have been responsible for providing a basis of government budgeting since 1968. Recent budget deficits in Taiwan have sparked debate over fiscal policy, as discussed by Rao (1998). Taiwan had a balanced government budget from 1955 to 1988 but has since had a deficit. The government has sold public properties, issued debts, and borrowed from private banks. A six-year macroeconomic stability plan adopted in 1990 but abandoned in 1993 produced large budget deficits financed by bonds (Wu, 1998).

The year 2000 introduced a new political era for Taiwan with a change in parties after the 50 year reign of KMT and the political situation has become unusually unstable. Stock markets were volatile during 2000. Labor costs have caused some enterprises to leave for China and the overall economic situation has worsened. The new administration has decided to increase government spending to stimulate aggregate demand.

Debate between supporters of market versus government led development is discussed by Hattori and Sato (1997). They conclude that growth in South Korea has been mostly government led while growth in Taiwan has been led by trade and productivity. Budget deficits had not been an issue for South Korea until 1997. After a lull, South Korea has regained momentum and output grew over 10% in 1999.

Thailand's output grew about 8% annually during the 1990s until the 1997 crisis that started with the collapse of the Thai bath. Thailand's government has pursued structural reform of the financial system and expansionary fiscal policy to revive growth. For all three countries, it might be worthwhile to look at the history of the viability of fiscal policy to forecast its potential for success.

2. Empirical Tests of Fiscal Policy and Output

Annual data include gross domestic product Y , government spending G , and tax revenue T for South Korea (1954-1996), Taiwan (1951-1996), and Thailand (1951-1995), all in real terms. Data are from AREMOS of the Taiwan Ministry of Education and are transformed to logarithms to achieve stationarity in variance.

Macroeconomic time series generally contain unit roots and are dominated by stochastic trends as developed by Nelson and Plosser (1982). Unit root tests detect nonstationarity that would invalidate standard empirical results. The present study uses augmented Dickey-Fuller (1991, ADF) and Kwiatowski-Phillips-Schmidt-Shin (1992,

KPSS) tests to detect unit roots. The Akaike (1974) information criterion (AIC) determines the optimal specification.

Table 1 reports results of ADF tests with a constant but no time trend.

Nonstationarity cannot be rejected for levels according to the test statistics of MacKinnon (1991) but nonstationarity can be rejected with differenced data. Every series is integrated of order one. Table 2 reports KPSS results confirming the ADF results.

* Table 1 * Table 2 *

Given the presence of unit roots, the question becomes whether there is some long run equilibrium cointegrating relationship between variables. A variable x_t is cointegrated of order (d,b) if it is integrated of order d and there is a vector b such that $b'x_t$ is integrated of order $(d-b)$. Cointegration tests are conducted with the Johansen and Juselius (1990) method. A VAR model is fit to the data to find the appropriate lag structure. The Schwartz criterion and the likelihood ratio test suggest two lags and a Ljung-Box Q test on residuals indicates no residual autocorrelation. The Lagrange multiplier test indicates no ARCH effects in systems.

Table 3 presents results from Johansen cointegration tests. Trace and L-max statistics suggest two cointegrating vectors for South Korea and one for Taiwan. For Thailand, the null hypothesis of no cointegration is not rejected at the 5% level. There are long run relationships between fiscal variables and output in South Korea and Taiwan but

there is none in Thailand. This long run independence of the variables in Thailand suggests immediately that fiscal policy will be ineffective. Thailand's economy is based more on natural resources and that may account for the lack of a long run relationship between fiscal policy and output.

* Table 3 *

If nonstationary variables are cointegrated, vector autoregression (VAR) in first differences would be misspecified. Since cointegration relationships are found for South Korea and Taiwan, an error correction model (ECM) is used to test for statistical causality. Granger (1988) points out that cointegration would imply statistical causality in at least one direction. The error correction model (ECM) of Engle and Granger (1987) takes into account information provided by cointegrated properties. Lag lengths are determined with Hsiao's (1979) sequential procedure based on the Granger definition of causality and Akaike's (1974) minimum final prediction error (FPE). For Thailand, the variables are not cointegrated and causality is analyzed without an error correction term.

Table 4 summarizes the ECM results. Numbers in brackets indicate minimum FPE lag length. For South Korea, unidirectional causality from G to T supports the spend-and-tax hypothesis. Income has led to government spending, not vice versa, while there is feedback between income and taxes. This evidence suggests expansionary fiscal policy has no history of success in South Korea.

