

**TESTING THE VALIDITY OF PURCHASING POWER PARITY (PPP) IN  
THE NEWLY INDUSTRIALIZED COUNTRIES (NICs)**

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**This project is submitted in partial fulfillment of  
the requirements for the degree of Bachelor of Economics  
with Honours  
(International Economics)**

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UNIVERSITI MALAYSIA SARAWAK  
2010**

## **ABSTRACT**

### **Testing the Validity of Purchasing Power Parity (PPP) in the Newly Industrialized Countries (NICs)**

**By**

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This study investigates the validity of purchasing power parity (PPP) in Newly Industrialized Countries (NICs) using a univariate unit root and ARDL approach. Quarterly data of eight NICs (South Africa, Mexico, Thailand, Turkey, the Philippines, Malaysia, Brazil, and India) are used to test for the long run PPP relationship with the China Yuan as base currency. In addition, the Granger causality test is employed to examine the short-run causality relationship between nominal exchange rate and relative price. The results of Ng and Perron test supported the PPP for four NICs while PPP is found invalid for the NICs by the autoregressive distributed lag (ARDL) model. This study found that there is no evidence of PPP in pre-crisis period, but more evidences are revealed in the post-crisis and overall period. These findings imply that the cointegration relationship is time dependent. In addition, there is a short-run causality between the nominal exchange rate and relative price in India, Thailand, Turkey and South Africa in different periods.

## **ABSTRAK**

### **Kajian tentang kesahihan parity kuasa beli di**

### **“Newly Industrialized Countries (NICs)”**

**Oleh**

**Tan Pei Yu**

Kajian ini bertujuan untuk mengkaji kesahihan parity kuasa beli di “Newly Industrialized Countries” dengan menggunakan ujian kepegunan dan ujian kepengamiran “ARDL”. Suku data telah digunakan untuk mengkaji hubungan parity kuasa beli pada jangka masa panjang dengan menggunakan yuan China sebagai mata wang asas di lapan “NICs” (Afrika Selatan, Mexico, Thailand, Turki, Filipina, Malaysia, Brazil, India, China. Di samping itu, ujian penyebab Granger the digunakan untuk mengkaji hubungan di antara kadar pertukaran nominal dan harga relatif pada jangka masa pendek. Ujian “Ng and Perron” mendapati parity kuasa beli wujud di empat “NICs” tetapi parity kuasa beli tidak wujud di mana-mana “NICs” dalam ujian kepengamiran “ARDL”. Walau bagaimanapun, kajian ini mendapati bahawa parity kuasa beli tidak wujud pada masa sebelum kewangan krisis manakala parity kuasa beli wujud pada masa keseluruhan dan selepas kewangan krisis. Jadi, hubungan cointegrasi adalah berdasarkan kepada masa. Tambahan pula, Negara India, Thailand, Turki, dan Afrika Selatan wujud hubungan di antara kadar pertukaran nominal dan harga relatif pada jangka masa pendek .

## **ACKNOWLEDGEMENT**

**Firstly, I would like to express my appreciation to my supervisor of the Faculty Economics and Business, University Malaysia Sarawak. His guidance, patience and advice assisted me to accomplish my study. Besides, he supervised me by sharing his knowledge, and taught me how to run the E-Views software. Ultimately, he informed me of the important criteria of a good thesis.**

**Furthermore, I would like to express my gratitude to the Faculty Economics and Business, Universiti Malaysia Sarawak, which makes available the final year project. This course gives me an opportunity to learn how to do empirical study. Thanks to all the staffs in Faculty Economics and Business for providing me the useful guidelines or information related to this final year project.**

**Lastly, I would like to thank a friend of mine, who always supported and assisted me in finding and collecting all the important materials. Besides, she also helped me whenever I faced problems in the study.**

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# **CHAPTER 1**

## **Introduction**

### **1.0 Background of study**

The purchasing power parity (PPP) hypothesis is one of the most important foundations in international economics (Hsing, 2009). The idea of PPP is raised by the Cassel (1918). The notion of PPP has attracted great attention theorists, empirical researchers, and policy makers, after the collapse of gold standard of fixed exchange rate in the early 1970. In the last few decades, a large amount of literatures have contributed to the theoretical debate and empirical test of PPP.

Generally, the PPP hypothesis states that the exchange rate between two currencies is determined by the change in the relative prices of the two countries. For example, if the U.S. price level rises by 3% over a year while Malaysia's price level rises by 2%, then relative PPP predicts that the dollar will depreciate against the ringgit by 1%. The dollar's 1% depreciation against the ringgit cancels the differential in the inflation rates. Hence, the relative domestic and foreign purchasing powers of both currencies are equal. In other words, PPP suggests that any percentage changes in the price level between two countries would be offset by an equal deprecation or appreciation of the nominal exchange rate.

However, the basic theory of PPP considered a two-country world in which the home and foreign country each produce a homogeneous traded good or the domestic and the foreign price levels are equal when measured in the same currency. This so, called "Law of One Price" with assumes that all goods are tradable, zero



transport costs, no barriers to trade, perfect homogeneity of domestic and foreign goods, and perfect competition. The arbitrage process will lead the PPP hold at long run in the situation where one country's currency is overvalue against PPP value, the other country's currency will undervalue. Hence, the export's demand shifts from country where currency is overvalued to country where currency is undervalued. Eventually, misalignment in currency will be eliminated, and PPP equilibrium will be restored. This means that PPP cannot hold in short run but process of arbitrage, which needs a long time to adjust, will ensure the PPP is valid in the long run.

Whether long run PPP holds (real exchange rate is stationary) has important economic implications. In practice, estimating the PPP is often used for several purposes such as to determine the degree of misalignment of nominal exchange rate and the proper policy response, the international comparison of national income levels, and the setting of exchange rate parities. Besides, the degree of persistence in the real exchange rate can be used to infer the principal impulses driving exchange rate movements (Chowdhury, 2007). According to Rogoff (1996), if the real exchange rate is highly persistent, then the shocks are likely to be coming from the supply-side, whereas if there is little persistence, then the shocks may mostly be aggregate demand-based. Ultimately, the real exchange rate is usually considered as one measure of international competitiveness, where exports have been the principal source of economic growth in Newly Industrialized Countries (NICs).

