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Volume Title: Monetary Policy under Very Low Inflation in the Pacific Rim, NBER-EASE, Volume 15

Volume Author/Editor: Takatoshi Ito and Andrew K. Rose, editors

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-37897-7

Volume URL: http://www.nber.org/books/ito_06-1

Conference Date: June 25-27, 2004

Publication Date: September 2006

Title: Deflation and Monetary Policy in Taiwan

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URL: <http://www.nber.org/chapters/c10148>

Deflation and Monetary Policy in Taiwan

Ya-Hwei Yang and Jia-Dong Shea

10.1 Foreword

Ever since the Great Depression of the 1930s drew to a close, inflation has been one of the major headaches for financial and economic decision-makers. Inflation and the unemployment rate have been the two major elements that make up the misery index, while deflation has never seriously been considered a threat. However, by the end of the 1990s, Japan, China, and Hong Kong had been exhibiting a phenomenon of price decreases for many years running, and the rate of price increases in both European and American countries had also started to slow down. The issue of deflation therefore gradually drew the attention of economists and policymakers. The November 2002 issue of *The Economist* even went so far as to suggest that deflation had become a serious threat to the global economy.

In Taiwan the gross domestic product (GDP) deflator decreased in four out of five years from 1999 to 2003, with the exception being 2001. The Consumer Price Index (CPI) also declined in each of the years from 2001 to 2003. Rogoff, chief economist of the International Monetary Fund, published a research report in April 2003 in which Taiwan, together with Japan, Hong Kong, and Germany, was ranked as a high-risk country for

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The authors thank Takatoshi Ito, Andrew Rose, Toshiki Jinushi, Shigeroni Shiratsuka, the seminar participants at the "Monetary Policy with Very Low Inflation in the Pacific Rim, East Asia Seminar on Economics Volume 15," and the anonymous referee of the University of Chicago Press for their helpful comments on an earlier version of this paper. Any errors and omissions in the paper are the authors' responsibility.

The early version of this paper has been published as NBER Working Paper No. 11244, March 2005.

deflation. The core CPI, published by the Directorate-General of Budget, Accounting, and Statistics of the Executive Yuan in Taiwan, exhibited a negative growth rate in each quarter in 2003. These findings have made deflation a cause for concern among both scholars and the media. Although the Central Bank of China in Taiwan has never admitted that Taiwan is suffering from a deflation problem, it has tried very hard to promote domestic economic activity and avoid price decreases.

Several international research institutions have engaged in research on deflation; see, for instance Ahearne et al. (2002) and Rogoff (2003). The Bank of Japan (2001) also convened a symposium on the issue—*The Role of Monetary Policy under Low Inflation: Deflation Shocks and Policy Responses*—in 2000, where participating scholars emphasized the importance of monetary policy in guarding against and dealing with deflation.¹

In Taiwan, however, there have been no government reports on the domestic deflation issue, probably for the reason that the government has denied that the problem exists. Similarly, very few studies have been performed by domestic scholars. Research reports compiled by the Department of Economic Research of the Central Bank of China (2002) and the Council for Economic Planning and Development of the Executive Yuan (2003) have merely tried to explain the causes of and responsive strategies to deflation in the light of other countries' experiences. Wu (2003), for instance, not only analyzed the reasons why the global price growth had slowed since 1997, but he also discussed the causes of low prices in Taiwan. Huang (2003) probed long-, medium-, and short-term causes that led to the price decreases in Taiwan and provided policy recommendations. However, although Wu and Huang talked about the causes of Taiwan's deflation, they simply presented narrative explanations or arguments, without engaging in any in-depth or detailed analysis.

In the early part of 2004, Taiwan's CPI reversed its downward trend and started to rise. Although the problem of deflation in Taiwan disappears gradually, there are several questions that are worth looking into. How serious has the deflation problem in Taiwan really been in the last few years? What are the fundamental reasons for the deflation? How has the Central

1. The theme of the seminar held by the Bank of Japan (2001) was *Monetary Policy under a Low Inflation Rate*, in which participants mostly emphasized the importance of monetary policy during a period of deflation. For example, Cargill thought that central banks generally focused more on policies to control the monetary environment during periods of inflation, while neglecting the seriousness of the problem of deflation, and therefore seldom utilizing monetary-policy tools to prevent the deflation phenomenon. This is considered to be one of the main reasons for the Great Depression of the 1930s. Cargill thought that Sweden differed from the United States in that it laid emphasis on the price level, paying close attention to deflation. As for Japan, he offered the same suggestion, calling for an emphasis on the importance of monetary policy during a period of deflation. Goodfriend also thought that monetary policy was the fundamental reason for deflation and economic stagnation.

Bank in Taiwan responded to deflation? How effective have the Central Bank's policies been? This chapter aims to answer these questions.

Since deflation is usually accompanied by a recession, section 10.2 of this chapter briefly introduces the changes in the political and economic environment in Taiwan that have taken place in recent years, thereby providing the background for Taiwan's unsatisfactory economic performance since 1999. Section 10.3 explains two phenomena associated with macro-price changes. One is deflation and the other is price divergence. Price divergence refers to the phenomenon that the three macro-price indexes—i.e., the CPI, wholesale price index (WPI), and GDP deflator (PGDP)—have been moving in different directions. In section 10.4, major global factors that have affected Taiwan's prices are emphasized. Section 10.5 probes the key factors causing Taiwan's PGDP to drop since 1999. The sources of the WPI-CPI divergence are also identified. Section 10.6 explains how Taiwan's Central Bank operates its monetary and exchange rate policies, and then discusses its policy responses to deflation, while also carefully reviewing their effectiveness. The final section presents the conclusions.

10.2 The Political and Economic Environment in Recent Years

Taiwan's economic growth used to be regarded by foreign scholars and decisionmakers as a "miracle" or taken as a "model" for developing countries to study or follow. Due to its sound economic fundamentals, quick policy responses, and other reasons as mentioned in Shea and Shih (1999), Taiwan was also relatively immune from the attack of the East Asian financial crisis in 1997–1998, performing better in terms of its economic growth rate, unemployment rate, currency depreciation, and falling stock prices than its East Asian neighbors.

As table 10.1 shows, however, Taiwan's economic performance since 1999 has never returned to the illustrious growth of the past three to four decades. The economic growth rate has yet to again exceed 6 percent, and its first negative growth rate of -2.18 percent in Taiwan's post-war history was recorded in 2001. The unemployment rate has also climbed steadily and remained at a level of around 5 percent in 2003. Although the stock price index and the total stock trading volume recovered a little in 2000, they have both decreased in other years. The New Taiwan dollar (hereafter the NT dollar) has also remained weak relative to the U.S. dollar during this period.

There have been several factors that have served to bring about Taiwan's unsatisfactory economic performance since 1999. The poor performance in 2001 can be partly explained by a gloomy world economy caused by the bursting of the Internet and IT bubbles in late 2000 and the 9/11 terrorist attacks in 2001. The SARS epidemic also hampered Taiwan's economic

Table 10.1 Key economic indicators

	Economic growth rate (%)	Changes in price indexes (%)			Unemployment rate (%)	Stock price index (1966 = 100)	Total trading volume in stock market (trillion NTS)
		GDP deflator	WPI	CPI			
1991-1995 average	7.12	2.94	1.71	3.76	1.56	5,043	10,724
1996	6.10	3.11	-1.01	3.08	2.60	6,004	12,908
1997	6.68	1.68	-0.45	0.89	2.72	8,411	37,241
1998	4.57	2.64	0.60	1.69	2.69	7,738	29,619
1999	5.42	-1.42	-4.55	0.17	2.92	7,427	29,292
2000	5.86	-1.73	1.82	1.26	2.99	7,847	30,527
2001	-2.18	0.57	-1.34	-0.01	4.57	4,907	18,355
2002	3.59	-1.01	0.05	-0.20	5.17	5,226	21,874
2003	3.31	-2.13	2.48	-0.28	4.99	5,254	20,333

	Exchange rate at year-end (NT\$/US\$)	ROA of domestic banks (%)	ROE of domestic banks (%)	Nonperforming loan ratio of financial institutions at year-end (%)		Growth rate of private enterprises investment (%)	Direct investment abroad (million US\$)	Tax burden (tax and monopoly revenue/ GNP) (%)	Outstanding central government debt as a % of GNP
				ROA of domestic banks (%)	ROE of domestic banks (%)				
1991-1995 average	27.265 ^a	0.71 ^a	11.87 ^a	3.00 ^a	14.28	2,451	18.0 ^a	12.36 ^a	
1996	27.491	0.73	11.36	4.15	3.44	3,843	16.1	16.5	
1997	32.638	0.85	12.23	4.18	18.61	5,243	15.7	17.2	
1998	32.216	0.71	9.29	4.93	11.88	3,836	16.0	15.8	
1999	31.395	0.54	6.91	5.67	-0.68	4,420	14.7	14.5	
2000	32.992	0.47	6.05	6.20	15.76	6,701	13.2	25.3	
2001	34.999	0.26	3.61	8.16	-29.29	5,480	13.0	28.9	
2002	34.753	-0.47	-7.35	6.84	2.50	4,886	12.3	29.0	
2003	33.978	0.21	3.50	5.00	-1.47	5,679	12.2	31.3	

Sources: Various data from the Directorate-General of Budget, Accounting and Statistics (DGBAS), Council for Economic Planning and Development (CEPD), Ministry of Finance (MOF), and the Central Bank of China (CBC).

^aFigure for 1995.

growth in 2003. In addition to these three well-known factors, the deterioration in Taiwan's political and economic environment also is a fundamental reason.

