THE RESEARCH ON INFLATION RATE AND UNEMPLOYMENT RATE IN CHINA

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ABSTRACT

The Chinese gross domestic product (GDP) has been rapidly growing since 2000 and this swift economic expansion is stimulated by two macroeconomic factors, which are continuous price increment and stable improvement in employment market. However, over the past few years, several dormant issues have been gradually emerging from the society and heaping up the list of Chinese macroeconomic issues. The most significant issue is the contradictory nature in macroeconomic policy formulation between the inflation-associated excess liquidity and severe employment market. This paper investigates the correlation of coefficient and causality between the inflation rate and unemployment for the period of 1978 to 2011. Surprisingly, the empirical proven Phillips curve is ineffective to find a causal relationship between the inflation rate and unemployment rate in China. The complex economic nature of China prejudices the generalisibility of Phillips curve in China. The actual relationship between the inflation rate and unemployment in China is further discussed in this paper. Constructive recommendation towards this issue is provided in the end of this paper.

Keywords: Phillips curve inflation, unemployment rate

1. Introduction

In 1958, Phillips (1958) graphically deduced a significant inverse link between the change in money wages and unemployment rate. It presented that the higher the change in money wages is, the lower unemployment rate will be, vice versa. Based on the deductive inference of Phillips, Samuelson and Solow (1960) find an empirical relationship between the inflation rate and unemployment rate in U.S by the mean of graphical illustration. This relationship is similar to Phillips’ findings, as the positive variation in inflation rate will trigger a negative variation in unemployment rate, vice versa. Noticeably, Samuelson and Solow (1960) suggest that pursuing monetary or fiscal expansion to rouse the benign inflation is an effective way to exchange for a lower unemployment rate. However, over-exercising this measure may create malign inflation, which could impair a nation’s macroeconomic stability.

According to the most recent statistics from the Chinese National Bureau of Statistics (2012), the
Chinese GDP is increasing from 40.12 trillion Yuan in 2010 to 47.16 trillion Yuan in 2011. The Chinese CPI is increasing 5.4% over the same time. The main reasons contribute to the inflation is the price increment in oil prices, the increase in transportation cost and production costs and the change in Chinese purchasing behavior. Noticeably, during January 2012, snow disaster exacerbated the shortage of agricultural product while the Chinese New Year spurred the purchasing behavior. Under the pressure from climatic impact and seasonal demand, the CPI reached a hike of 14.7% in the January 2012 over the last period.

The rising price trend also posts a significant extent of pressure on the inflation. For an example, Brazilian CVRD has increased the iron ore price benchmark by 71.5% in 2007, 65% in 2008 and intended to increase the price by another 90% increment in 2012. As the largest iron ore consumer, China is facing the inflationary pressure from the price increment in raw material. Apart from that, the economic expansion over the past 10 years also inflates several input factors, such as labor, land, resources, cost of capital and etc. Thus, the economic development in China is irresistible force to the creation of inflation.

China is facing a severe inflation issue coming from the hot money; the Chinese government may exert its socialist command to sophisticationally manipulate. Further, the Chinese government does control major large-capitalization companies and all local banks in China. Highly centralization gives the Chinese government more options than foreign countries to sterilize the hot money. However, the balance between currency appreciation and inflation combat must be abortively adjusted to benefit the majority at the insignificant expenses of minority.

After that, the Core CPI who influences the inflation is irrelevant to the China on the measurement of inflation. By using the normal CPI as the inflation indicator, there is a visual relationship between the inflation and unemployment. To prove aforesaid options viable to the Chinese inflation issue.

2. Literature Review

According to Farnham (2009), the Phillips curve is a progress of economic cycle, which composes of several stages. For an example, by starting the economy with a recession, there will be a labor surplus due to excess manpower lay off. After the economy enters into the recovery phase, the increase in aggregate demand will improve the employment rate. The increment in wages will sequentially and slowly follow the increase in aggregate demand. The rise in wages or production costs will be passed to the customer in the form of higher prices. Therefore, a decrease in unemployment rate will bring about an increase in inflation rate.