In addition, Liew et al (2005) stated that the validity of PPP has important implications for policy makers such as central bank, exchange rate market participants, and multinational firms. When PPP holds, an exchange rate can be evaluated whether is over or undervalue based on the equilibrium value as suggested

by PPP itself. In addition, PPP and its extended models also can be a reliable predicting tool for future exchange rate movements. The study of PPP has an equally important implication to reflect the degree of trade integration and liberalization among countries. Therefore, many study on the validity of PPP appeared in the literature.

In this study, the validity of PPP is tested in Newly Industrialized Countries (NICs). These countries have one similar characteristic, in the sense that they are export-oriented. The validity of PPP is important for the NICs policy makers can make better policy such as creation of a common currency area that can stabilize the economics of the NICs.

### **1.1 Background of country**

The Newly Industrialised Countries (NICs) are LEDCs that have undergone recent, rapid industrialisation and experienced high growth rates, rising incomes and international involvement. The NICs are considered as countries that have not yet achieved the first world standard but are moving toward it. In the late 20<sup>th</sup> century, four Asian tigers (NICs) that include South Korea, Taiwan, Singapore, and Hong Kong had substantial growth in their manufacturing output and consequently exports. In the 21st century, the 4 Asian Tigers becomes advanced economies and high-income economies. However, the new generation of NICs are just born and listed by Bozyk (2006), Guillen (2003), Waugh (2000), and Mankiw (2007) in year 2009. The new NICs are South Africa, Mexico, Brazil, China, India, Malaysia, the Philippines, Thailand and Turkey.

Generally, the governments of NICs focus more on industrial development, and encourage industries to export manufacture products to the more developed and richer countries abroad. The profits generated by exports are re-invested in the domestic economy. Then, boost up the domestic business, wages, and spending on home-produced goods and services. This stimulates further growth of NICs. This kind of cycle, in which money paid out by business is re-invested in the economy, is call as multiplier effect. Therefore, the rapid economic growth of NICs depends on the growth of exports. In addition, World Bank (1993) suggests that the rapid growth of exports provides one of the main engines of the rapid growth in real GDP. Thus, NICs is chosen in testing the validity of PPP because their economies are export-oriented.

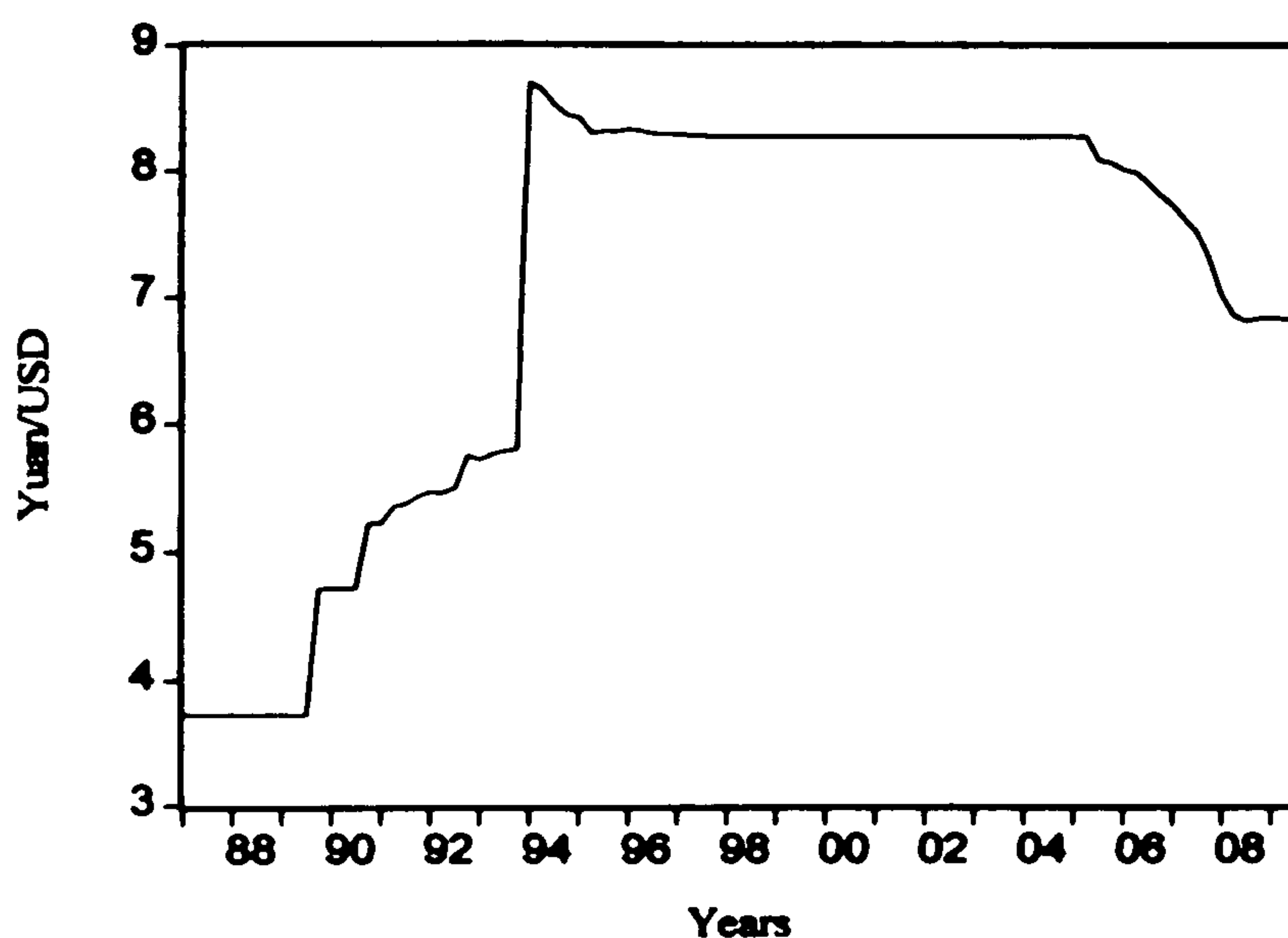
In addition, the fluctuation of exchange rate will affect the volume of exports and directly influence the economic growth. Ethier (1973) argues that exchange rate risk could lower the exports due to profit risk. Hence, one of the ways to offset the exchange rate risk is when the PPP hold in NICs. Therefore, PPP is important for policy makers to suggest appropriate policy such as liberalization trade and stabilization of the exchange rates to boost up the economy of NICs. Brief review of the economics background, exchange rates trend, and relative prices level of each of these countries is show below.