For Taiwan, there is unidirectional causality from T to G, supporting the tax-and-spend hypothesis. There is feedback between Y and G, suggesting that expansionary fiscal policy may have some impact on Y. Also, higher income causes increased taxes.

For Thailand, the first differenced VAR model suggests no causality between government spending and taxes while higher income causes both increased government spending and higher taxes. There is no evidence of viable fiscal policy in Thailand, a link between either G or T and Y.

* Table 4 *

Table 5 reports cumulative impulse responses after 10 years indicating the direction of the impact of an innovation. The effects gradually build up over 10 years. Focusing on the established causality, in South Korea the impact of G on T has an elasticity of 0.25, a moderate spend-and-tax effect. The causal impact of Y on G is close to zero. The feedback between Y and T is dominated by the effect of T on Y.

For Taiwan, the elasticity of T on G is only .07, indicating a very weak tax-and-spend property. The elasticity of G on Y is 0.26 and the reverse of this feedback mechanism a much weaker 0.07. A 10% increase in government spending in Taiwan would lead to a 2.6% increase in income after 10 years. Such a small impact suggests fiscal policy would not be recommended. Higher income leads to slightly lower taxes in Taiwan.

For Thailand, all cumulative responses are negligible and the two causal impacts are close to zero.

* Table 5 *

Table 6 presents variance decompositions after 10 years. Forecast error variance is decomposed into the proportion attributed to each random shock. For South Korea, the forecast error variance of T attributed to G is only 7%. The variance of G attributed to Y is 57% and for T the variance attributed to Y is 58%. The feedback from T to Y is much weaker, only 6%.

In Taiwan, the forecast error variance of G attributed to T is relatively large, 45%. The variance of G attributed to Y is 42% but the “fiscal policy” forecast error variance from Y to G is only 8%. While increased G causes an increase in Y in Taiwan, the effect is very small. The variance of T attributed to Y is 50%.

For Thailand, variables are accounted for mostly by their own innovations, confirming the lack of causal links. The variance of T attributed to Y is relatively high, 65%. Output in all three countries is predominantly exogenous as indicated by the high own variance decomposition terms.

* Table 6 *

3. Conclusion

Output growth has not depended on any particular approach to fiscal policy in these three quickly growing Asian economies, and there is little evidence to support a belief that expansionary fiscal policy will be effective in the future. More active fiscal policy would seem likely to have different effects on the three economies. In South Korea, there would be moderate output effects that would gradually build up, and higher taxes can be expected according to its spend-and-tax character. In Taiwan, only very weak output responses can be anticipated in response to government spending. Taiwan has a cautious approach to fiscal policy, establishing a tax base before spending. In Thailand, taxes and spending have been independent and fiscal policy has had no output effects.

In summary, more active efforts at fiscal policy stimulation is not recommended for these three Asian economies. The three have relatively small public sectors and no history of successful fiscal policy. The 1997 crisis was financial and it would be wise to concentrate on correcting the underlying inefficiencies in the financial systems.

References

Akaike, H. (1974) A New Look at the Statistical Model Identification, *IEEE Transaction on Automatic Control* AC-19, 716-723.

Baffes, John, and Anwar Shah (1994) Causality and Comovement between Taxes and Expenditures: Historical Evidence from Argentina, Brazil, and Mexico, *Journal of Development Economics*, 311-331.

Buchanan, James and Richard Wagner (1978) Dialogues Concerning Fiscal Religion,

Journal of Monetary Economics, 4, 627-636.

Darrat, Ali (1998) Tax and Spend, or Spend and Tax? An Inquiry into the Turkish Budgetary Process, *Southern Economic Journal*, 940-956.

Dickey, David. A. and W.A. Fuller (1991) Likelihood Ratio Statistics for Autoregressive Time Series with A Unit Root, *Econometrica*, 1057-1072.

Engle, R.F., and C.W.J. Granger (1987) Co-integration and Error-Correction: Representation, Estimation and Testing, *Econometrica*, 251-276.

Friedman, Milton (1978) The Limitations of Tax Limitation, *Policy Review*, 7-14.

Granger, C.W.J. (1988) Some Recent Developments in a Concept of Causality, *Journal of Econometrics*, 199-211.