Since the early 1990s, the ruling power in Taiwan has gradually shifted from those who migrated from mainland China to Taiwan in the late 1940s together with the KMT (Kuomintang) government, over to the so-called "native Taiwanese." During the process of this power transition, an ongoing confrontation between the two camps has never been resolved. Although a significant proportion of the people in Taiwan would like to maintain Taiwan's status quo, there is a major division among the people on the issue of whether Taiwan should pursue independence from China or be unified with China at some point in the future. Constant friction between the two camps and disputes between them in major elections, which Taiwan has held almost annually in recent years, have caused Taiwan to degenerate into a society that lacks any consensus or harmony. The switch in the ruling party from the KMT to the DPP (Democratic Progressive Party) for the first time in 2000 only further complicated the situation. KMT and DPP legislators have since then fought tooth and nail almost irrationally on any issue in the Legislative Yuan (the law-making body in Taiwan). The result is a semiparalyzed government without much determination or executive power. This phenomenon of political unrest is certainly a negative factor in relation to private investment.

The rise of China's economy has also affected Taiwan's own economy in many ways. China's cheap labor and land have provided Taiwan's fading labor-intensive industries with an opportunity to revitalize. A big China market has also been attractive to capital- and technology-intensive product manufacturers. Therefore, huge numbers of business people flooded into China to invest in the 1990s. This massive investment in China gave rise to concerns over whether Taiwan's economy would be "hollowed out." This hollowing-out concern plus the bad feeling regarding China on its political stance of constantly repressing Taiwan in international affairs finally led former President Teng-Hui Lee to adopt a "no hurry, be patient" policy to guide economic relations with China. However, due to the huge potential profits from investing in China and the advantage of sharing the same language and culture enjoyed by Taiwan businessmen in competing with investors from other countries, this "no hurry, be patient" policy did not effectively counter the huge flow of westward-bound investment from Taiwan to China.

After the opposition DPP candidate won the presidential election in 2000, the DPP's stance of leaning toward Taiwan's independence from China enhanced China's hostility toward Taiwan. No official dialogue between the two sides of the Taiwan Strait has ever been resumed. China has even strengthened its threat of military reprisals against Taiwan. A large number of the DPP's loyal supporters also oppose any closer economic ties

with China. Tension with China of this sort has not only nearly put an end to the potential role that Taiwan can play as a medium or bridge for foreign investors entering the China market, but it has also discouraged private and direct foreign investment in Taiwan.

The financial sector in Taiwan has also encountered a number of problems. Allowing new private banks to be set up in 1991 suddenly increased the number of domestic commercial banks from seventeen in 1991 to thirty-three in 1993. Some credit cooperatives and investment and trust companies were also allowed to be converted into commercial banks in subsequent years. Therefore, the total number of domestic banks, including commercial banks and medium-business banks, increased from twenty-five in 1991 to forty-one in 1993 and to fifty-two in 1999—more than double the original number. The resulting fierce competition among banks led to credit expansion and prosperous stock and real estate markets in the mid-1990s.

In the years that followed, although Taiwan remained relatively insulated from the East Asian financial crisis, the contagion effects of the crisis still caused Taiwan's stock and real estate prices to fall and the nonperforming loans ratio of its financial institutions to rise in 1998. Furthermore, between the end of 1998 and early-1999, several listed companies and business groups, which had been found guilty of misconduct in fund management (e.g., engaging in cross-investments in the stocks of their group members, being highly leveraged, borrowing short to invest long, being involved in stock-price supporting activities, or overinvesting in the slackening housing industry), sank into heavy financial troubles. These so-called "land-mine" companies or business groups not only adversely affected the financial condition of the domestic banks, but also accelerated the downturn in stock prices.

Fierce competition among banks together with the accidents caused by these "land-mine" companies steadily lowered the return on assets (ROA) and the return on equity (ROE) of domestic banks, and raised the nonperforming loans ratios of financial institutions during the 1998–2002 period, as table 10.1 indicates. The willingness and ability of financial institutions to grant loans to the business sector therefore shrank during this same period.

All of the above-mentioned factors, including political unrest, tensions with China, out-bound investments attracted by China, and a weakened financial sector, had a detrimental impact on private and foreign investment in Taiwan. As shown in table 10.1, the growth of fixed investment on the part of private enterprises slowed down or even turned negative, while direct investment abroad grew significantly after 1999.

When faced with deflationary pressure, the government is usually expected to adopt an expansionary fiscal policy to stimulate the economy. Unfortunately, Taiwan's government has been constrained by its deteriorating financial condition, such that it has not been able to afford to expand

Table 10.2 Contribution to the economic growth rate of expenditure items^a (%)

Year	Economic growth rate	Domestic demand					Net exports
		Subtotal	Private consumption	Public expenditure ^b	Private sector fixed investment	Increase in inventory	
1996	6.10	5.58 (91.48)	3.85	0.87	0.46	0.40	0.52 (8.52)
1997	6.68	8.43 (126.20)	4.30	0.75	2.48	0.90	-1.75 (-26.20)
1998	4.57	6.38 (139.61)	3.88	0.70	1.75	0.05	-1.81 (-39.61)
1999	5.42	1.87 (34.50)	3.25	-0.38	-0.11	-0.89	3.55 (65.50)
2000	5.86	3.89 (66.40)	2.98	-0.28	2.36	-1.17	1.97 (33.60)
2001	-2.18	-4.93 (272.02)	0.62	-0.26	-4.78	-0.51	2.75 (-126.15)
2002	3.59	0.96 (26.74)	1.23	-0.73	0.30	0.16	2.63 (73.26)
2003	3.31	0.36 (10.88)	0.42	-0.07	-0.17	0.18	2.95 (89.12)

Source: DGBAS.

Note: Figures in parentheses are contribution shares to the economic growth rate of that specific year.

^aCalculated by real growth rate of expenditure item x share in GDP of previous year.

^bPublic expenditure includes government consumption, government investment, and public-enterprise investment.

public expenditure. Under China's threat of military action, Taiwan has had no room to cut its national defense expenditure. Moreover, political parties have been competing for votes by writing checks for welfare programs, cutting tax rates, and by providing tax holidays or tax exemptions to please the voters. As a result, the tax burden in Taiwan, as table 10.1 shows, has fallen year after year to reach a level of 12.2 percent in 2003, one of the lowest in the world. Outstanding central government debts as a percentage of gross national product (GNP) have also been increasing very rapidly from 14.5 percent in 1999 to 31.3 percent in 2003.

Due to such financial constraints, Taiwan's public expenditure (including government consumption, government investment, and public-enterprise investment) in fact fell during 1999–2003, bringing a negative contribution to economic growth in this period, as table 10.2 shows. We can also see from this table that the private sector's fixed investment in addition contributed little or even negatively to economic growth, except in the year 2000. Another conclusion we can draw from table 10.2 is that the major driving force behind economic growth on the expenditure side during the period 1999–2003 was net exports instead of domestic demand.

10.3 Macro-price Changes in Taiwan

10.3.1 Deflation as a New but Short-term Concern

In April 2003 Taiwan was listed by the International Monetary Fund (IMF) as a country that faced a high risk of deflation, along with Japan, Hong Kong, and Germany. The IMF calculated the deflation risk index for thirty-five countries, and classified the results into four categories as high-, medium-, low-, and very low-risk countries. Among the countries categorized as being high-risk, Japan scored the highest, followed by Hong Kong, Taiwan, and Germany.²

Figure 10.1 depicts the inflation rate of Taiwan's GDP deflator (hereafter PGDP) from 1961 to 2003. Except for 1965 when its value was slightly negative (−0.61 percent), the PGDP annual changes before 1998 were positive. During this period, the annual inflation rate measured by PGDP seldom exceeded 5 percent, except for the two oil crisis years. However, there has been an obvious change since 1999. That is, PGDP inflation turned negative in most of the subsequent years. The annual PGDP change was −1.42 percent in 1999, −1.73 percent in 2000, 0.57 percent in 2001, −1.01 percent in 2002, and −2.13 percent in 2003. The CPI also exhibited a negative inflation rate for three consecutive years in 2001–2003, as shown in table 10.1. The IMF and scholars in Taiwan thus became worried that Taiwan might have started to experience deflation.³

Since 2003, however, the global as well as domestic economic situation has improved. Starting with the second half of 2003, the global prices of raw materials like steel, cement, petroleum, coal, wheat, soybeans, butter, and paper pulp have been surging. During the first quarter of 2004, the CPI in Taiwan increased by 0.51 percent as compared with the same quarter in 2003. During that same time, the core CPI rose by 0.12 percent and the WPI increased by 2.37 percent. The government and various research institutions in Taiwan have each forecasted that both the CPI and WPI will exhibit positive growth rates in 2004. Taiwan's period of deflation is therefore generally believed to be over.

10.3.2 Divergence of PGDP, CPI, and WPI

In recent years, the macro-price indexes in Taiwan have exhibited a divergence, with the PGDP, CPI, and WPI moving in different directions. As figure 10.2 indicates, from 1999 to 2000 the PGDP declined, but the WPI and CPI rose slightly. In addition, from 2002 to 2003 both the PGDP and CPI declined, leading to a concern about deflation. The WPI, however, rose—an obvious price divergence. When there is price divergence, which

2. See Kumar (2003) and Rogoff (2003).

3. Deflation is defined as a phenomenon where general price levels continue to drop. To facilitate the analysis, the IMF defines deflation as occurring when annual price growth is negative for two consecutive years. Please see IMF (1999, 106).