### **1.1.1 China**

During the past 30 years, China has changed from centrally planned system that was largely closed to international trade to a more market-oriented economy and leads a rapidly growing private sector and is a major player in the global economy.



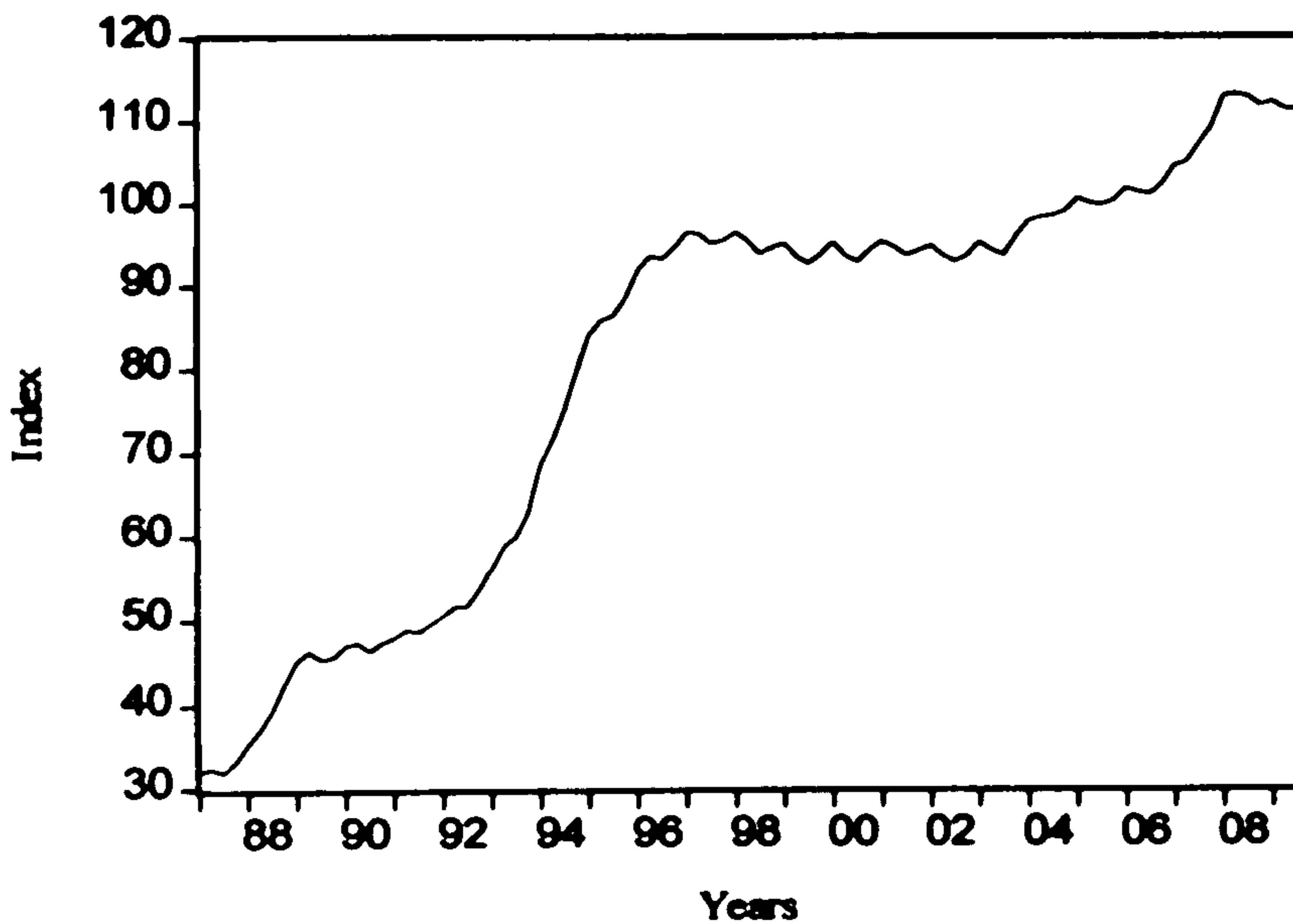
The reforms was started in the late 1970s with the phasing out of collectivized agriculture, and more prefer to liberalization of pieces, fiscal decentralization, diversified banking system, and opening to foreign trade and investment. The annual inflows of foreign direct investment rose to nearly \$84 billion in 2007. A continues high growth of China has had a significant impact on the world economy. The trend of the China nominal exchange rate (NEXC) is illustrated in Figure 1.1.



**Figure 1.1: Nominal Exchange Rate (NEXC) of China from 1987Q1-2009Q3**

From Figure 1.1, China experienced sharp depreciation of the yuan against USD from 1987Q1 until 1994Q1. The depreciation of China yuan (RMB 3.722 to 8.708) reach about 134% in seven year. However, China eliminated the dual-track system and introduced single free floating currency effective January 1, 1994 and the Yuan turn freely convertible under current account transaction effective December 1996. So, the RMB start appreciates slightly between the periods of 1994Q2 to 2005Q4 as in Figure 1.1. Afterwards, China yuan become stable along 1995 to 2005. Eventually, RMB was tightly pegged at 8.277 to USD at 2001. In July 2005, People's Bank of China revalues its currency by 2.1% against the US dollar to 8.11

yuan/USD and moved from USD pegging to manage floating based on a basket of foreign currencies. Therefore, the RMB began to appreciate sharply after the RMB is release from peg the currency in 2005. The appreciation of RMB reaches about 15.6% from RMB 8.092 to 6.829 (2005Q3-2009Q3). Next, the consumer price index of China will be discussed based on Figure 1.2.