The Phillips curve relationship was holding true during 1950s and 1960s (Griffiths and Wall, 1999). However, the presence of stagflation during the period of 1967 to 1970 in U.K. and France broke down the inverse relationship between in Phillips curve (Ormerod et al., 2009). Failure of considering the simultaneous emergence of both stagnant economies and rising inflation impairs the theoretical practicability of Phillips curve. According to Friedman (1968), the long-term Phillips curve is supposed to be vertical as the unemployment rate always returns to its natural rate in long run. Contrarily, Sargent (1973) proposes that the Phillips curve is not applicable to the real economy as the passive monetary policy or static macroeconomic framework is able to cool down the exogenous money. Indubitably, this question is one of the most debatable topics in the macroeconomic puzzle.

There are a handful number of researches carried out under the research background of China. In 2010, Chen Jie (2010) estimated the relationship between the unemployment rate and inflation rate by following the established model of Phillips curve. He found that there was a significant
relationship between the unemployment rate and inflation rate in China as the short term Phillips curve. In contrary, Scheibe and Vines (2005) estimates a vertical long-term Phillips curve in China by examining quarterly data from 1988 to 2002. They find that the output gap, exchange rate policy and inflation expectation play significant roles in explain the degree of inflation. They also find that a forward-looking Phillips curve is more significant than a backward-looking Phillips curve in investigating the relationship. Thus, the Phillips curve is theoretically practical in China.

3. Problem Statement

Currently, the global economic atmosphere is depressed due to the unsettled European sovereign debt crisis. The spillover effect of debt crisis originated from Portugal, Ireland and Greece brings negative ripple to other peripheral countries such as Italy and Spain. The slowdown in economic growth rate worsens the European unemployment rate. To combat the debt crisis, most European Union members are implementing fiscal austerity policy to minimize the non-value-added activities. Subsequently, both household consumption and commercial investment are inhibited by the fiscal austerity. Hence, the shrinkage in European importing volume decreases the Chinese exporting volume and further impinges on the manufacturing industry of China.

Moreover, in 2011, European Union members were appealing for modifying the European Union trading regulation in order to prohibit the Chinese product entering into the European countries for the reasons of product quality control and local product protection (Deutsch, 2012). If the European Union succeeds in their isolation strategy, China is very likely to a severe unemployment issue due to the decrease in supply. At present, the Chinese unemployment rate is fluctuating around the natural unemployment rate. This implies that the high unemployment rate is deriving from the economic transformation, which originates from the frictional unemployment and structural unemployment. Theoretically, both frictional and structural unemployment will return to the natural rate in long run.

Currently, China is under the process of rapid industrialization. Substantial investments lead to a number of agricultural lands transforming into commence districts (Bromley and Yao, 2006; Brandt and Rawski, 2008). The Chinese national grain output is significantly influenced by the amount of Chinese total plough. Although this situation does aggravate the Chinese national grain production quantity, this supply factor only does little relevance to the grain price. This is because the total supply shortage can be resolved by importing food products from other countries, such as Vietnam or Thailand.

Nevertheless, the subsequent impact of industrialization does change the demand landscape on the food product. The rapid growth of China resident income intensely amplifies the Chinese demands towards the food products (Huang and Gale, 2009). The swift aggregate demand expansion considerably influences the food price equilibrium level. Hence, Chinese grain price is more impacted by the demand factor than the western countries, in which either the western country has rich land resources such as Canada or the country does not experience rapid social living transformation like France. Therefore, due to the rapid economic transformation, food prices in China are not primarily influenced by the supply factors, instead, by the total social demand factors at a larger extent.

Conclusively, the Chinese government should not combat the inflation but transform the harmful inflation into benign inflation to infuse positive incentive into the Chinese economy. Namely, the Chinese government should use the inflation as a constructive stimulus on the control of aggregate demand, investment volume and employment market prospective. This measure is better than the
inflation combat because an alone inflation combat could suppress one’s economic growth.

4. Research Objectives

Currently, the Chinese economy is facing the inflation arising from the excess hot money while the global economy is stagnant. Aforementioned, the presence of stagflation is unexplainable by the Phillips curve. The exogenous money activities or hot money may also elevate the inflation without decreasing the unemployment. Although preceding researcher considered the Phillips curve presenting in China, the Vicissitude in Chinese economy oppugns the current generalisability of Phillips curve in China. Hence, the main objective of this paper is to examine the relationship between the unemployment rate and inflation rate. If the Phillips curve does not explain the current Chinese economic variation, an alternative explanation to the Chinese economic trend will be provided in light of matching the theoretical ground with the Chinese complex macroeconomic mechanism.