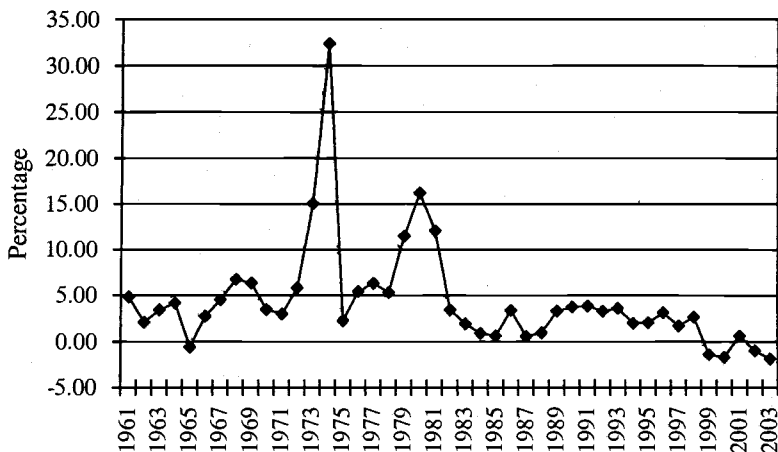


Fig. 10.1 Growth rate of PGDP

Source: DGBAS.

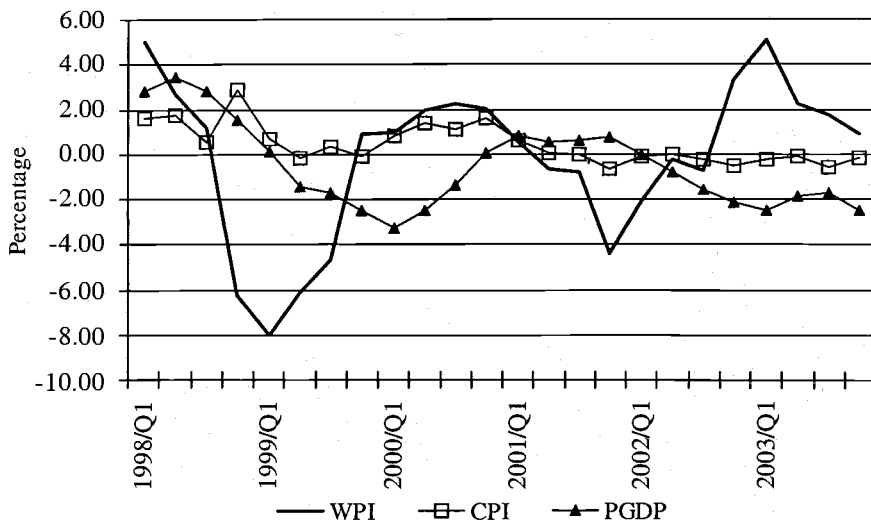


Fig. 10.2 Inflation rates of WPI, CPI, PGDP

Source: Price Statistics Monthly, DGBAS.

price index is a proper indicator for inflation or deflation becomes an issue. This paper chooses PGDP as the indicator in the discussion on deflation.

In fact, divergence of price indexes happens all the time in Taiwan. As can be seen from table 10.3 and figure 10.3, ever since 1982 price divergence has occurred many times. For example, from 1986 to 1992, the CPI and PGDP went up, while the WPI went down.

Table 10.3 Moving directions of WPI, CPI, and PGDP (1982 to 2003)

Year	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
WPI	-	-	+	-	-	-	-	-	-	+	-	+	+	+	-	-	+	-	+	-	+	+
CPI	+	+	-	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-
PGDP	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	-
Divergence	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

Notes: From 1982 to 2003, only five years have experienced a simultaneous movement in the same direction for three price indexes. + indicates positive growth; - indicates negative growth. Yes indicates a simultaneous movement in the same direction for the three price indexes; No indicates no such comovement.

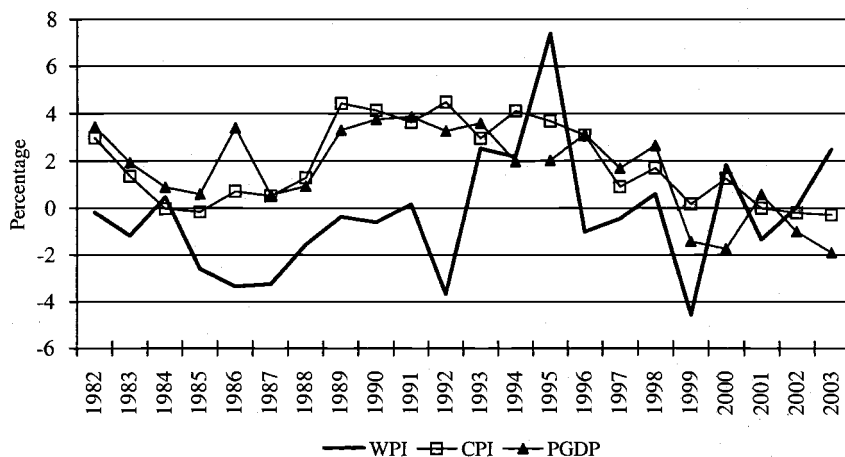


Fig. 10.3 Inflation rate of WPI, CPI and PGDP (annual)

Source: Price Statistics Monthly, DGBAS.

10.4 Global Factors Affecting Taiwan Prices

The deterioration in Taiwan's political and economic environment, as mentioned in section 10.2, has not only brought about an unsatisfactory performance in terms of economic growth in Taiwan, but also has formed deflationary pressure on Taiwan's macro prices. In addition, there have been several global factors affecting Taiwan's macroeconomy and prices.

Taiwan is a highly open economy. Ever since the 1970s, the ratios of exports and imports to GDP have almost always remained above 40 percent, sometimes even exceeding 50 percent. The macroeconomy of Taiwan has thus been deeply affected by the global economic situation and prices. For example, during the periods of the two oil crises, Taiwan encountered the problem of so-called "imported inflation." Macro-price changes in Taiwan in recent years have not only been caused by domestic factors, but have also been closely related to major factors that have affected global prices, especially the bursting of the internet bubble in 2000 and the rise of China's economy.

Excessively optimistic expectations on the future of the internet, communications, and the IT industries resulted in overinvestment and caused stock prices to soar globally in the late-1990s. After the economic bubble burst at the end of 2000, the huge excess capacities of these industries led to their prices dropping. The bursting of the bubble also caused stock prices to sink and wealth to shrink. Furthermore, the global economic situation worsened and unemployment rose. All of these factors caused world consumption to fall. In addition, excess capacity contributed to a pessimistic outlook, such that willingness to invest decreased. Therefore, the bursting

of the Internet and IT bubbles brought about a weakening in world consumption and investment, which further caused global prices to fall.

As an economy highly dependent on exports, especially the exports of products from IT and IT-related industries, Taiwan suffered heavily from the bursting of the IT bubble. Taiwan's total exports dropped by 17.16 percent in 2001, which was also one of the major factors causing a negative economic growth rate of -2.18 percent in that year for Taiwan.

Ever since China accelerated its transition from a controlled economy to a market economy in 1992 and reinforced its trade and investment relations with the rest of the world, it has had a significant impact on the global economy. The rise of China's economy has affected global and Taiwanese prices in several ways.

China has a huge pool of cheap labor. Labor-intensive products produced in China and exported to the world market have forced the global prices of those products, mostly final consumer goods, to fall. On the other hand, the rise of China has caused the prices of China's major imports, mostly raw materials, agricultural products, and capital- or technology-intensive goods (regarding which, China has a comparative disadvantage) to rise. China's rapid economic development has also raised the purchasing power and hence private consumption of the Chinese people, which has further increased the demand for and the global prices of raw materials and agricultural products. To prepare for the 2008 Olympic Games in Beijing and the 2010 Shanghai World Exposition, China has begun large-scale public-construction projects, which have given rise to even higher increases in the global prices of raw materials such as minerals, cement, and petroleum.⁴

In sum, due to the rise of China's economy, the global prices of its exports (most are manufactured as final consumer goods) have been decreasing, while the prices of its imports (mainly upstream raw materials, agricultural products, and machinery and equipment) have been rising. The prices of related products in Taiwan are naturally affected.

As table 10.4 indicates, export prices and import prices in Taiwan had been moving in different directions each year in 2000–2003. The general index of export prices, together with its major component—the export prices of industrial goods—had been decreasing almost steadily except for in

4. China consumed approximately 50 percent of the world's cement, 36 percent of its steel products, and 30 percent of its coal in 2003. In 2003, China's demand for steel products amounted to about 38 million tons. In the first quarter of 2004, China imported 10.08 million tons of steel products worth U.S.\$5.72 billion. The quantity of steel products imported increased by 17.5 percent compared with the first quarter of 2003, with the total value going up by 28.4 percent. In 2003, China imported 91.12 million tons of crude oil (representing annual growth of 30 percent). In the first quarter of 2004, China imported 30.14 million tons of crude oil worth U.S.\$7.15 billion. The volume of crude oil imports increased by 35.7 percent compared with the first quarter of 2003 and its total value increased by 41.2 percent. This shows that unit prices for steel products and crude oil have surged.

Table 10.4 Changes of export and import price indexes in Taiwan (%)

Year	Export price indexes				Import price indexes			
	Components				Components			
	General index	Agricultural goods	Processed		General index	Raw materials	Capital goods	Consumer goods
			agricultural goods	Industrial goods				
1998	5.57	40.41	9.24	5.53	0.74	-1.81	6.55	11.21
1999	-8.53	4.93	10.50	-8.93	-4.10	-4.75	-3.72	-0.92
2000	-0.88	-51.18	-18.11	-0.34	4.63	7.15	-4.53	-0.15
2001	0.32	-6.31	-10.14	0.53	-1.25	-2.21	0.15	2.85
2002	-1.49	16.22	1.11	-1.55	0.40	0.88	-1.58	-0.45
2003	-1.49	10.10	4.45	-1.62	5.14	7.00	-0.25	1.35

Source: Price Statistics Monthly, DGBAS.