Granger, C.W.J. and P. Newbold, (1974) Spurious Regressions in Econometrics, *Journal of Econometrics*, 111-120.

Hasan, Mohammad, and Ian Lincoln (1997) Tax then Spend or Spend then Tax? Experience in the UK, 1961-1993, *Applied Economics Letters*, 237-239.

Hattori, Tamio and Yukihiro Sato (1997) A Comparative Study of Development Mechanisms in Korea and Taiwan: Introductory Analysis, *The Developing Economies*, 35, 341-357.

Hsiao, Cheng (1979) Causality Tests in Econometrics, *Journal of Economic Dynamics and Control*, 4, 321-346.

Johansen, S. and K. Juselius (1990) Maximum Likelihood Estimation and Inference on Cointegration - With Applications to the Demand for Money, *Oxford Bulletin of Economics and Statistics*, 169-210.

Koren, Stephan, and Alfred Stiasny (1998) Tax and Spend, or Spend and Tax? An International Study, *Journal of Policy Modeling*, 163-191.

Kwiatkowski, D., P.C. Phillips, P. Schmidt, and Y. Shin (1992) Testing the Null

Hypothesis of Stationarity against the Alternative of a Unit Root, *Journal of Econometrics*, 159-178.

MacKinnon, James (1991) Critical Values for Cointegration Tests in Long-Run Economic Relationships, in *Readings in Cointegration*, edited by Engle and Granger, Oxford University Press.

Meltzer, Allan, and Scott Richard (1981) A Rational Theory of the Size of Government, *Journal of Political Economy*, 89, 914-927.

Mundle, S. (1999) Symposium: Fiscal policy and growth Some Asian Lessons for Asia, *Journal of Asian Economics*, 10, 15-36.

Nelson, C. R. and C.I. Plosser (1982) Trends and Random Walks in Macroeconomic Time Series - Some Evidence and Implications, *Journal of Monetary Economics*, 139-162.

Owoye, Oluwole (1995) The Causal Relationship between Taxes and Expenditures in The G-7 Countries: Cointegration and Error-Correction Models, *Applied Economics Letters*, 19-22.

Peacock, Alan, and Jack Wiseman (1979) Approaches to the Analysis of Government Expenditure Growth, *Public Finance Quarterly*, 7, 3-23.

Rao, M.G. (1998) Accommodating Public Expenditure Policies: the Case of Fast Growing Asian Economies, *World Development*, 26, 4, 673-694.

von Furstenberg, George M., R. Jeffery Green, and Jin-Ho Jeong (1986) Tax and Spend, or Spend and Tax? *Review of Economics and Statistics*, 179-188.

Wu, J L. (1998) Are Budget Deficits “Too Large”? The Evidence from Taiwan, *Journal of Asian Economics*, 9, 519-528.

Table 1. ADF Unit Root Tests

	Level	AIC(n)	First-difference	AIC(n)
South Korea (1954-1995)				
Y	1.07	-6.70(1)	-3.98*	-6.82(1)
G	-0.61	-3.67(1)	-7.16*	-3.90(1)
T	-1.01	-3.70(1)	-4.70*	-3.70(1)
Taiwan (1951-1996)				
Y	-0.81	-7.26(1)	-4.21*	-7.24(1)
G	-1.10	-4.55(1)	-5.19*	-4.51(1)
T	-1.63	-4.70(1)	-5.19*	-4.68(1)
Thailand (1951-1995)				
Y	1.47	-7.07(1)	-3.46*	-7.05(1)
G	0.02	-4.73(1)	-5.59*	-4.90(1)
T	1.25	-5.58(1)	-4.57*	-5.53(1)

*5% significance

Table 2. KPSS Unit Root Tests

	Level (l=3)		1st-difference (l=3)	
	h_u	h_t	h_u	h_t
South Korea				
Y	1.17*	0.14**	0.31	0.11
G	1.17*	0.04	0.05	0.05
T	1.16*	0.10	0.04	0.04
Taiwan				
Y	1.25*	0.18*	0.21	0.17
G	1.25*	0.04	0.08	0.05
T	1.25*	0.10	0.20	0.05
Thailand				
Y	1.22*	0.12**	0.33	0.07
G	1.23*	0.08	0.05	0.05
T	1.22*	0.20*	0.27	0.05

*5%, **10%

Table 3. Cointegration Tests

South Korea Y, T, G (VAR lag = 2)