5. Research Methods

The paper follows the research methodology of Wang Lei (2007) to seek a new light of historical economic theory with the current Chinese macroeconomic condition. Principally, the Phillips is the core theory in this inductive study. The relationship between the unemployment rate and inflation rate in China is examined under the test of correlation coefficient with the period of 1978 to 2011. Constructive recommendations are provided at the end of this paper in accordance to the research findings.

6. The unemployment rate of China

An unemployment rate is used to estimate the unemployment situation of a country. It is deriving from dividing the amount of unemployment by the total number of person who has the ability to work. Chinese National Bureau of Statistics computes the unemployment rate by using the registered urban unemployment rate in accordance with the international conduct. The formula is:

\[
\text{Registered Urban Unemployment Rate} = \left[ \frac{\text{Registered Urban Unemployment}}{\text{Registered Urban Unemployment} + \text{Registered Urban Employment}} \right] \times 100\%
\]

Registered urban unemployment rate does not reflect the real national unemployment rate as it only focuses on the urban manpower. In 2005, the Chinese National Bureau of Statistics started including the farmers (e.g. landless farmer) in the computation of unemployment rate. Due to a change in unemployment rate computation, this paper adopts the registered urban unemployment rate in order to cover longer examination period. This step is necessary for the research to observe the evolving characteristics of Chinese economy over the period of 1978 to 2011.
The data analysis of unemployment rate

Chart 1: Unemployment rate and GDP growth from 1978 to 2011

Chart 1 depicts the trend of unemployment rate and GDP growth over the period of 1978 to 2011. The unemployment rate reached the peak of 5.4% in 1979 and went to the trough of 1.8% in 1985. From the period of 1984 to 1988, the unemployment rate was behaving relatively stable comparing with its later period. From 1989 onwards, the unemployment rate was showing an upward trend until 2004. In 2004, the introduction of unemployment rate reduction policy effectively controlled the continuous rising trend of unemployment rate. Worth to mention, the unemployment rate never surpassed the GDP growth over the period of 1978 to 2011.

Theoretically, there is an inverse relationship between the unemployment rate and GDP growth. However, from Chart 1, the variation in GDP growth does not visually impact the degree of unemployment rate in China, especially during the period of 1999 to 2011. The rising trend of GDP growth has been following with an upward trend in unemployment rate. According to USCC (2012), the Chinese economy presents a weird situation of simultaneous increase in GDP growth, unemployment rate and inflation rate. USCC further expresses that the job providing scheme of Chinese government does not radically solve the serious unemployment. For an example, the recently announced unemployment rate was 4% whereas the real unemployment rate was nearly 8% when the number of recent fresh graduates was inclusive in the computation. Thus, the unemployment issue is severely influencing the social harmony and economic stability in China.
7. Overview of Chinese inflation situation

Referring to Chart 2, there are several turbulences in Chinese inflation rates. This circumstance indicates that Chinese economy has experienced several economic reformation and transformation over the past 40 years.

In 1980, China was implementing an economic reformation which opened its economy to the foreign investments (Brandt and Rawski, 2008). This modernization policy improved the Chinese economic conditions and the rapid investment growth in China stimulated the increase in inflation rate during that period. To support the rapid growth, the Chinese government also devoted into the building of infrastructures. This economic growth arose the beginning of Chinese modern industrialization and the prologue of subsequent series of Chinese inflation.

During 1985 to 1989, the Chinese economy occurred to the first severe tide of inflation (Yang and Wang, 2003). First, the rapid growth in fixed assets heavily spurred the social demand in consumer products. Besides, the product cost was increasing as the wage increasing rate was higher than the productivity. Further, the popularity of using credit purchase intensified the level of inflation. These issues brought the inflation to 18% during 1988 to 1989. As a result, in November 1989, the Chinese government issued a three-year solution to abate the inflation by using the governmental interference.