2001. On the other hand, the general index of import prices, especially the import prices of raw materials, which account for 70.0 percent of the general import price index in weighting, had been rising, with an exception in 2001. These changes in export and import prices were consistent with the impacts of the bursting of the Internet and IT bubbles and the rise of China's economy on the world prices.

10.5 Causes of Deflation and Price Divergence

10.5.1 Analysis of PGDP Deflation

The GDP deflator (PGDP) measures the price of final domestic products. In order to explain the change of PGDP, we need a theoretical model as the base. According to the aggregate-demand and aggregate-supply (AD-AS) model, any factor that may cause the AD curve to move to the right (left) will lead PGDP to go up (down); while it may cause the AS curve to shift to the right (left), leading PGDP to go down (up).

We can set up the AD equation as the following:

$$(1) \quad Y = \overset{-}{AD}(\overset{+}{PGDP}; \overset{+}{GEXP}, \overset{+}{MS}, \overset{+}{Pf}, \overset{+}{Yf}, \overset{+}{EXR}, \overset{-}{Z} \dots).$$

In this AD equation, Y is real GDP; $GEXP$ is government real expenditures, including government consumption expenditures, government investment, and public enterprise investment; MS is money-supply volume; Pf and Yf represent foreign export prices and the global economic situation, respectively; and EXR is the exchange rate measuring the value of the U.S. dollar in terms of the NT dollar. Z represents unquantifiable qualitative factors, including political unrest, tensions with China, and a weak-

ened financial sector. On the right-hand side of the equation, a positive or negative symbol above each explanatory variable represents the direction of impact of that variable on Y .

A general equation of aggregate-supply (AS) can be presented as follows:

$$(2) \quad Y = AS(\overset{+}{PGDP}; \overset{-}{W}, \overset{+}{K}, \overset{+}{T}).$$

In this equation, W is the nominal wage rate; K is the capital stock; and T is the technology level. Because it is difficult to measure the capital stock K and technology level T , and because W , K , and T may jointly affect aggregate supply through unit output labor cost LC , the AS function can be rewritten as

$$(3) \quad Y = AS^*(\overset{+}{PGDP}; \overset{-}{LC}).^5$$

From equations (1) and (3), the PGDP equation can be derived as

$$(4) \quad PGDP = f(\overset{+}{GEXP}, \overset{+}{MS}, \overset{+}{EXR}, \overset{+}{Pf}, \overset{+}{Yf}, \overset{-}{LC}, \overset{-}{Z} \dots).$$

Because increases in the first five explanatory variables on the right-hand side all cause the AD curve to shift to the right, and a rise in LC causes the AS curve to shift to the left, thus all six explanatory variables have a positive impact on PGDP.⁶ However, Z has negative influence on PGDP.

Since the first six variables are measurable, we can look at their trends to help identify the sources of PGDP deflation in Taiwan. Since 1999, PGDP has been declining, except in 2001. This phenomenon of a declining PGDP has been caused by several factors. Figure 10.4 shows the changes in four explanatory variables ($GEXP$, LC , EXR , and Pf) which have contributed to PGDP deflation. As explained in section 10.2, mainly due to a finance constraint, government expenditures ($GEXP$) decreased during this period. Furthermore, improvements in production technology caused unit output labor costs (LC) to go down, except in 2001. The bursting of the Internet and IT bubbles and the rise of China's economy also depressed world export prices (Pf) before 2003. Furthermore, the NT dollar appreciated relative to the U.S. dollar in 1999 and 2000. All of these factors contributed to PGDP's decline.

5. In theory, it is not difficult to infer that the impact of the wage rate W on unit output labor cost LC is positive, and the impact of the capital stock K and the technology level T on LC is negative. Furthermore, because LC affects aggregate supply negatively, equation 3 implies that the impact of W on Y is negative, and the impact of K and T on Y is positive, which is consistent with equation 2.

6. We have tried to apply the Two-Stage Least Squares (2SLS) technique to estimate this equation. The empirical results support our theoretical model.

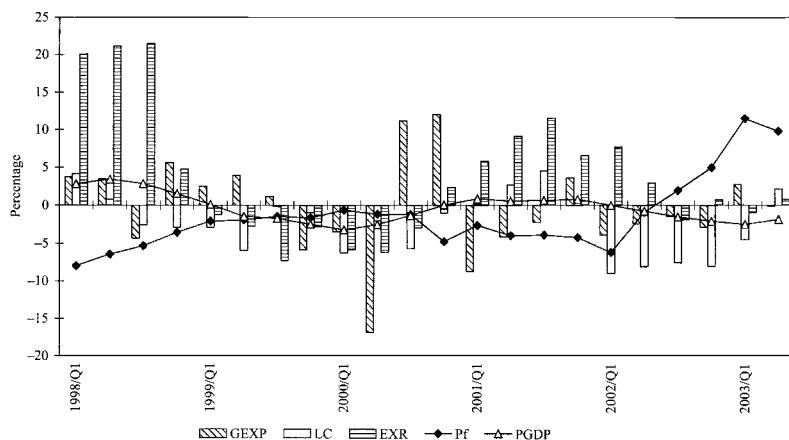


Fig. 10.4 Changes in PGDP and its determinants (annual growth rate)

Source: DGBAS.

10.5.2 Causes of WPI-CPI Divergence

This subsection intends to explain the possible factors that caused a divergence between the WPI and CPI during the period extending from the fourth quarter of 2002 to the third quarter of 2003. During this period, the CPI slowly declined, while the WPI rose.

What the WPI measures is factory prices or wholesale prices of three categories of products: domestically-produced and domestically-sold (DPDS) products, imported goods, and exported goods. It is a weighted average of the above three categories of price indexes. Let WPI_d, PM, and PX represent the price index of DPDS products, the import price index, and the export price index, respectively. These three components enjoy roughly equal weights in the current calculation of the WPI in Taiwan.

As figure 10.5 shows, the WPI_d in Taiwan fell during 1998 and 1999, began to rise slightly in 2000, and followed up with a further slight decline in 2001. Since then, the WPI_d has been rising. The reason why the WPI_d fell in 2001 was the recession in Taiwan. A lack of effective domestic demand caused the WPI_d to slide. Since 2003, the economy has slightly recovered. Domestic demand and the WPI_d are therefore rising.

In the case of import prices (PM), because agricultural products and industrial raw materials constitute the largest portion of Taiwan's imports, followed by capital goods and consumer goods, PM is mainly affected by the global prices of agricultural products and industrial raw materials as well as capital goods. It is also influenced by the global prices of consumer goods, the NT-dollar exchange rate, and customs duties. Since the 1980s, the effective customs-duty rate has decreased, resulting in decreasing import prices. Since 2001, however, the NT dollar has depreciated, pushing

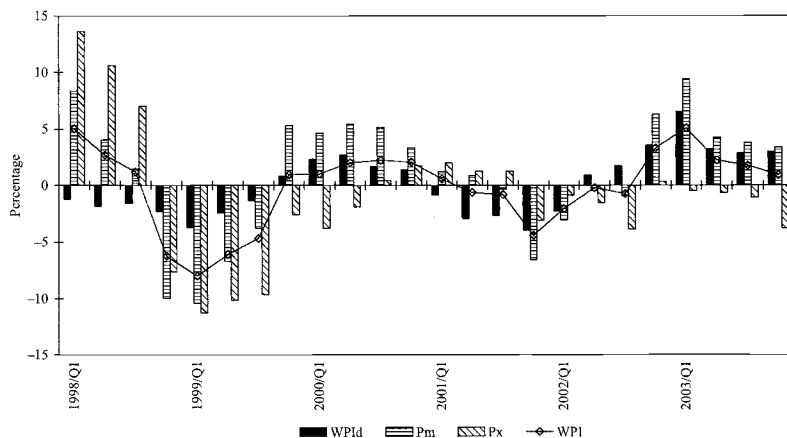


Fig. 10.5 Change in WPI and its component (annual growth rate)

Source: *Price Statistics Monthly*, DGBAS.

up import prices. Strong Chinese demand for raw materials and capital goods has caused the global prices of that category of goods to soar, thus raising Taiwan's import prices and hence the WPI since the fourth quarter of 2002.

As for export prices (PX), Taiwan's exports are mainly composed of industrial products, the bulk of which are information industry and electrical machinery or electronics products. The former has been affected by the bursting of the Internet bubble, and the latter by competition from China's exports in recent years. The PX has thus dropped since the second half of 2002.

Figure 10.5 summarizes the trend in the WPI and its components since 1998. During the period from the fourth quarter of 2002 to the third quarter of 2003, the WPI rose. Among its components, the wholesale price index for DPDS products (WPI d) rose as well as the import price index (PM), while the export price index (PX) declined. Therefore, it is evident that the rise in the WPI was mainly caused by a rise in the prices of DPDS products and imported goods.

CPI trends have differed from those of the WPI. From the fourth quarter of 2002 to the third quarter of 2003, the WPI surged, while the CPI fell. The CPI measures the retail prices of consumer goods and services. Consumer goods can be further divided into local consumer goods and imported consumer goods.⁷ In other words, CPI measures the price of local consumer goods, imported consumer goods, and service sectors. A fall in the price of services (P_s) accounts for a large portion of a decline in CPI.

7. Since there is no other better proxy, we adopt PGDP as the proxy measure of the prices of local consumer goods. We have tried some regression of CPI on PGDP, PM_c , and P_s , and obtained satisfactory results.