	Tr	L-max	Tr (5%)	L-max (5%)
H ₀ : r=0	48.0*	27.2*	30.0	21.0
H ₀ : r=1	21.0	20.6*	15.4	14.1
H ₀ : r=2	20.3	0.27	3.76	3.76

Estimates of cointegrating relation (asymptotic standard errors)

$$\begin{aligned} \text{lr}gdp - 1.833 \text{lr}ge + 0.742 \text{lr}gr &\sim I(0) \\ (0.23) & \quad (0.19) \end{aligned}$$

Taiwan Y, T, G (VAR lag = 2)

	Tr	L-max	Tr (5%)	L-max (5%)
H ₀ : r=0	35.4*	21.4*	30.0	21.0
H ₀ : r=1	15.2	13.5	15.4	14.1
H ₀ : r=2	0.59	0.59	3.76	3.76

Estimates of cointegrating relation (asymptotic standard errors)

$$\begin{aligned} \text{lr}gdp - 4.074 \text{lr}ge + 3.143 \text{lr}gr &\sim I(0) \\ (2.11) & \quad (1.20) \end{aligned}$$

Thailand Y, T, G (VAR lag = 2)

	Tr	L-max	Tr (5%)	L-max (5%)
H ₀ : r=0	16.7	11.3	30.0	21.0
H ₀ : r=1	5.38	3.93	15.4	14.1
H ₀ : r=2	1.46	1.46	3.76	3.76

Given the restricted test results, the trend is not incorporated for Thailand.

* 5%

Table 4. Granger Causality Tests: Multivariate ECMs for South Korea and Taiwan, VAR in differences for Thailand

South Korea

G	\Rightarrow	T
Y	\Rightarrow	G
Y	\Leftrightarrow	T

Taiwan

T	\Rightarrow	G
Y	\Leftrightarrow	G
Y	\Rightarrow	T

Thailand

Y	\Rightarrow	T
Y	\Rightarrow	G

Details about the estimates of ECM and VAR in difference are upon email request.

Table 5. Cumulative Impulse Responses after 10 years

South Korea

Response to Y			Response to G			Response to T		
Y	G	T	Y	G	T	Y	G	T
.41	-.04	.09	.47	-.01	.25	.75	.48	-.18

Taiwan

Response to Y			Response to G			Response to T		
Y	G	T	Y	G	T	Y	G	T
.25	.07	-.04	.26	.09	.08	.24	.07	.03

Thailand

Response to Y			Response to G			Response to T		
Y	G	T	Y	G	T	Y	G	T
.04	-.00	.01	.04	.00	.02	.04	.04	-.01

Table 6. Variance Decompositions after 10 years

South Korea

Var decomp of Y			Var decomp of G			Var decomp of T		
Y	G	T	Y	G	T	Y	G	T
.92	.02	.06	.57	.25	.18	.58	.07	.35

Taiwan

Var decomp of Y			Var decomp of G			Var decomp of T		
Y	G	T	Y	G	T	Y	G	T
.89	.08	.03	.42	.13	.45	.50	.05	.45

Thailand

Var decomp of Y			Var decomp of G			Var decomp of T		
Y	G	T	Y	G	T	Y	G	T
.92	.04	.04	.08	.88	.05	.65	.05	.65

Note the referee of “The Viability of Fiscal Policy in South Korea, Taiwan, and Thailand” (new title) by Tsangyao Chang and WenRong Liu (Feng Chia University) and Henry Thompson (Auburn University)

1. We considered including interest rates but decided against that for the present project as addressed in the introduction. The linkages from G to i and then to Y would be summarized by the linkage from G to Y . A study of crowding out would also have to involve investment spending, greatly complicating the model.
2. bracket added
3. real government spending as noted
4. data source on p4
5.
 - i. We attempt to motivate the use of VAR analysis better.
 - ii. normalized long run equation included
 - iii. restricted trend addressed
 - iv. ditto
 - v. The ECM results are extremely messy and difficult to summarize in any easy way. We will email the results to an interested reader.
 - vi. We spend more space discussing the direction of effects and the viability of fiscal policy.
 - vii. We make it clearer how the cointegrating vectors are used.
6. We try to be clear about the main policy implication of the paper. It is difficult to say exactly why there is no long run relation between output and fiscal policy variables in Thailand but it may be the economy’s reliance on natural resources as mentioned on p6.