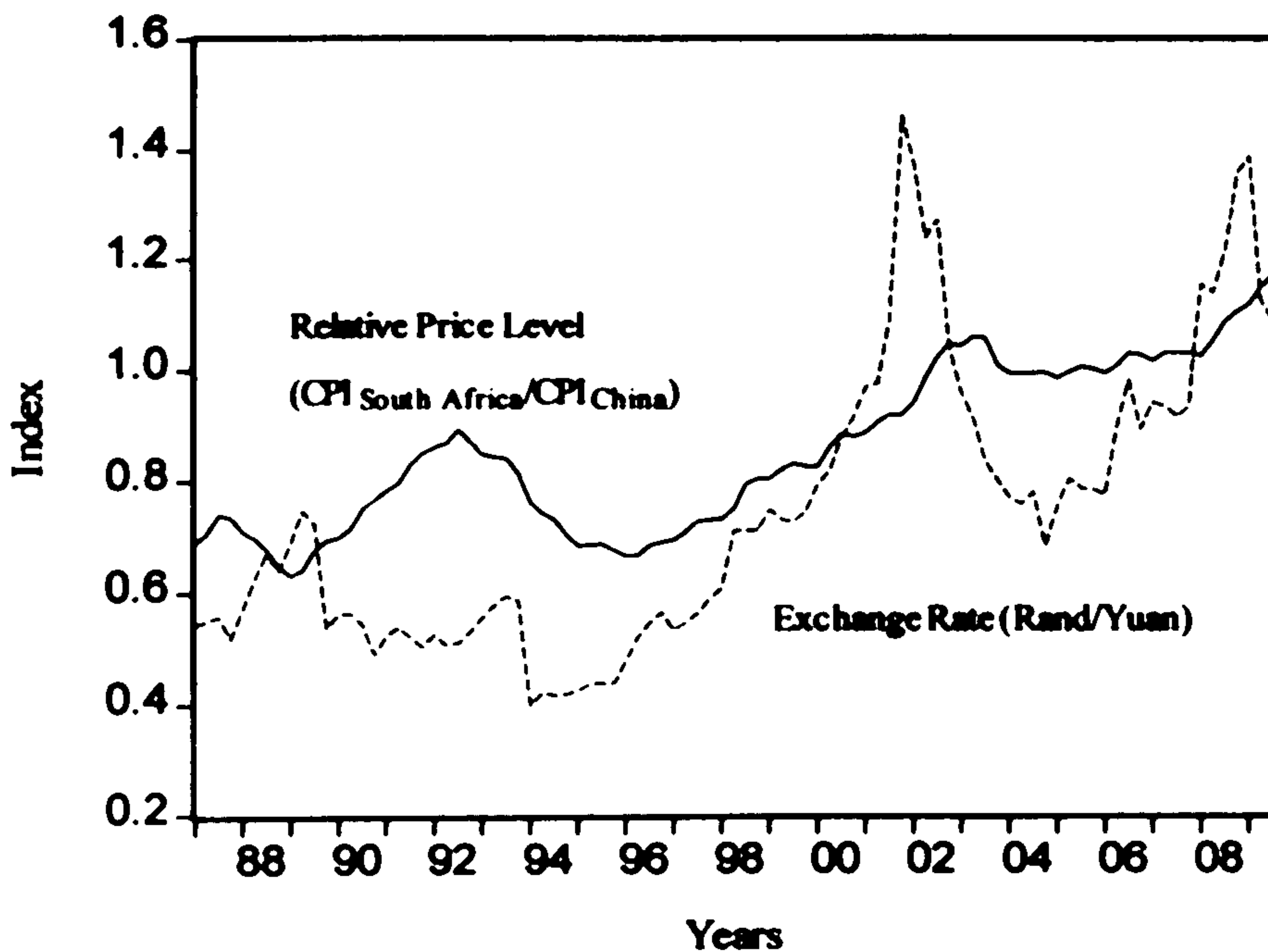
**Figure 1.2: Consumer Price Index (CPI) of China from 1987Q1-2009Q3**

From Figure 1.2, the CPI of China experienced increasing trend from 1987Q1 to 2009Q3. In the early stage (1987Q1-1997Q2), China's CPI rises sharply from 32.08 to 96.33 which about 200%. This implies that before Asian financial crisis, the economy of China is performed well. However, the China's CPI considered stable in post- crisis period from 1997Q3 to 2009Q3.

### 1.1.2 South Africa

South Africa is a middle-income, emerging market an abundant supply of natural resource, and well developed financial country. Besides, South Africa has a

stock exchange that is 17<sup>th</sup> largest in the world. The economics growth was robust from 2004 to 2008 due to obtain the benefit of macroeconomic stability and a global commodities boom. The exchange rate regime that preferred by South Africa is flexible exchange rate regime that allow Rand to fluctuate. The exchange rate of Rand/Yuan and the relative price level is show as follow:



**Figure 1.3: Purchasing Power Parity, South Africa/China from 1987Q1 to 2009Q3**

The Rand of the South Africa experienced three stages from 1987Q1 to 2009Q3. First, the sharply depreciate of Rand against the Yuan from 1987Q1 to the peak of 2001Q4 (0.542 to 1.465) that about 170.3 percent. Second, appreciate of Rand/ Yuan start from 2002Q1 to 2004Q4 from (1.376 to 0.68). Lastly, depreciate of the currency was appear from 2005Q1 until 2009Q1 due to the global financial crisis that raise by US subprime mortgage crisis. A good sign for recovery in recently global economy bring appreciate of Rand from 1.39 to 1.09 (2009Q1-2009Q3). The relative price level between South Africa and China has increasing trend from

1987Q1 to 2009Q3. A drop of relative price level from 0.740 to 0.630 reaches about 14.9% between 1987Q3 to 1989Q1. Another slump of relative price is on 1992Q4 until 1996Q1 before improving. The Figure 1.3 shows that the exchange rate and relative price level cross each other which imply PPP may hold between China and South Africa.