In the period from 1993 to 1996, the prevalence of property and stock investment created financial bubbles in China. The economic booming greatly consumed the resources of capital transportation, heavy metal, raw material and energy resources. An insufficiency in resources supply caused high pressure to Chinese inflation. To deal with this supply shortage, the Chinese government issued a “soft landing” to mitigate the tension. Therefore, based on the preceding overview, it implicitly reveals that a growth rate always follows by a high inflation rate, in which this situation is fully according to the economic theory.
The main stimulus of Chinese inflation trend

Chinese current inflation is triggered by Demand-pull inflation; it is mainly caused by the excessive growth of money supply or excessive inflow of foreign investment. In recent years, the inflow of foreign exchange has constituted the fundamental for Chinese central bank to support the monetary base (Chinese National Bureau of Statistics, 2012; Labonte and Morrison, 2011). This situation is illustrated in the figure 2, which explains the ratio of Chinese foreign exchange over the monetary base from year 2000-01 to year 2012-06.

![Foreign Exchange/Reserve Money](image)

Figure 2: Foreign exchange to reserve money share

In 2001, the foreign exchange to reserve money ratio was 43%. It was steadily increasing over 2001 to 2005 and breaking 100% in 2006. The ratio reached the peak in 2007, which is 129%. Namely, during 2006 to 2012, the Chinese monetary base was almost fully occupied to cover the inflow of foreign exchange. The large numbers of foreign exchange inflows lead to a rapid growth in money supply. This issue forced the China Central Bank to increase its reserve funds to deal with swift expansion in the M2 (The People’s Bank of China, 2012).
Figure 3 depicts the ratio of M2 to GDP of China, U.S. and the world. This figure shows that Chinese M2 to GDP ratio has been gradually elevating over the period from 1993 to 2011. Although the macroeconomic control in 2004 did successfully restrain the increasing phase of M2 to GDP ratio over 2004 to 2007, the 2008 subprime mortgage crisis broke the monetary control and further caused the M2 to GDP ratio to rise again. Due to the raise in money supply, a positive stimulation to the inflation was inevitable.

In particular, the impact of excess liquidity followed a certain sequence on inflating the prices of different Chinese product segments. Usually, the impact would firstly influence the asset price and affect the commodity price in subsequent (McConnell and Brue, 2008). Owing to the overcapacity in China, the increasing degree of asset price was higher than the increase level of commodity price. This situation was common as consumers were more likely to reduce their consumptions and increase their savings to deal with uncertain cash flows during the financial crises. This sudden saving behaviour incurred an insufficiency in effective consumption demand. Thus, high savings strengthened the increase in asset price and delayed the increase in commodity prices.

When the time went on, the expected rate of return declined as a result of the gradual increase in asset prices. The squeeze from over-savings would progressively flow into the commodity markets and further inflate the commodity prices. Therefore, the demand-pull inflation in China is presented as a multi-phase progress.

**CPI and core CPI in China**

Publishing the core CPI has become a general norm for countries worldwide. Although the key concept of the core CPI is coined by Gordon in 1975 (Gordon, 1975), different countries might follow different methods to calculate the core CPI indices. For examples, the U.S. core CPI excluding food (weight 15%) and energy (weight 9%), the Japanese core CPI not including fresh food (food weight
25%, fresh food weight 4.5%), the E.U. based core CPI exclusive of unprocessed food (the food’s weight was 19.3%, unprocessed food weight 7.6%) and energy weight 8.2%) in the core CPI formula. The main significance of using the core CPI is core CPI filtering the interference of seasonal factor from the normal CPI (Bradley et al., 2009). Principally, the core CPI does not consider the changes in food and energy sectors. However, this measure raises several doubts over the scientific reliability of the core CPI:

First, there are many empirical researches consider that the normal CPI is more relevant than Core CPI in measuring the inflation (Labonte, 2011; Chen Jie, 2010; Valkovszky and Vincze, 2000). This is because the exclusion of seasonal factor from the simple CPI does take the whole fiscal year into account. For an instance, instead of the core CPI, the U.S. adopts the core personal consumption expenditures price index (core PCE) in setting its monetary policy. However, the core PCE may not post the same significance to China in setting its monetary policy (Yifan and Muyun, 2008). In respect that, the core CPI and core PCE are deemed as local indicators that has dissimilar impacts to different countries.

As the core CPI does not take the food product into account, the significance of food products to the Chinese inflation makes the core CPI inferior to the normal CPI in measuring the Chinese actual inflation. Moreover, the core CPI does not consider the change in price of price-controlled substance or product. However, there is a number of products are under the price control scheme in China. As a result, to exclude the impact from the price control scheme, the normal CPI should be adopted to more accurately measure the Chinese inflation.