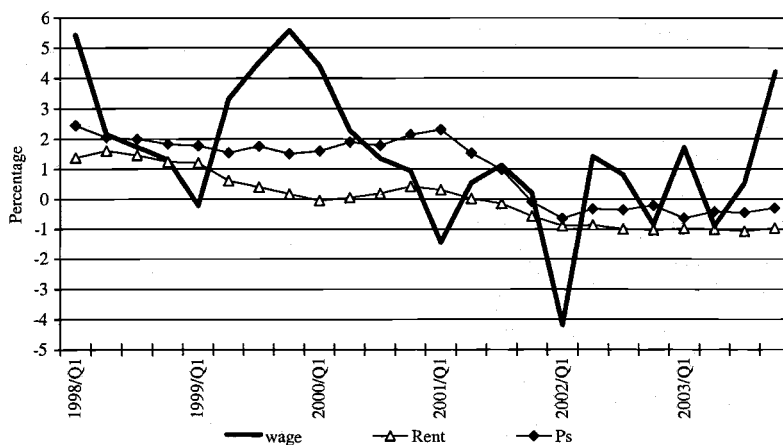


Fig. 10.6 Changes in P_s and its components (annual growth rate)

Source: Statistical Database, DGBAS.

Note: Rent is housing rentals. Wage is per capita average salary of employees each month.

Because the fall in the price of services (P_s) is a major factor causing the CPI to drop, we study the reasons for the decrease in P_s . The production costs and prices of services are mainly determined by the wage (W), rent (R), and the interest rate (r). Figure 10.6 indicates that P_s moves closely with rent R and the interest rate r . The wage has also been relatively stable since 2001.

Falling rents were mainly caused by factors such as weak domestic demand, the outward migration of companies and white-collar laborers, and an oversupply of houses and office buildings. The decline in the interest rate was due to the central banks of many countries adopting a low-interest-rate policy to stimulate their economies during this period, a path that Taiwan also followed. Stable wages were the result of competition from Chinese labor and an increase in domestic unemployment.

10.6 The Central Bank's Policy Responses to Deflation

Although the Central Bank in Taiwan (formally the Central Bank of China, hereafter the CBC) has never admitted that Taiwan has encountered the problem of deflation, the CBC implemented some measures to stimulate aggregate demand for Taiwan's products, in order to promote economic growth as well as to counter the problem of deflation.⁸ The deterioration in the government's financial situation as explained in section

8. When deflation became a public concern in Taiwan in 2002 and 2003, the CBC several times tried to downplay the issue by pointing out either that the core CPI was still rising or that the falling CPI was just a temporary phenomenon.

10.2 restricted the government's ability to adopt an expansionary fiscal policy to promote the economy. The CBC's monetary and exchange rate policies therefore became the major policy instruments for the government to rely on.

10.6.1 The Formation of Monetary Policy

According to the Central Bank Act, the CBC has the obligation to maintain price as well as exchange rate stability and to assist in economic development. To achieve these final goals, the CBC chooses monetary-aggregate targeting as the basic framework of its monetary policy, instead of inflation, exchange-rate, or interest-rate targeting. Since 1992, the monetary aggregate M2 has been chosen as the intermediate target of monetary policy to achieve the final goals.

Before the end of each year, the CBC (often after having consulted with scholars and experts) sets and publicly announces the target zone of the M2 growth rate for the subsequent year based on the government's target figures of the economic growth rate and inflation rate, as well as other factors influencing the demand for money, such as the opportunity cost of holding money and the diversification of financial assets. Using a zone, rather than a specific number, as the M2 growth target, the CBC is endowed with the flexibility to maintain the stability of interest rates, the exchange rate, and other major financial indicators throughout the year.

The actual M2 growth rate is very carefully observed each month by the CBC. In order to effectively control M2, the CBC adopts reserve money as the operational target. At the beginning of each month, the CBC has a monetary estimation and forecasting meeting to determine the target value of reserve money for that month. A reference target for the inter-bank overnight call-loan rate is also derived in the meeting. The CBC then applies a variety of operational instruments, including required reserves, discounts and accommodations, open market operations, re-deposits from financial institutions, selective credit management, and moral suasion, to fine-tune the daily figures of reserve money and the inter-bank overnight call-loan rate.

Since monetary-aggregate targeting is generally regarded as outdated, the CBC occasionally has faced challenges from scholars who strongly suggest to replace monetary-aggregate targeting with interest-rate targeting or inflation targeting. By adopting a target zone for M2 growth and setting a reference target for the inter-bank overnight call-loan rate in its operations, the CBC in fact has implicitly incorporated interest-rate targeting in its framework of monetary policy.

Among CBC's operational instruments, open market operations are the most frequently-used instruments. Re-deposits from financial instruments, selective credit management, and adjusting the discount and accommodation rates are sometimes adopted. The required-reserve ratios are adjusted

only occasionally for special cases as a strong monetary-policy measure. For open market operations, before 1992 the CBC relied on the issuance of savings bonds, treasury bills, and certificates of deposit (CDs) as tools to manage the liquidity situation in the financial market. However, the issuance of savings bonds and treasury bills was terminated in 1992 and 1998, respectively. In recent years, the CBC has either issued or redeemed CDs almost every day to affect the liquidity and inter-bank overnight call-loan rate. Since 1999, the CBC has depended heavily on the issuance of CDs and on receiving re-deposits from financial institutions in order to sterilize the impact of the accumulation of foreign exchange reserves on reserve money, such that the CBC's outstanding CDs and re-deposits from financial institutions have increased very rapidly. As of the end of 2003, the outstanding CDs even reached NT\$2.99 trillion, equivalent to 185 percent of total reserve money, and re-deposits from financial institutions amounted to NT\$2.06 trillion, or 127 percent of reserve money.⁹

10.6.2 Exchange Rate Policy

The authorities in Taiwan shifted from a fixed exchange rate system to a floating exchange rate system in July 1978. The purpose behind introducing a floating exchange rate was to make Taiwan's economy less vulnerable to external disturbances. However, in a highly open economy like Taiwan, the exchange rate is a key factor affecting its trade balance, economic growth, and domestic price level. The exchange rate is therefore frequently regarded as an important policy instrument to promote economic growth or stabilize prices. According to the Central Bank Act, the CBC also has the obligation to stabilize the external value of the NT dollar, as in the exchange rate. Hence, since the adoption of a floating exchange rate in 1978, the CBC has frequently intervened in the foreign exchange market in order to affect the level of the exchange rate or its fluctuations. The final purpose of the CBC is either to promote exports and economic growth, to stabilize domestic prices, or to stabilize the exchange rate. In other words, what is adopted by the CBC is in fact a managed floating exchange rate.

The general impression and feeling derived by scholars and experts in Taiwan over the CBC's foreign exchange operations may be summed up as follows. First, the CBC has usually adopted a strategy of repressing the NT dollar, aiming to promote exports. Therefore, the NT dollar has been characterized as being "easy to depreciate, difficult to appreciate." Second, when domestic prices face any serious inflation problem, the CBC is then more

9. Re-deposits from financial institutions constitute a very powerful and effective operational instrument for the CBC to adjust reserve money. The CBC is entitled to receive or return re-deposits from the postal savings system, three specialized agricultural banks, and other approved banks when the CBC concludes that the domestic financial situation requires it to do so. To increase (decrease) reserve money, the CBC can simply return (receive) re-deposits to (from) the financial institutions.

willing to allow the NT dollar to appreciate. Third, when major events such as political unrest, a military threat from China, and the East Asian financial crisis in 1997–1998 occurred, such that the NT dollar faced serious pressure to depreciate, the CBC was obliged to defend the exchange rate.

Since the CBC has kept information on foreign exchange intervention a secret, the impact of CBC's intervention on the exchange rate is difficult to estimate. In a recent study on the NT-dollar exchange rate, Yang and Shea (2005) set up an optimal-intervention model to introduce three variables, representing three purposes of CBC intervention, into the determination equation of the NT-dollar exchange rate, together with the standard factors affecting the exchange rate, such as the relative price level, interest-rate gap, and export-competing countries' exchange rates. The empirical estimation results of this paper show that each of the three intervention-purpose variables played a significant role in the determination of the NT-dollar exchange rate. The model incorporating the intervention-purpose variables performed far better, in terms of both explanatory power and forecasting power, than the model that excluded the intervention-purpose variables. These results clearly indicate that CBC's intervention is really a key factor affecting the NT-dollar exchange rate, and that promoting economic growth, stabilizing domestic prices, and stabilizing the exchange rate are truly the main concerns of the CBC in exchange rate management.

10.6.3 Counter-Deflation Policies

By coping with the weakening demand for money caused by the slowdown of economic growth and the increase of substituting financial assets, the CBC could not but passively and gradually adjust downward the target zone of its M2 growth rate during the period from 2000 to 2003, as shown in figure 10.7. This figure also shows that the actual growth rate of M2 fell most of the time into the target zone, which indicates that the CBC's management of money supply was, generally speaking, satisfactory during this period.

The expansionary monetary policy adopted by the CBC to stimulate domestic demand was revealed by the policy measures, which were intended to loosen the monetary environment and to guide the market interest rate in a downward direction. Between December 2000 and the end of 2003, the CBC lowered both the discount rate and the rate on accommodations on fifteen occasions, as indicated by table 10.5. In 2001–2003, the required-reserve ratios of the NT-dollar deposits and foreign currency deposits were reduced on one occasion and three occasions, respectively. As a result, the market interest rates as represented by the inter-bank overnight call-loan rate, one-year time deposit rate, and the 31–90 day Commercial Paper (CP) rate in the secondary market all moved downward in 2001–2003 as figure 10.8 shows.