### 1.1.3 Mexico

The economy of Mexico is 11<sup>th</sup> to 13<sup>th</sup> largest in the world and has a free market economy in the trillion dollar class. The economy contains rapidly developing modern industrial and service sectors with increasing private ownership. The trend of nominal exchange rate of Mexico in term of China Yuan is increasing over the time. In other word, Mexico experienced depreciates of exchange rate from 1987Q1 to 2009Q3.

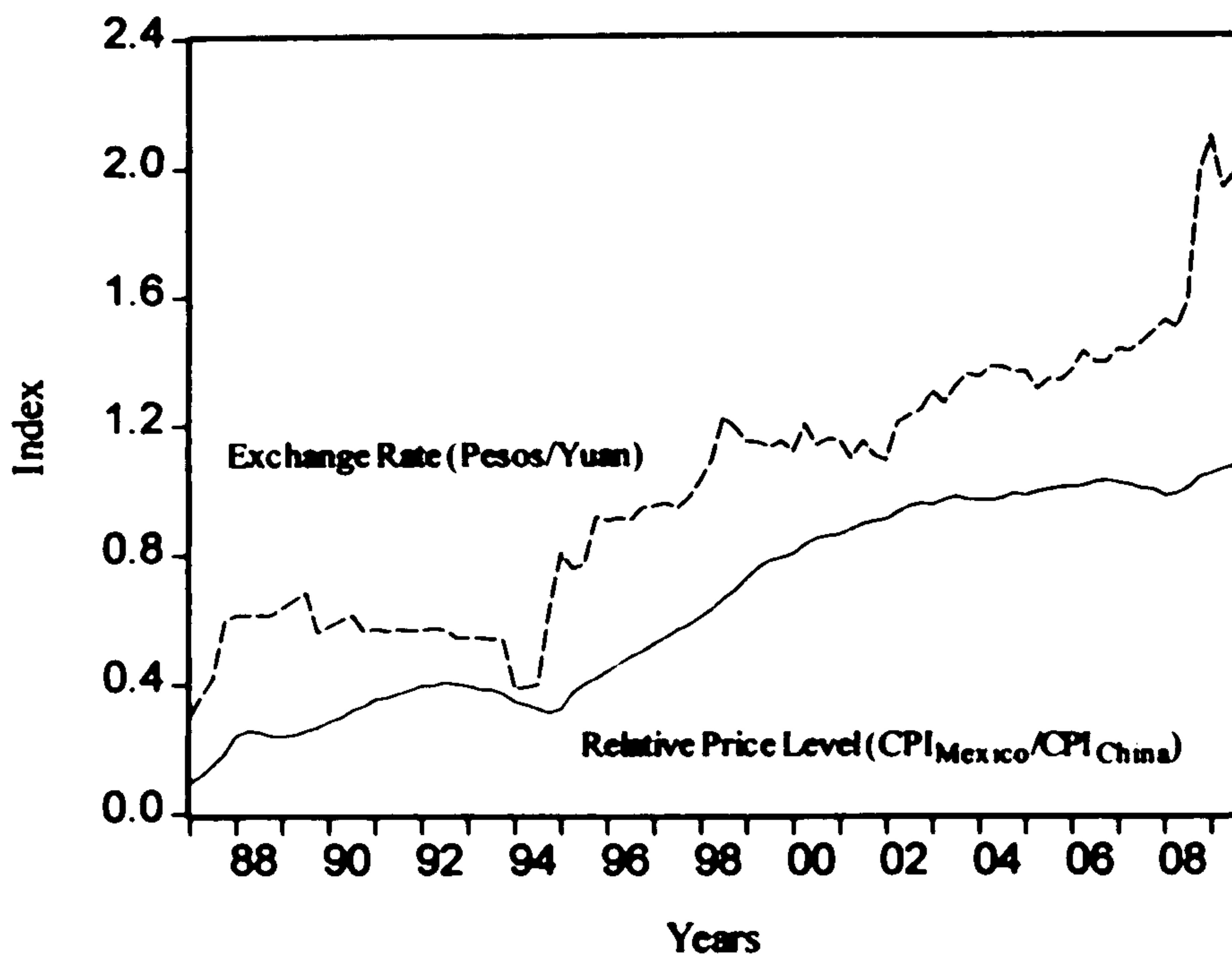


Figure 1.4: Purchasing Power Parity, Mexico/China from 1987Q1 to 2009Q3



In 1994Q1, there is a significant depreciate of currency of Mexico from Pesos 0.386 to 0.809 which about 110 percent. Besides, another sharply depreciates of nominal exchange rates of Mexico is about 40 percent from Pesos 1.5 to 2.1 between 2008Q2 to 2009Q1. The depreciation of the Mexico Pesos occurs due to the global financial crisis that rises by the subprime mortgage crisis in United Stated. Simultaneously, the relative price also increases over the time. The direction of trend for relative price and nominal exchange rate is quite close and similar.

#### 1.1.4 Brazil

From 2003 to2007, Brazil records the trade surpluses and recorded its first current account surpluses since 1992. Productivity gains coupled with high commodity prices contributed to the surge in exports. The exchange rate of Reais and Yuan and the relative price between Brazil and China shows in Figure 1.5.