<table>
<thead>
<tr>
<th>Items</th>
<th>Growth rate of CPI</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPI</td>
<td>5.4</td>
<td>100</td>
</tr>
<tr>
<td>Food</td>
<td>11.8</td>
<td>66</td>
</tr>
<tr>
<td>Tobacco, Liquor and Articles</td>
<td>2.8</td>
<td>7</td>
</tr>
<tr>
<td>Clothing</td>
<td>2.1</td>
<td>3.2</td>
</tr>
<tr>
<td>Household Facilities, Articles and Services</td>
<td>2.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Health Care and Personal Articles</td>
<td>3.4</td>
<td>5.5</td>
</tr>
<tr>
<td>Transportation and Communication</td>
<td>0.5</td>
<td>0.8</td>
</tr>
<tr>
<td>Recreation, Education and Culture Articles</td>
<td>0.4</td>
<td>0.3</td>
</tr>
<tr>
<td>Residence</td>
<td>5.3</td>
<td>16.8</td>
</tr>
</tbody>
</table>

Table 1: Growth rates of Chinese CPI in 2011 (Chinese National Bureau of Statistics, 2012)

Majorly, the main difference between the normal CPI and core CPI is contributed the change in food price. In Table 1, the food item attributes to 66% over the total portion of normal CPI calculation. If the food item is excluded from the CPI calculation, it is unlikely to precisely present the actual inflation rate in China. As aforementioned, food items are very significant in the measurement of Chinese inflation rate and they should not be excluded from the calculation. This makes the core CPI less meaningful than the normal CPI in measuring the Chinese inflation rate. This proves that the adoption of normal CPI is superior than using the core CPI in this paper.
Conclusively, the normal CPI and core CPI are homogenous in nature. Namely, the rising in normal CPI is very likely to increase the core CPI at a similar proportion. However, the huge disparity between the Chinese normal CPI and core CPI oppugns the practicability of the core CPI. Therefore, instead of the core CPI, the normal CPI is adopted in this paper to determine the inflation trend of products in China.

![Graph 1: Monthly changed of CPI in China (Chinese National Bureau of Statistics, 2012)](image)

Referring to Graph 1, in 2011, the increase in Chinese CPI was 5.4% and monthly increase in Chinese CPI was above 4%, which was deemed to be a high level comparing to the global economy. Link relative ratio measures whether an inflation rate in current year is greater or lower than the inflation rate in previous year. The formula of a link relative ratio is the figure in current year minus the figure in last year over the same period or month. Referring to the link relation ratio, only March and November results in 2011 did appear to be growing at a slower pace over the same period in 2010. Overall, it indicates that the increase in demand in 2011 was higher than the increase in demand in 2010. This exhibits that the Chinese social demand is still under a growing phase.
There are eight segments to compose the overall CPI. Referring to Graph 2, the biggest contributor of the increase in CPI is the increase in food prices, which increased 11.8% in 2011. In following, the residence associated expenses was inflated by 5.3%. Fees regarding transportation and communication and recreation and education and culture articles were steady over 2011. The increasing rates of other segments were ranging between 2% to 3%.

**Empirical relationship among food products in China**

Due to the unusual turbulence in food product prices, the window period of testing the relationship among food products in China is from 1990 to 2010. Table 2 shows the correlation coefficient among food products from 1990 to 2010.

From Table 2, it shows that all segments but fruit segment are correlating with the CPI.