As for its exchange rate policy, the CBC has been used to keeping the NT dollar undervalued in ordinary times in order to stimulate Taiwan's exports

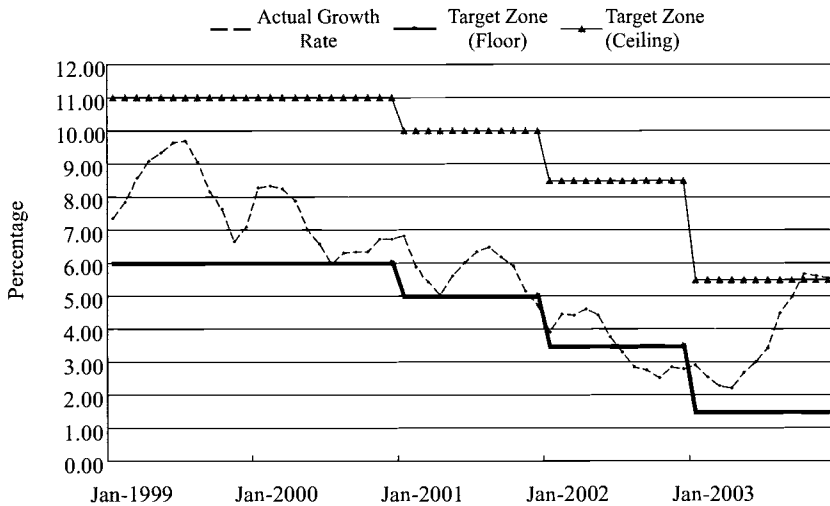


Fig. 10.7 Target zone and actual growth rate of M2

Source: The Central Bank of China.

Table 10.5 CBC interest rates (percent per annum)

Effective date of change	Discount	Accommodations with collateral	Accommodations without collateral
27 June 2000	4.750	5.125	9.625
29 Dec. 2000	4.625	5.000	9.625
2 Feb. 2001	4.375	4.750	9.625
6 Mar. 2001	4.250	4.625	9.625
30 Mar. 2001	4.125	4.500	9.625
23 Apr. 2001	4.000	4.375	9.625
18 May 2001	3.750	4.125	6.000
29 June 2001	3.500	3.875	5.750
20 Aug. 2001	3.250	3.625	5.500
19 Sep. 2001	2.750	3.125	5.000
4 Oct. 2001	2.500	2.875	4.750
8 Nov. 2001	2.250	2.625	4.500
28 Dec. 2001	2.125	2.500	4.375
28 June 2002	1.875	2.250	4.125
12 Nov. 2002	1.625	2.000	3.875
27 June 2003	1.375	1.750	3.625

Source: *Financial Statistics Monthly*, CBC.

and economic growth, as explained above. When faced with a slowdown in economic growth in the period 2000–2003, the CBC was naturally more eager to intervene in the foreign exchange market than in any ordinary period by purchasing foreign exchange in the market to maintain an undervalued NT dollar or to prevent it from appreciating. Deflation in this period further strengthened the justification for the CBC's foreign exchange

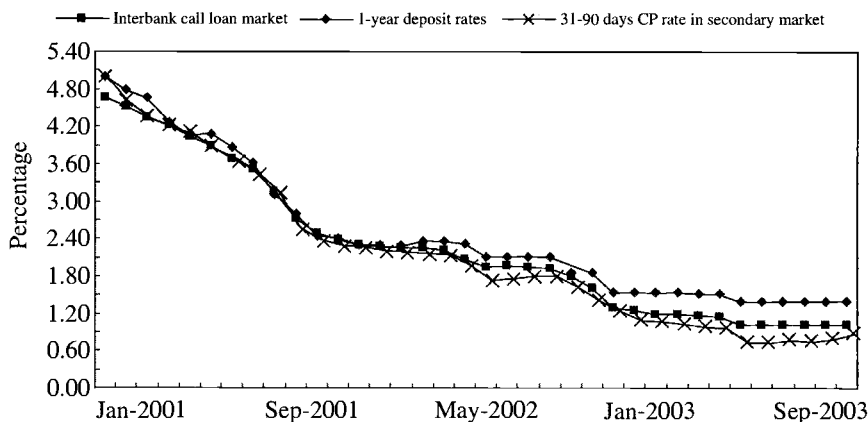


Fig. 10.8 Market interest rates

Source: Financial Statistic Monthly, CBC.

intervention. Without its intervention, the currency's appreciation would have caused domestic prices to go down, thereby worsening the deflation problem. Therefore, the CBC's foreign exchange intervention during this period was regarded as a good strategy for "killing two birds with one stone." That is, an undervalued NT dollar was believed to be beneficial both in promoting economic growth and in combating deflation.¹⁰

The CBC intervened heavily in the foreign exchange market to slow down the appreciation of the NT dollar during the period 2000–2003 when Taiwan enjoyed a huge balance-of-payments surplus. Although the NT dollar was still appreciating then, CBC tried to smooth its movement, otherwise the degree of appreciation would have been larger. The result of the CBC's intervention was a rapid piling up of foreign exchange reserves and a relatively stable NT-dollar exchange rate. The foreign exchange reserves held by the CBC almost doubled from US\$106.7 billion at the end of the year 2000 to US\$206.6 billion at the end of 2003. The NT\$-U.S.\$ exchange rate even fell from 32.992 to 33.978, a depreciation of 2.90 percent relative to the U.S. dollar, during the same period, when most of the currencies of Taiwan's major export-competing countries were appreciating.¹¹

The by-product of foreign exchange purchasing by the CBC was a

10. Svenson (2001) proposed depreciation as a foolproof way of getting out of deflation for Japan. This policy recommendation was actually adopted by CBC.

11. During the same period from the end of the year 2000 to the end of 2003, the appreciation rates of the currencies of Taiwan's major export-competing countries relative to the U.S. dollar were as follows:

Japan	South Korea	Hong Kong	Singapore	Malaysia
7.01 percent	6.04 percent	0.51 percent	1.76 percent	0

Table 10.6 Liquidity ratio and loan/deposits ratio (%)

Year	Liquidity ratio of deposit money banks	Ratios of loans and investments over deposits for major financial institutions
1998	19.47	92.28
1999	21.71	88.31
2000	18.94	85.59
2001	22.77	81.19
2002	27.33	77.27
2003	31.32	75.19

Source: *Financial Statistics Monthly*, CBC.

pumping out of reserve money into the financial market. To control the growth of M2 within the target zone, the CBC was obligated to issue CDs and to receive re-deposits from financial institutions so as to sterilize the impact of foreign exchange intervention on reserve money. The CBC's outstanding CDs hence rapidly increased from NT\$562 billion at the end of the year 2000 to NT\$2,992 billion at the end of 2003, and re-deposits from financial institutions nearly doubled from NT\$1,148 billion to NT\$2,056 billion over the same three-year period.

Although lowering the target zone of M2 growth rate was a passive response to a weakened demand for money, and massive sterilization was a necessary policy measure to control the money supply after heavy foreign exchange interventions, these two measures may still seem as a contradiction to the expansionary monetary policy that the CBC is supposed to adopt. However, the falling of the market interest rates as shown in figure 10.8, together with the rising liquidity ratio of banks and the dropping of the ratio of loans and investments over deposits of major financial institutions as reported in table 10.6, all show that CBC had effectively created a relatively loose monetary environment.¹²

Despite these efforts, the CBC's effectiveness in curbing deflation and stimulating economic growth might have been limited for several reasons. First, political unrest and tensions with China had not eased, and these were major factors weakening private consumption and domestic investment in Taiwan. Second, in view of its high degree of openness, Taiwan's economic performance was closely linked with that of the global economy.

12. In addition, there are two measures about real estate market which contribute on the counter-deflation policy. First, the preferential loans for real estate are adopted, which is subsidized by the Ministry of the Interior, and CBC provided the funds needed. Second, the Central Bank advises local banks to adopt interest-index housing loans. The interest-indexed housing loans are set according to the interest rates of one-year time deposits or time and savings deposits plus fixed markup. This policy makes the interest rate of real estate move together with the market interest rate. As a result, the interest rates of real estate are transparent, and it follows the decline of market interest rates. It can enhance the effects of transmitting monetary policy. These measures help lessen the interest burden of housing buyers, stimulate the real estate market, and lessen the threat of deflation.

Taiwan could hardly curb deflation caused by external factors. Third, due to the restrictions imposed by the government's deteriorating financial situation, an expansionary fiscal policy could not be implemented. By depending on the CBC's policies alone, Taiwan's economy could not have improved very much. However, we may state that CBC's efforts might have at least shielded the economy from a more serious recession and deflation in 2000–2003.

Of course, the CBC's counter-deflation policies have not been immune from complaints and criticisms. Although lowering the market interest rates had been generally regarded as a necessary and correct policy direction, it created complaints from depositors, as well as from insurance companies since it depressed their profitability. Some scholars and journalists even criticized that the CBC had intervened too heavily in the foreign exchange market on the basis that the foreign exchange reserves had accumulated too rapidly and too much. Nevertheless, the CBC's policy responses to deflation were in general well accepted by the general public and most scholars in Taiwan.¹³

10.7 Conclusion

Taiwan is a small open economy that is characterized by an export-oriented path of development. Domestic investment also serves to stimulate the growth of the economy. There have been some major changes in the political and economic environment in Taiwan in recent years. These changes—including political unrest, tensions with China, outbound investment to China, a weakened financial system, and a deteriorating government financial situation—have provided the backdrop for an economic slowdown and deflation in Taiwan. Some global factors, especially the bursting of the Internet and IT bubbles in late 2000 and the rise of China's economy, have also heavily influenced both global and Taiwanese prices.

This chapter probes the reasons influencing deflation during the period from 1999 to 2003. Reviewing the actual changes of some major economic variables affecting the aggregate demand or the aggregate supply, this chapter has identified some sources of PGDP deflation in Taiwan. During this period, government expenditures have decreased. This factor together with development of production technology that has caused unit output labor costs to fall, the collapse of the bubble economy, the influx of cheap products from China into the world market, and the NT dollar's appreciation have all contributed to a lower PGDP.