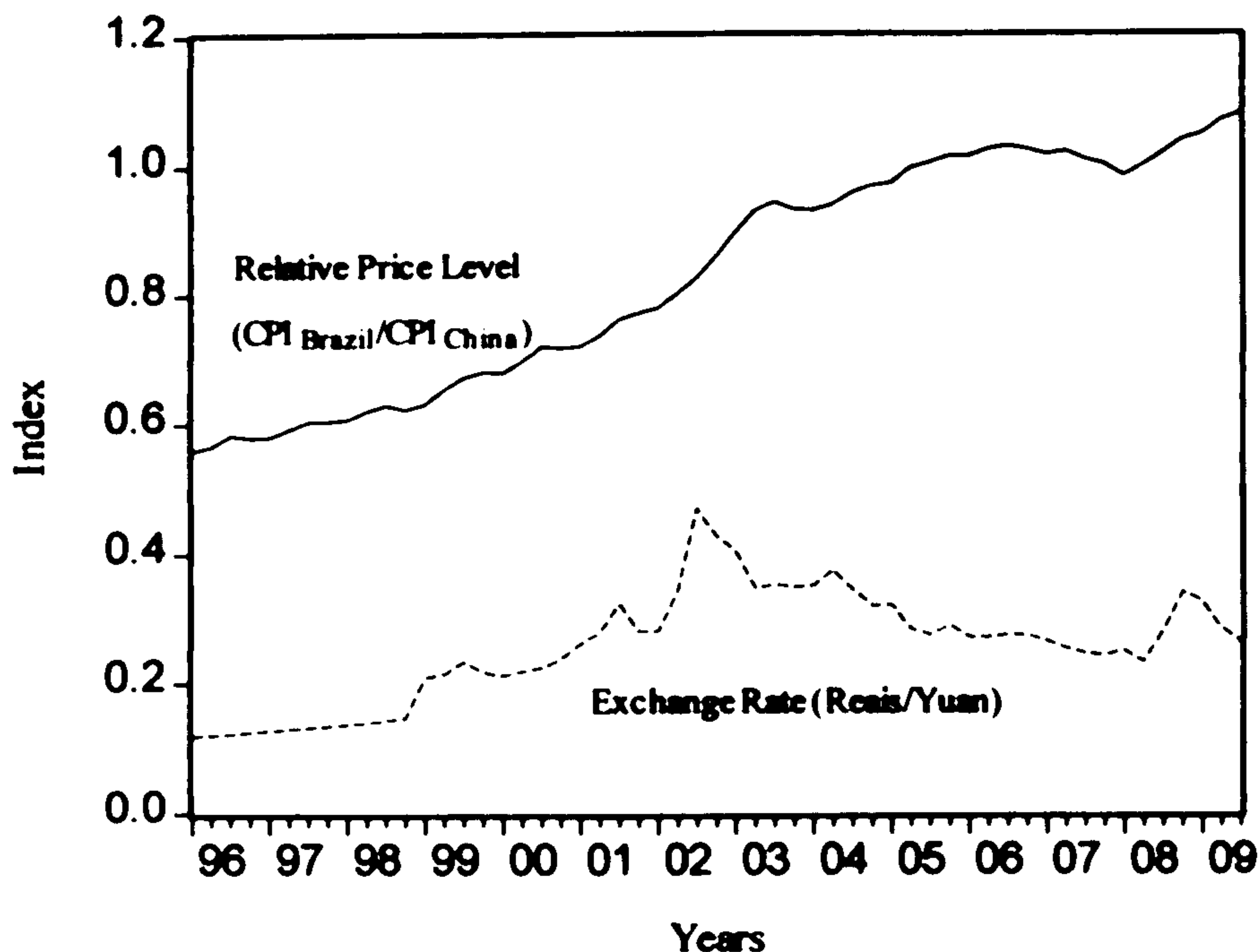
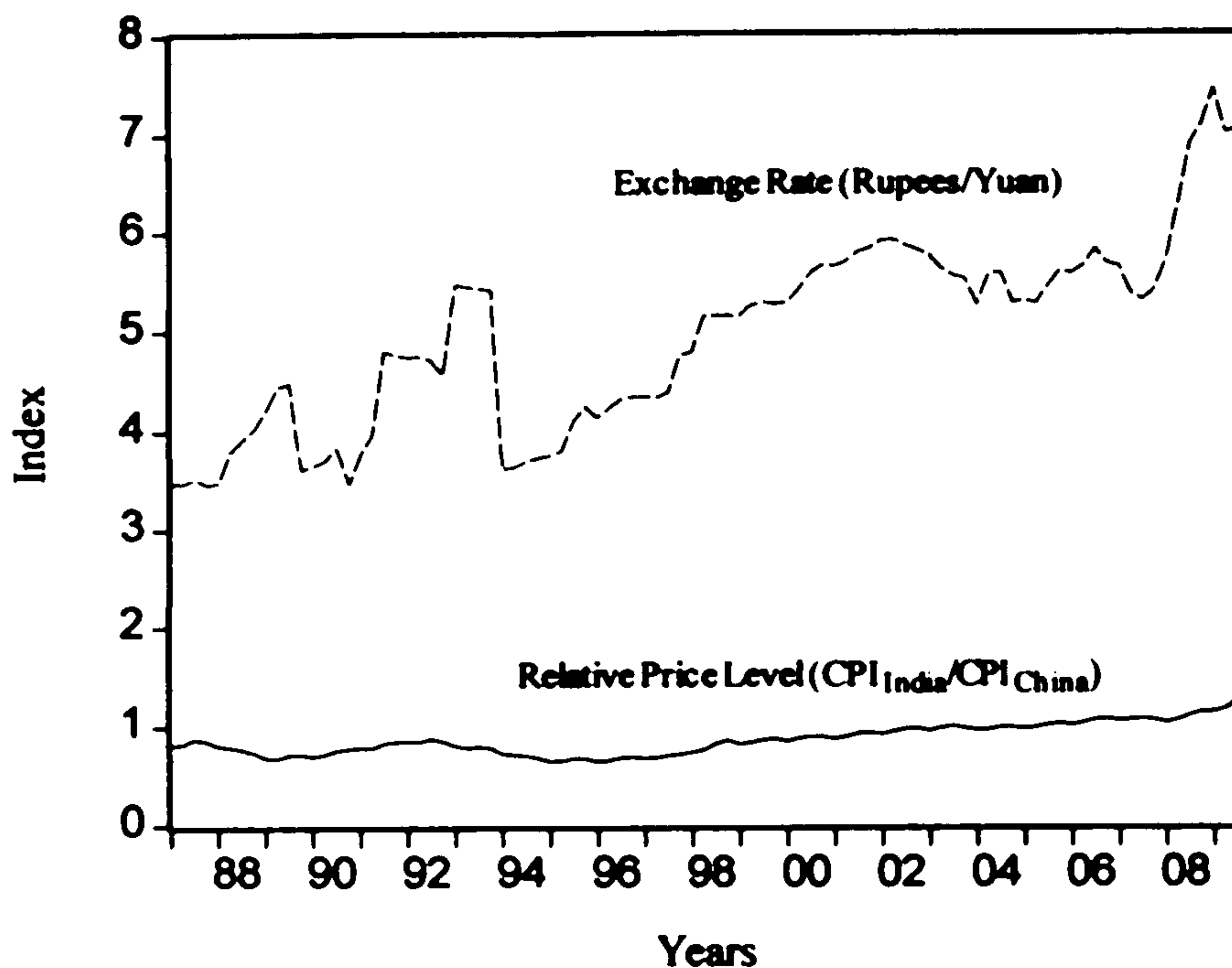