<table>
<thead>
<tr>
<th></th>
<th>Bean</th>
<th>Animal</th>
<th>Corn</th>
<th>Rice</th>
<th>Wheat</th>
<th>Cereal</th>
<th>Vegetable</th>
<th>Oil</th>
<th>Marine</th>
<th>Fruits</th>
<th>Sugar</th>
<th>CPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bean</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal</td>
<td>.685*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corn</td>
<td>.488*</td>
<td>.773**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>.484*</td>
<td>.723**</td>
<td>.173*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>.555**</td>
<td>.763**</td>
<td>.943**</td>
<td>.999**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereal</td>
<td>.590**</td>
<td>.718**</td>
<td>.894**</td>
<td>.918**</td>
<td>.969**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vegetable</td>
<td>.472**</td>
<td>.646**</td>
<td>.824**</td>
<td>.787**</td>
<td>.826**</td>
<td>.755**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil</td>
<td>.581**</td>
<td>.869**</td>
<td>.724**</td>
<td>.726**</td>
<td>.715**</td>
<td>.653**</td>
<td>.591**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine</td>
<td>.672**</td>
<td>.776**</td>
<td>.792**</td>
<td>.822**</td>
<td>.828**</td>
<td>.723**</td>
<td>.865**</td>
<td>.685**</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fruits</td>
<td>.135</td>
<td>.375</td>
<td>.549**</td>
<td>.582**</td>
<td>.576**</td>
<td>.535**</td>
<td>.693**</td>
<td>.423</td>
<td>.508</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar</td>
<td>.268</td>
<td>.384</td>
<td>.627**</td>
<td>.547**</td>
<td>.625**</td>
<td>.619**</td>
<td>.586**</td>
<td>.243</td>
<td>.509</td>
<td>.608**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CPI</td>
<td>.522**</td>
<td>.776**</td>
<td>.457**</td>
<td>.782**</td>
<td>.829**</td>
<td>.784**</td>
<td>.709**</td>
<td>.645**</td>
<td>.133</td>
<td>.426</td>
<td>.648**</td>
<td>1</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level.**

**Correlation is significant at the 0.05 level.**

This means that the variations of almost all food products have individual gross impacts to the CPI.
variation in CPI. However, the table also indicates that there is a possible multicollinearity in a multiple regression if all segments (independent variables) are regressing against the variation in CPI (dependent variable). This is because all segments are significantly highly correlated among each other. This situation is common because all food segments listed in Table 2 are complements to each other to form the basic daily meal for Chinese. Multicollinearity could impair the significance of an independent variable in explaining the variation in dependent variable.

Thus, instead of using all individual segments in a multiple regression, the general agricultural product price increment is adopted as the explanatory variable to prove how significant is the agricultural product to explain the variation in CPI.

\[
\begin{align*}
\alpha & \quad 0.0227^{***} \\
\theta & \quad 0.4746^{***} \\
\text{Breusch–Godfrey} & \quad 0.0001^{***} \\
\text{White test} & \quad 0.0015^{***} \\
R^2 & \quad 0.7265 \\
F\text{-stat} & \quad 50.4685^{***}
\end{align*}
\]

1)*** and ** indicates statistical significance at the 1% and 5% levels respectively
2) \(\alpha\) denotes the intercept. \(\theta\) denotes the coefficient of general agricultural product price increment.
3) General agricultural product price increment is regressed against the variation in CPI (inflation).
4) The examination period is 1990 to 2010.

Table 3 - Findings of regression analysis

\(\text{CPI}_t = \alpha + \theta \text{AP}_t + \epsilon_t\)
Where,
\(\text{CPI}_t = \) Annual variation in CPI at time \(t\)
\(\alpha = \) Intercept
\(\text{AP}_t = \) Annual variation in general agricultural product price at time \(t\)
\(\epsilon_t =\) error term

Refer to Table 3, findings from Breush-Godfrey test and White test indicate that a Newey-West standard error adjustment should be adopted in the regression to deal with the problems of serial correlation and heteroskedasticity. Multicollinearity is unable to present when there is only independent variable in a regression. Thus, after applying a standard error adjustment to the regression, the finding from this regression is unlikely to be spurious.

From the finding, it shows that there is a strongly significant relationship between the general agricultural product price increment and variation in CPI even at the 0.01 significance level. Further, 72.65% variation in CPI can be explained by the variation in general agricultural product price. This is
very closing to the CPI weight of food products shown in the Table 1. Thus, an inclusion of food inside the inflation computation is necessary to truly reflect the inflation situation in China. As a result, the normal CPI is adopted in this paper to represent the inflation indicator as the core CPI is not applicable in China.

4. The Phillips curve phenomena in China

Based on the data availability, this paper uses the data ranging from 1978 to 2011. Figure 4 visualizes the Phillips curve or the relationship between the inflation rate and unemployment rate in China. In Figure 4, it illustrates that there is an inverse relationship between the inflation rate and unemployment rate. Before the bar of 3.2% unemployment rate, it shows that a higher inflation rate is accompanying with a lower unemployment rate somewhat. This situation is more significant and observable after the bar of 3.2% unemployment rate, which a lower inflation rate is together with a higher unemployment rate.