In order to fight deflation, the Central Bank adopted several measures to reduce the extent of price decreases. It lowered the discount rate and the

13. Some reports of investment banks, such as Goldman Sachs (2004), Lehman Brothers (2004), and UBS (2004), also have positive evaluation on the monetary policy of CBC in this period.

rate on accommodations on many occasions, and occasionally reduced the required-reserve ratio to guide the market interest rates in a downward direction. The Central Bank also intervened in the foreign exchange market to maintain an undervalued NT dollar, so as to promote exports and combat deflation at the same time.

Although the Central Bank tried to help solve the deflation problem, its monetary policy could not serve as the only remedy. Various factors still needed to be added to strengthen the recession situation. Therefore, the expansionary effects of a loose monetary environment do not seem to be significant. Fortunately, from 2004, the Taiwan economy is no longer under the threat of deflation.

During this period of deflation, the price configuration has experienced a change, whereby the PGDP has gone down and the CPI has slightly decreased, but the WPI has gone up. In fact, this kind of price-divergence phenomenon has not only appeared during the period of deflation, but has also appeared repeatedly on several occasions according to historical data over the years.

In analyzing the reasons why the WPI and CPI trends have diverged since 2002, we find that the WPI increase is mainly due to the huge Chinese demand for raw materials. This has caused the prices of global raw materials and Taiwan's imports to rise, which has caused the WPI to rise. Another reason is that the domestic economy has been recovering since 2003. As for the CPI decrease, this has resulted from a decrease in the prices of services and PGDP. A decrease in the prices of services is related to the decline in rents and the interest rate. A rise in domestic unemployment and competition from China's cheap labor has also kept domestic wages steady.

The deflation problem puzzled Taiwanese scholars during the period from 1999 to 2003. Fortunately, it has started to disappear gradually since 2004. The economic growth rate increased up to 5.71 percent, and inflation rates for PGDP, WPI, and CPI are -1.8 percent, 7.1 percent, and 1.7 percent in 2004, respectively. It shows the phenomenon of price divergence in 2004. Furthermore, although PGDP growth rate is negative in 2004, the first quarter of 2005 is around 0.3 percent, and it is expected to be positive for all the year of 2005. Although deflation in Taiwan seems to be over, the global and domestic factors will all continue to influence Taiwan's economy from different aspects.

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Comment Toshiki Jinushi**Summary of the Paper**

The chapter by Yang and Shea gives a nice starting point for the analysis of the deflation experience in Taiwan in the early 2000s. They offer a broad political and economic background for the deflation first, and then a basic analysis of the price movements, and the description of the monetary-policy operation in the end. This comments focus mainly on the monetary-policy operation.

The Monetary-Policy Operation

The framework for the Taiwanese monetary policy has been monetary targeting for years but its operation has changed recently. The Central Bank of Taiwan seems to have smoothed the interest rate changes recently, as Young and Shea pointed out. The volatility of the interest rates got decreased evidently since around 1998 (fig. 10C1.1). Though the operation has become more pragmatic the monetary aggregate has been within the target band, except for in the latter half of 2002. Thus, we may evaluate that the Central Bank has maintained the monetary targeting well.¹

However, the operation in 2002 is highly problematic. It is the time when the Taiwanese economy faced the deflation. Though the WPI increased slightly, both the CPI and the GDP deflator decreased. In addition, the GDP gap² is significantly negative after the IT bubble collapsed. As figure 10C1.2 shows, these two main concerns for the monetary policy unanimously call for the monetary ease. But, the money supply did not even meet the lower end of the target band.

This policy operation seems quite passive, even though the money demand would have been quite stagnant then. In fact, the Central Bank lowered its discount rate only twice in 2002, from 2.125 to 1.875 in June, and to 1.625 in November. The inter-bank rate followed it from around 2.30 in January to 1.60 in December.

The Central Bank did have ample chances to meet the monetary target in 2002, since it implemented massive FX market intervention against the NT dollar appreciation. However, it sterilized this by the open market operation and the re-deposit.

The Central Bank might have been in the “wait-and-see” mode, after the

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Author would like to thank Mr. Singo Umino for assistance in the data collection and some calculations.

1. The Central Bank seems to have faced some difficulties so that it has changed the definition of the target aggregates. That is common in the monetary-targeting countries.

2. The GDP gap in the chart is calculated as the deviation of the actual GDP from its quadratic trend.

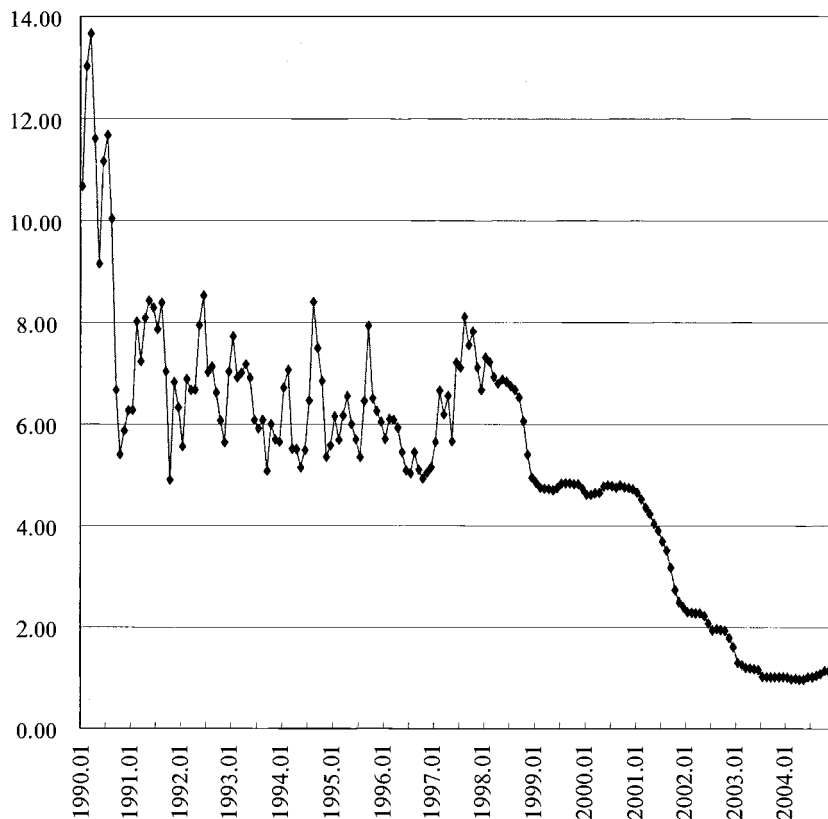


Fig. 10C1.1 Taipei inter-bank overnight rate

aggressive easing in 2001; it lowered the discount rate eleven times from 4.625 to 2.125. But, later, it found it necessary to lower interest rates through 2003. In addition, the literature had already shown that the extraordinary aggressive easing is desirable on the edge of the deflation and the zero bound of the nominal interest.

Based on these reasons, we could evaluate that the Central Bank's easing decisions were delayed in 2002. In fact, even the simple Taylor rule shows that the inner-bank rate should have been lowered more (fig. 10C1.3).³

The Analysis of the Deflation

Yang and Shea decomposed the factors affecting the price movements in Taiwan. Their main analysis is about the GDP deflator. They concluded

3. The calculation is based on the original coefficients of 0.5 and 0.5 and the target inflation rate of 1.835 percent (the Taiwanese average inflation rate for 1982 to 2004).

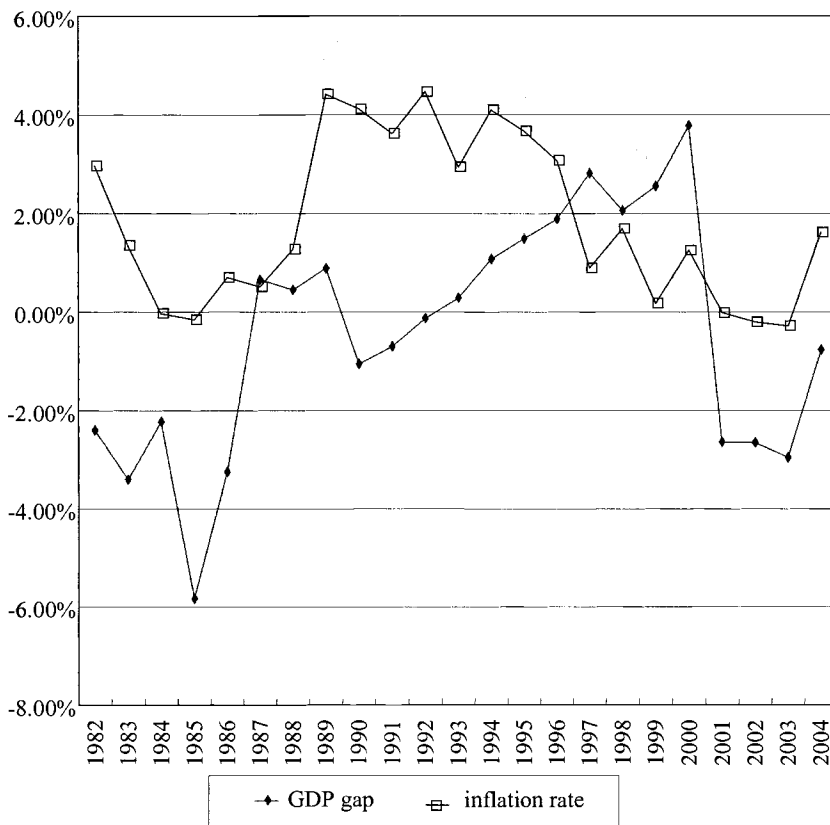


Fig. 10C1.2 GDP gap and inflation rate

that the reduction in unit labor cost, lower export prices, the NT dollar appreciation, and the low government expenditure are the main contributors for the recent deflation. Then, they focused on the divergent behavior of the price indexes, GDP deflator, CPI, and the WPI.