Figure 1.5: Purchasing Power Parity, Brazil/China from 1996Q1 to 2009Q3

Brazil nominal exchange rate was depreciated from 1996 to the dip in 2002. The currency of the Reais against Yuan becomes weaker during these periods. There is a significant drop from 0.118 to 0.470 which about 298.3% of the depreciation and after 2002Q3, recovery turn to appreciate of exchange rate until 2008Q2. However, depreciate of the currency occurs in 2008Q3 of the global financial crisis. The Reais depreciate about 47.4 percent from 0.232 to 0.342. The CPI for Brazil is increasing over the period. There is a large gap between nominal exchange rate and relative price level. As in Figure 1.5, the relative price level is must more high compare to nominal exchange rate.

### 1.1.5 India

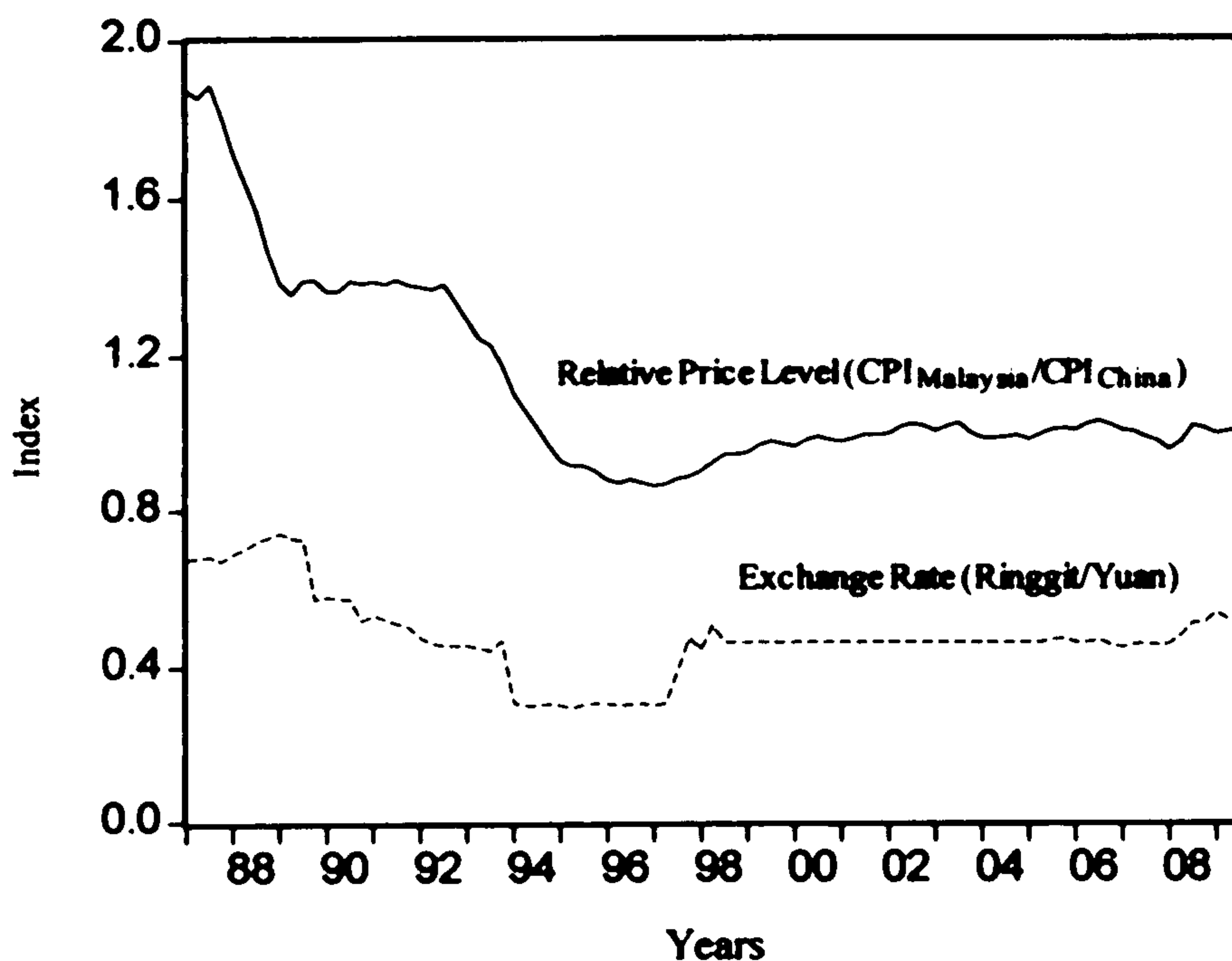


**Figure 1.6: Purchasing Power Parity, India/China from 1987Q1 to 2009Q3**

The rapid economy growth of India has pasted an average growth rate of more than 7 percents in the decade since 1997. The expanding of India economic

continues and achieved 9.6 percent GDP growth in 2006, 9.0 percent in 2007 but 6.6 percent in 2008. The exchange rate of Rupees/Yuan and the relative price level are show in Figure 1.6. India's economics became larger with increasing nominal exchange rate volatility and stable relative price level between India and China. During 1987Q1 to 2009Q3, the movement of exchange rate of India is fluctuating freely and increasing trend. Moreover, the exchange rate of India is affected seriously due to the global slowdown that cause by the subprime mortgage in US.