By regressing the data from Figure 4, the correlation coefficient between the Chinese inflation rate and Chinese unemployment rate in 2011 was -0.62. The R square or explanatory power of this relationship is 0.38. Namely, only 38% change in the inflation rate can be explained by the variation of the unemployment rate. In other words, the remaining 62% variance of the inflation rate cannot be explained by the sole unemployment rate. This proves that additional explanatory variables should be included to examine the root cause of the variation in inflation rate.

Several reasons contribute to the poor explanatory power of unemployment rate towards the variation in inflation rate. First, the collected data only covers the urban unemployment rate and consumer price index. This cannot accurately represent the whole population as well as the actual relationship between the unemployment rate and inflation rate. Second, the Chinese labor market is not as effective as the developed countries (Ge and Yang, 2012). A less free labor market constrains the employees’ bargaining power to negotiate with their employers and adjust their wages in accordance with the variation in unemployment rate. Last, the money illusion arose from the time gap between wages raises and actual inflation also impairs the practicability of Phillips curve in China.
As a result, a mismatch between the Chinese labor interests and Chinese rapid economic development cause a noteworthy disparity between the Chinese Phillips curve and international Phillips curve. Formal inflation indicators and unemployment indicators are inefficient to fulfill the basic requirement of forming the Phillips curve. Thus, a lack of precise inputs deteriorates the generalisability of Phillips curve in China.

6. Strategies

Currently, China is facing severe inflation issue where the salary increment does not match with the inflation. According to the Phillips curve, both inflation and unemployment issues will come to an economy at the same time. The concurrency between the inflation and unemployment makes an economic puzzle to the Chinese government as the root cause of inflation is unrecognized yet. Aforementioned, adjusting the interest rate or fiscal outlay is only able to solve either the inflation or unemployment once at a time. However, the reconditeness of root cause impairs the effectiveness of direct intervention. Thus, to solve the inflation issue in China, the Chinese government should embark on both indirect governance and direct intervention.

Strategies are discussed below:

1) Money supply contraction

As the root cause of inflation remains unknown, the Chinese government could follow the traditional strategy to solve the inflation issue, which uses the combination of both monetary policy and fiscal policy.

Under the current economic, a fiscal austerity might not be effective to control the inflation issue. A fiscal contraction will directly decrease the Chinese aggregate demand and degrade the overall equilibrium price and quantity (Samuelson, 2010). This situation is unfavourable to the Chinese economy and GDP growth. This is because a fiscal contraction could damage both malicious inflation and benign inflation, in which the benign inflation is an input of economic growth.

According to the Chinese National Bureau of Statistics (2012), the comfort zone of inflation level is around 2% to 4%. When the inflation is below 2%, the insufficiency of inflation momentum may cause an economy stagnant, such as Japan. When the inflation is above 4%, the Chinese government will face the condemnation of people. Thus, although the issue of excess liquidity is severely influencing the inflation, the current inflation rate is 5.4% (slightly above 4%) implies an impracticality of demand control. This is because the traditional Chinese saving behaviour offsets the strong inflation impact of excess liquidity. Besides, the huge polarization of rich and poor causes a disaccord in purchasing power increment between the rural area and urban area (Xin, 2006). Therefore, the impracticality of fiscal contraction is embodied from the high probability of destroying both benign inflation and malicious inflation.
To implement a quantitative tightening policy, the Chinese government should increase the bank reserve requirement rate and decrease the interest policy rate. A significant elevation in the bank reserve requirement rate in foreign currency can reduce the credit creation level and further decrease the money supply (credit supply) to the market. Concurrently, implementing a slight decrease in the interest policy rate can cool down the incentive for foreign player to swarm into the Chinese capital market. The effectiveness of this inverse control in monetary policy is working in both Brazil and Turkey on abating the issues of inflation and excess liquidity without compromising the employment condition (Weisenthal, 2011).

However, a monetary policy is unable to solve the issue alone. This is because this solution is provided to control the M3. To control the MB, the China Central Bank should also step in this ball game. As China does not implement laissez-faire, this provides the China Central Bank has the power to control both interest rate and money supply (Letiche, 1992). To amplify the magnitude of preceding solution, the China Central Bank can properly reduce the volume of MB supply. When the MB supply is cut down, this could further cool down the inflation come from the social consumption and pileup of foreign reserve. A decrease in MB supply is applicable to China as the Chinese government could loosen the Yuan value suppression to let the Yuan appreciate in accordance to the Chinese economic growth. As a result, the Chinese government could release the foreign exchange reserve and excess liquidity.

