Analysis of Output Fluctuations in Taiwan: An Application of the IS–MP–AS Model

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Abstract
Extending the IS–MP–AS model, this paper finds that real GDP in Taiwan is positively affected by real depreciation and stock values and negatively associated with the government deficit/GDP ratio, the U.S. federal funds rate, and the expected inflation rate. Therefore, current large and rising government deficits, recent appreciation of the New Taiwan dollar, and gradual increases in the federal funds rate would hurt real output in Taiwan. (JEL E52, E62, F41)

Introduction
This paper attempts to examine output fluctuations in Taiwan based on the extended IS–MP–AS model [Romer, 2000] and the Taylor rule [1993; 1998a; 1998b; 1999] and has several different aspects. First, the IS–MP–AS model is extended to include several additional variables such as stock prices and the exchange rate. Households are likely to increase their consumption spending when assets such as stock values go up because of the wealth effect. Business firms are expected to raise investment spending with increased stock values due to Tobin’s q theory or the balance-sheet channel [Mishkin, 1995; Kuttner and Mosser, 2002]. Second, the Taylor rule [1993; 1998a; 1998b; 1999] is extended in formulating the monetary policy reaction function so that the CBC would target the interest rate based on the inflation gap, the output gap, the exchange rate gap, and the world interest rate. Third, comparative-static analysis is employed to determine the direction and magnitude of a change in one of the variables on equilibrium output.

The paper is organized in the following manner. The evolution of Taiwan’s economy is presented in the second section. The empirical literature is surveyed in the third section. The theoretical literature is described in the fourth section. The model is presented in the fifth section. Empirical results are reported and analyzed in the sixth section. A summary and conclusions are made in the last section.

The Evolution of Taiwan’s Economy
In recent years, Taiwan’s economy experienced challenges and made progress. Its economy reached the bottom in 2001 or 2002 and then gradually climbed out of the recession. Real output declined 2.18 percent in 2001 but bounced back quickly to grow 5.71 percent in 2004. Per capita GNP decreased from US $14,188 in 2000 to US $12,798 in 2001 and then rose to $14,032 in 2004. Industrial production grew 7.4 percent in 2000, declined 7.8 percent in 2001, and then rose 9.9 percent in 2004. The unemployment rate rose from 2.99 percent in 2000 to a high of 5.17 percent in 2002 and then declined to 4.44 percent in 2004. Because unemployment went up and income declined, the growth rate

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of household consumption spending changed from 4.9 percent in 2000 to 1.0 percent in 2001 and then rose 3.13 percent in 2004. Sluggish businesses and lower expected profits reduced the growth in private domestic investment spending from 15.70 percent in 2000 to −29.2 percent in 2001, but it bounced back strongly to grow 28.2 percent in 2004. The deficiency in aggregate demand caused the inflation rate to change from 1.3 percent in 2000 to negative rates during 2001–2003 and 1.6 percent in 2004.

To increase aggregate demand and employment, the authorities launched the Expansion of Employment Plan and the Infrastructure Expansion and Economic Revitalization Program creating 104,000 jobs and 100 public projects in 2003. The authorities raised spending by NT $50 billion to deal with SARS in 2003. Challenge 2008: National Development Plan was launched to raise a total of US $21 billion from the government and the private sector in order to achieve an annual growth rate of 5 percent or higher, enhance research and development, develop a knowledge-based economy, and other goals. Due to expansionary fiscal policy, the government deficit/GNP ratio rose from 1.3 percent in 2000 to 2.5 percent in 2001 and is expected to reach 3.3 percent in 2005, the deficit/government spending ratio also rose from 14.0 percent in 2001 to a projected 20.7 percent in 2005, and the debt/GNP ratio went up from 24.0 percent in 2000 to 27.9 percent in 2001 and to a projected 34.6 percent in 2005. To deal with large deficits and debt, the authorities attempted to broaden the tax base, proposed a new minimum business income tax, raise tax rates, sell SOEs, and reduce the government size [Asian Development Outlook].

To stimulate household and business spending after September 2001, the Central Bank of China (CBC) in Taiwan lowered the discount rate and the overnight call rate by 0.25 percentage points to 2.5 percent and 2.875 percent effective October 4, 2001 and continued to reduce them to a record low of 1.375 percent and 1.75 percent in June 2003 before they were raised in September 2004. In response to inflation expectations which were higher than the target 1.7 percent and to follow the 0.25 percentage point increase in the federal funds rate in June 2005, the CBC recently raised the discount rate and the overnight call rate by 0.125 percentage points to 2.0 and 2.375 percent effective July 1, 2005 (Monetary Policy Decisions of the Board Meeting, CBC, Taiwan).

According to the Monetary and Foreign Exchange Policy (Monetary Policy Decisions of the Board Meeting, CBC, Taiwan, March 26, 2004), the exchange rate would have significant influences on economic growth and trade because Taiwan is a highly open economy with the trade/GDP ratio exceeding 100 percent. In principle, the New Taiwan (NT) dollar exchange rate is determined by market forces. However, if irregular or seasonal factors cause excessive volatility, the CBC will take appropriate measures to step in to maintain the dynamic stability of the NT dollar exchange rate. To encourage exports and compete globally, the CBC let the exchange rate depreciate 34.0 percent from a record value of 24.764 NTD/USD in June 1992 to a high of 35.0 in 2001. Recently, the NTD/USD exchange rate had declined to below 31.0 in March 2005, suggesting that the NT dollar had become stronger.

The authorities have taken measures to reform the financial institution. Privatization of SOEs has been underway with some resistance from labor unions, SOE themselves, and the parliament. The Financial Restructuring Fund of US $4 billion was created in 2001 to liquidate 44 failing community financial institutions. Tax breaks were given to asset management firms to help dispose NPLs. The Financial Institution Merger Act and the Financial Holding Company Law were passed in 2000 and 2001 to provide incentives to consolidate small financial firms. The Financial Supervisory Commission was created in July 2004 to place the oversight of banks, saving and loan associations, credit unions,