### 1.1.6 Malaysia



**Figure 1.7: Purchasing Power Parity, Malaysia/China from 1987Q1 to 2009Q3**

Malaysia considered as a middle income country that has transformed itself from a producer of raw materials into an emerging multi-sector economy since the 1970. In 2003, former Prime Minister Abdullah shifted the Malaysia's economy father up the value added production chain by attracting investment in high technology industrial. Malaysia economy is closely tied with the economy of US

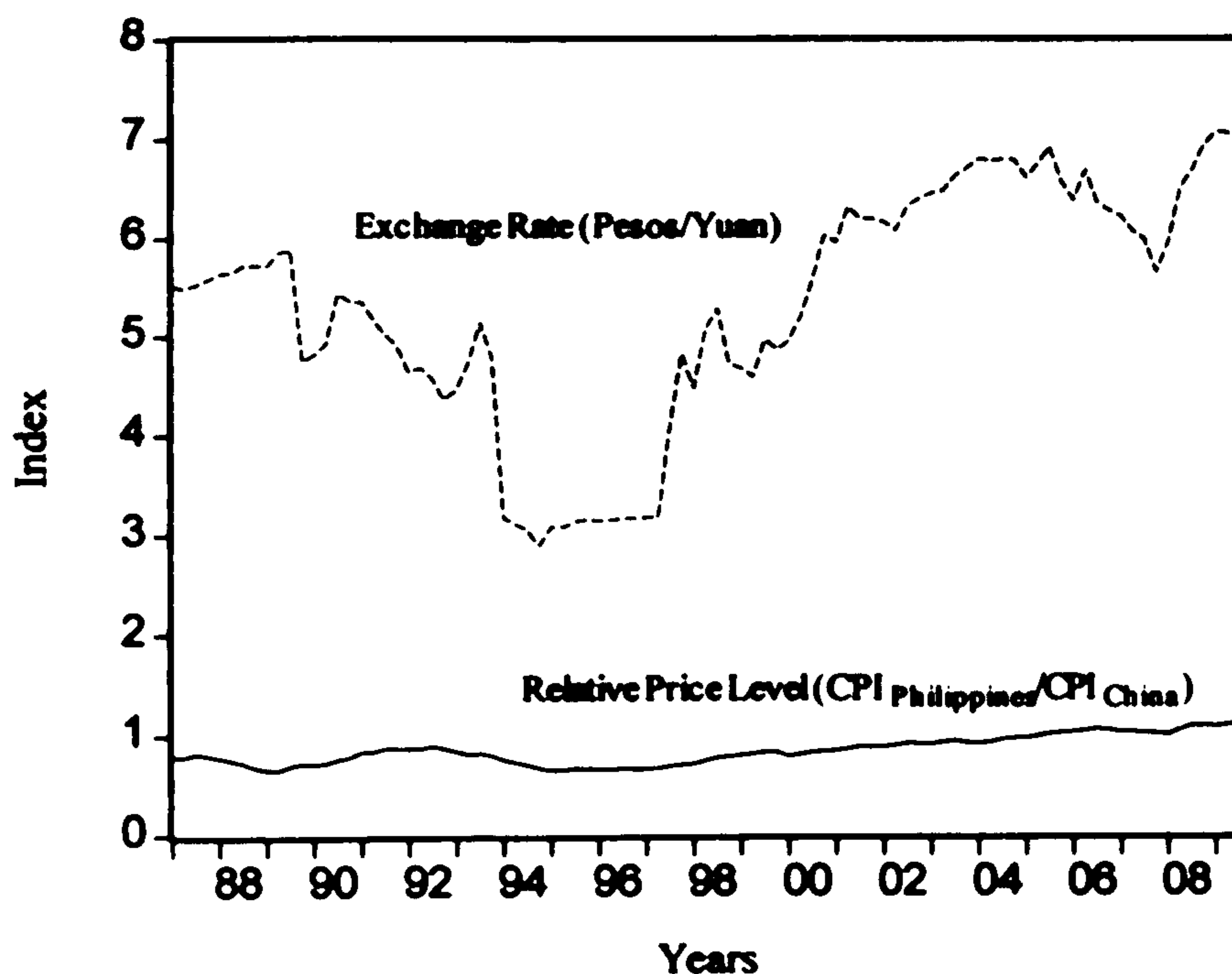


because the growth of the GDP is heavily depending on the exportation. The exchange rate movement of Malaysia can be showed in Figure 1.7. From Figure 1.7, Malaysia's currency is considers strong before 1997. However, the sharply depreciation of the Ringgit Malaysia from 0.299 to 0.504 between 1997Q1- 1998Q2 due to the Asian Financial crisis that leads Malaysia implemented fixed exchange rate system with peg the currency with RM 3.8/US\$ or equal to RM0.459/Yuan . The fixed exchange rate system is hold until 2005 and ease the currency to float in manages floating system. After ease the currency, ringgit Malaysia was appreciate but depreciate of ringgit appear in 2007Q4 due to the global financial crisis. From 1987Q1 to 1997Q1, the relative price level experienced a decreasing trend with the lowest point of 0.86. After 1997Q1, the relative price between China and Malaysia became stable along the time. From the figure, the movement of exchange rate and relative price quite similar but there is still has a gap between two variables.

### **1.1.7 The Philippines**

The Philippines's economy grew at its fastest pace in three decades in 2007 with real GDP growth exceeding 7 percent. However, the GDP growth was slowed to 3.8% in 2008 because of the world financial crisis. In the Figure 1.8, the volatility exchange rate of Pesos/Yuan is unstable from 1987Q1 to 2009Q3. This shows that Philippines currency was weakens over the time. However, depreciate of currency will creates the economy growth due to the export's price of the country relatively cheap than foreign countries. The drop of the exchange rate of the Philippines is due to the Asian financial crisis that started in Thailand in 1997. In 2007, depreciate of exchange rate of Philippines is caused by the global financial crisis. The relative

price level between the Philippines and China is stable from 1987Q1 to 2009Q3. The movement of nominal exchange rate is unstable compare to relative price. The exchange rate of Philippines against China and the relative price level are shows as following:



**Figure 1.8: Purchasing Power Parity, Philippines/China from 1987Q1 to 2009Q3**

### 1.1.8 Turkey

Turkey's dynamic economy is a complex mix of modern industry and commerce along with a traditional agriculture sector that still accounts for about 30 percent of employment. Turkey is one of the countries that classified as developed countries by the Central Intelligence Agency (CIA). In Figure 1.9, the PPP imply hold between Turkey and China due to the exchange rate and the relative price level is intercept before 1994.