To complement the monetary policy, the Chinese government could implement new capital inflow circuit breaker. In terms of the inflow circuit breaker, the Chinese government should increase the control in hot money, which undermines the economic stability. Further, the Chinese government could reduce the benefits of direct investment in the urban area. Alternatively, the Chinese government should shift the foreign direct investment benefits from the urban area to the rural area. This can effectively reduce the polarization of poor and rich and make the inflation as a positive stimulus to the citizen’s living standards. This measure offers the foreign player either selection of assisting rural area development or reducing direct investment. Either selection benefits the Chinese economy, in terms of minimizing the polarization of rich and poor or cooling down the issue of excess liquidity.

Benefits of money supply contraction are releasing the pileup of foreign exchange reserve, suppressing the potential asset bubble, minimizing of the polarization of poor and rich, turning the inflation into a stimulus of salary increment and reducing the associated negative impacts to unemployment condition. However, these benefits come with a price, which is the appreciation of Chinese Yuan. If the Chinese Yuan is appreciating against other major currency, the Chinese price advantage and labour cost efficiency will be deteriorated. Withdrawal of foreign capital, loss of international competitive for Chinese exporting and deflation are foreseeable. Thus, the Chinese government should find a balance between the inflation combat and Yuan appreciation to persistently stabilize the economy.
2) Other solutions

Other solutions are provided to assist or substitute the preceding money supply contraction to combat the current inflation issue.

(1) Tax cut in the corporate sector
Tax cut might alleviate the financial burden and increase the profit reserve for an enterprise. This can encourage an inefficient enterprise to expand its production line or refine its technology to achieve the economics of scale. However, a tax cut is ineffective to those companies who have achieved the economics of scale or do not foresee an increase in the aggregate demand. Thus, the significance of tax cut is little if the demand is unlikely to increase in future. Therefore, a tax cut policy is only applicable to the food industry and residence industry which are experiencing high demand-pull inflation.

(2) Loosening the Chinese Yuan control
The gradual increase in Chinese reliance on importing energy sources and raw materials is lifting the production costs in China (Home, 2012). Loosening the Chinese Yuan control or reducing the printing of money can allow the Chinese Yuan to appreciate. In return, the importing product will be cheaper in commensurate to the appreciation level of Chinese Yuan. The appreciation of Chinese Yuan can allow the Chinese government to release a portion of foreign exchange reserve. Eventually, this measure can bring down the production costs and reduce the tension of employee lay off at the same time.

However, aforementioned, allowing the Chinese Yuan to appreciate will weaken the competitiveness of Chinese product in the global market. The Chinese government is in midst of a fork to either inflation combat or unemployment mitigation. Besides, the expectation of Chinese Yuan appreciation has attracted the influx of foreign capital into the Chinese capital market (China Daily, 2011). Foreign players and investors are demanding a return beside the pure investment gain, which is currency appreciation gain. This situation heightens the issue of excess liquidity in China. This is because a slight increase in Chinese Yuan might trigger the more inflows of foreign capital and hot money to exploit profit from the Chinese government’s measure. Thus, this is an issue of balancing the capital inflow control and Chinese Yuan appreciation. Further research is required to provide a sophisticated solution.

7. Summary

Although China is facing a severe inflation issue coming from the hot money, the Chinese government may exert its socialist command to sophisticatedly manipulate the macroeconomic status. This is because China not really follows the invisible hand system, but follows a semi-command economy system. Further, the Chinese government does control major large-capitalization companies and all local banks in China. Highly centralization gives the Chinese government more options than foreign countries to sterilize the hot money. However, the balance between currency appreciation and inflation combat must be abortively adjusted to benefit the majority at the insignificant expenses of minority.
Conclusively, the Core CPI is irrelevant to the China on the measurement of inflation. From the finding, it empirically illustrates that the inclusion of Food index is crucial to accurately reflect the inflation status in China. By using the normal CPI as the inflation indicator, there is a visual relationship between the inflation and unemployment. This result is consistent with Chen Jie (2010) findings. To prove aforesaid options viable to the Chinese inflation issue, a further research is necessary to statistically and consistently place the Chinese economic puzzle into a rest.

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