However, based on the discussion on the monetary operation, the focus should be put on the persistence of the factors contributing for the deflation. By doing so, they might be able to examine the reasons why the Central Bank downplayed the deflation in 2001–2003.

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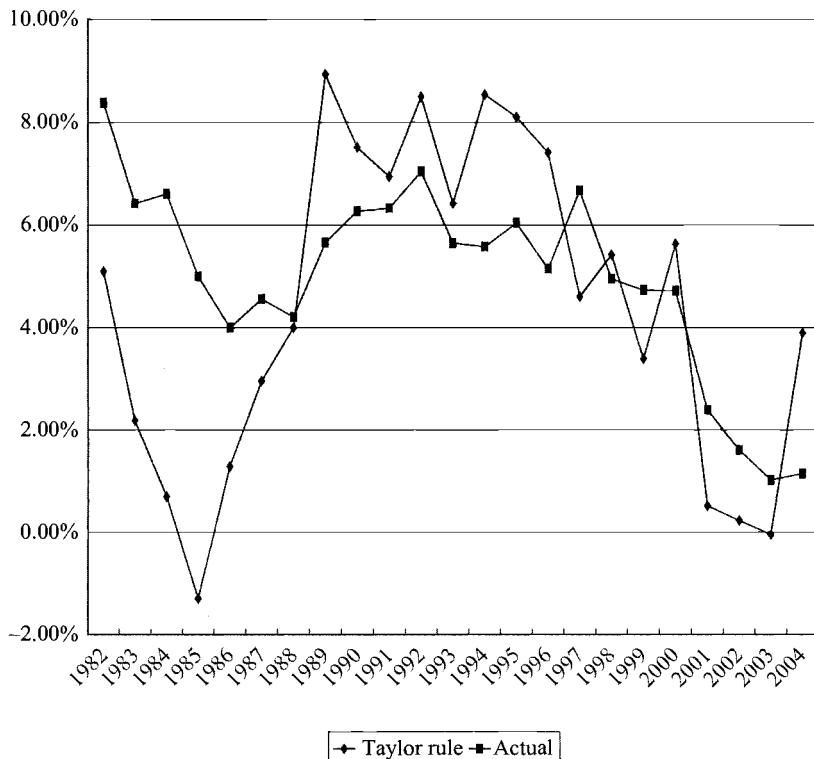


Fig. 10C1.3 The Taylor rule and the actual rate: inter-bank overnight rate

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Comment Shigenori Shiratsuka

Introduction

Ya-Hwei Yang and Jia-Dong Shea provide useful information on Taiwan's experience with deflation in the early 2000s, ranging from political and economic background to price developments and monetary-policy responses. This is another story of deflation in the East Asian region, but one

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The views expressed in the paper are those of the authors and do not necessarily reflect those of the BOJ or the IMES.

less well-known compared with Japan's experience in the years following the mid-1990s.

As Toshiki Jinushi points out in his comments, Yang and Shea's chapter seems to suggest that deflation in Taiwan is influenced not only by temporary factors but also more persistent factors. This associates me with Japan's experience of low economic growth in the 1990s, often referred to as the "lost decade." Based on my previous papers, joint with co-authors, on Japan's experience, I will elaborate some possible explanations for deflation in Taiwan involving structural and persistent factors.

Distortion in Cross-Sectional Resource Allocation

The first point is that various structural impediments prevent the resources in the economy from reallocating in an efficient manner.

As Yang and Shea argue, sudden and significant changes in Taiwan's economic environments, such as the bursting of the IT bubbles, the rise of China's economy, and the weakened financial system, helped bring about the stagnant economic condition after 1999. In Japan's case, structural impediments have also affected the economy after the bursting of asset-price bubbles.^{1,2} In addition, significant structural changes to the economic environments occurred during the 1990s: for example, the changing pattern in the division of labor between Japan and its East Asian neighbors, a rapidly aging population, and advances in information and communications technology.

Okina and Shiratsuka (2004) argue that protracted economic stagnation in Japan after the 1990s can be seen as the result of incomplete economic adjustments to significant changes in relative prices in two dimensions: the intertemporal and cross-sectional dimensions. In the cross-sectional dimension, when relative price changes occur, frictions and distortions in factor markets lead the economy to exhibit inefficient resource allocation, thereby lowering attainable output given the total amount of resources in the economy. In the intertemporal dimension, as long as economic growth remains stagnant, asset prices, which correspond to the discounted present value of future cash flow, can hardly be expected to recover, thus producing further downward pressure on trend growth through declines in capi-

1. The list of structural impediments includes rigid corporate governance, inefficiency of the nonmanufacturing sector, the issue of nonperforming assets associated with the generation and bursting of the asset-price bubble, and the savings-investment imbalance.

2. Hayashi and Prescott (2002) argue that economic stagnation in Japan in the 1990s is attributable to declines in both the TFP growth rate and working hours, while Kawamoto (2005) points out that technology growth, measured as a purified Solow residual, remains almost unchanged from the 1980s to the 1990s. In any case, these empirical studies suggest that structural impediments against more efficient resource allocation are crucial factors behind Japan's lost decade. Sekine, Kobayashi, and Saita (2003); and Caballero, Hoshi, and Kashyap (2003) provide further evidence that one of the major causes of Japan's long-term stagnation is forbearance lending to inefficient firms.

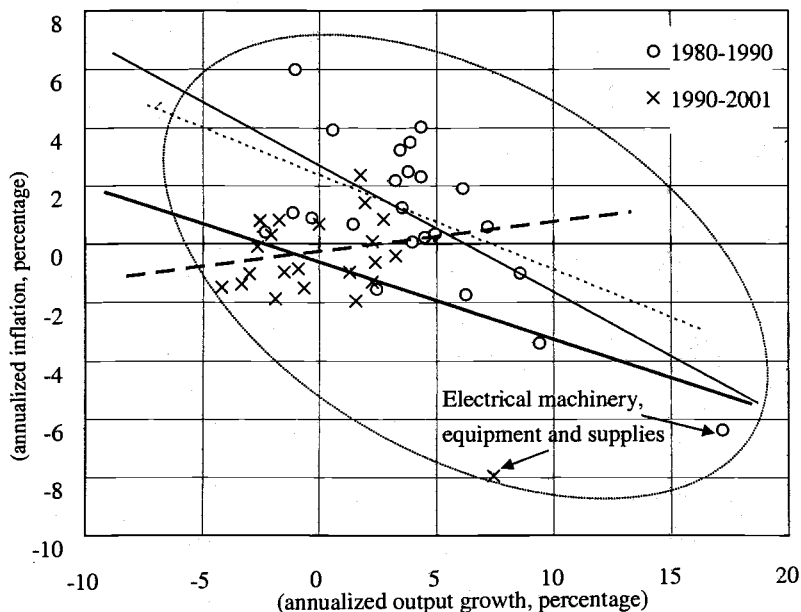


Fig. 10C2.1 Output growth and inflation by industry

Source: Okina and Shiratsuka (2004).

tal accumulation in high-productivity sectors. In addition, it should be noted that the cross-sectional and intertemporal resource misallocation interacts to amplify the negative impacts of structural factors on the economy as a whole.

Figure 10C2.1, taken from Okina and Shiratsuka (2004), depicts the relationship between output growth and price changes by industry in Japan. The horizontal and vertical axes plot annualized changes in outputs and deflators by industry, respectively. Observations shown as circles and Xs, respectively, indicate data for the period from 1980 to 1990 and from 1990 to 2001.

An overall negative relationship suggests the importance of supply-side factors in determining cross-sectional differences over time. Resources are allocated to growing industries where relative prices are declining, reflecting their relatively high productivity growth. A closer look at the figure, however, reveals that the above negative relationship varies between two periods: thin and bold solid lines for the observations for the periods 1980–90 and 1990–2001, respectively; and thin and bold dotted lines for the observations for the corresponding periods but excluding electrical machinery. The slopes of the observations for the period of 1980–90 are negative, regardless of inclusion or exclusion of the outlier observation for electrical

machinery, while the slope of the observations for the period 1990–2001 turns slightly positive if the outlier observation for electrical machinery is excluded.

Increased Waiting-Option Value in Response to Political Uncertainty

The second point is that waiting-option values rise in response to increased uncertainties in the economy, thereby restraining irreversible expenditure to consumption and investment.

Yang and Shea document that uncertainties in both political and economic environments have increased significantly in the 2000s. Political conflicts with China have intensified, as Taiwan has leaned toward establishing itself as an independent nation. The rise of the Chinese economy induces foreign direct investment to China, leading to the growing concerns over the hollowing out of Taiwan's manufacturing sector.

As discussed in Saito and Shiratsuka (2003), an important element in saving motive under uncertainty is an option to wait for the uncertainty to be resolved. With this motive, savings are regarded as a flexible choice for the future, while consumption is treated as a firm commitment to current expenditures or a perfectly irreversible decision. Such a waiting-option motive becomes more important when uncertainties surrounding the economy are growing. It should be noted, however, that a waiting-option motive is often confused with a precautionary motive.

The aforementioned two types of saving motives under uncertainty provide broad implications. That is, the first motive is driven by the magnitude of risks, while the second is promoted by the subsequent resolution of uncertainty. If saving motives as waiting options are present, savings increase when uncertainty is expected to be resolved subsequently. Empirical results shown in Saito and Shiratsuka (2003) indicate that saving behavior since the 1980s is more consistent with dominant precautionary savings; however, estimation results from the behavior during the 1990s offer some evidence in favor of savings as waiting options.

Conclusions

In closing, I emphasize the importance of investigating the cause of the problem more deeply for each episode of deflation. I think there are more interesting issues on deflation ripe for further investigation. The nature of deflation varies from country to country and from episode to episode. Required policy responses also vary according to such differences in the nature of the deflation.

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