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Cyclical Analysis of India's Economic Growth: Is Service Sector Catching up?

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ABSTRACT

This paper analyses the cyclical fluctuations of economic growth in India emphazing upon the service sector for the period 1952 to 2006. Using Hodrick and Prescott (HP) Filter method, we estimate the trend components and cyclical components of real GDP, agriculture, services and industry. The results show that service sector is subject to less cyclical volatility as compared to other sectors. Hence, it can be argued that service sector is more stable than industrial sector. After estimating the trend series, we again apply HP filter method on the series of output deviation to derive cyclical movements and irregular components or short-term shocks. Thus the economy had undergone one completed business cycle and other ongoing cycle during the period of study.

Key Words: Services, Hodrick and Prescott method, business cycle.

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1. Introduction

The structural reform and liberalization policies adopted since 1991 have transformed the Indian economy to one of the fastest growing economies of the world. 'This is certainly a far cry from the conventional image of the Indian economy as a limbering, shackled giant trailing far behind most significant emerging market economies in the growth race.'[1] Illustratively, Indian economy in recent decades moved to a robust growth above 6 percent with a sharp reduction in the GDP growth volatility. Against this backdrop, this paper attempts to examine the nature of the structural transformation with an emphasis on the service sector in India.

The post-independent Indian economy has experienced a variety of growth phases over the period 1950-2006. The growth rate of Indian economy from 1950s to 1970s averaged only about 3.5 per cent and later, during 1980s to 1990s the growth rate crossed 5 percent per annum (Appendix Table 1). The real upsurge in the growth could take place during 1990-2006, when the economy attained a growth rate of 8 per cent. According to Ahluwalia (2002) the growth of 1980s was unsustainable because it was fuelled by a buildup of external debt that culminated in the crisis of 1991. However, the initiation of structural reforms helped Indian economy in bringing a higher scale of integration of Indian economy with the world. Thus the performance of the post-reform economy was encouraging in many respects; the increase in the domestic saving rate, investment rate in the country and in turn, improvement in the growth rate. Therefore the country was able to withstand from the contagious effect of East Asian crisis of 1997-98.

But, the pattern of the sectoral growth of the Indian economy showed a progressive and gradual shift away from agriculture to industry and later towards the services. As

[1] Acharya(2006)

indicated in Table 1, Agriculture which is considered to be the mainstay of the Indian economy shows a decelerating growth over the years. The growth in Agriculture and Allied sectors was more or less same around 3 percent during the period from 1952 to 2006.

Table 1: Sectoral Growth Rates in India, 1952-2006 (Percent per annum)

Sector	1952- 61	1962- 71	1972-81	1982-91	1992-01	2002-06
Agriculture	3.1	2.5	1.8	3.5	2.8	3.0
Industry	6.2	5.5	4.0	6.2	5.6	7.3
Services	4.2	4.8	4.4	6.6	7.3	8.4

Source: Authors' calculation using the CSO data

Turning to the industrial sector the growth rate rose substantially in the decade of 1980s. In fact, it was only in 1990s, that the growth rate of service sector exceeded that of industrial sector. To have a better understanding about the growth patterns, we can see the three phases in Table 1, i.e., before 1980s, between 1980s to1990s and after 1990s. It can be seen that the performance of the industry was sluggish in the first phase i.e., before 1980s. However, the growth of this sector grew at the rate of 6.2 percent during 1980 to 1990s. In the third phase, by the introduction of structural reforms, the service sector outpaced the growth of industry to a large extent. Thus service sector emerged as the dominant sector in India's growth scenario.

Thus, the emergence of service sector as the major contributor to the growth of Indian economy merits special mention. The sector's share in GDP was much below 5 percent till 1980s; concomitantly, services gained more strength during 1982-1991. 'Advances in information technology, liberalization of the telecommunications sector and availability of skilled labor have permitted India to reap advantages through globalization of some services' (Mohan, 2006)

If we scrutinize the path of economic growth in India, we can see the transition from 'Hindu growth rate' to a 'new Hindu growth rate' over the decades in India.[2] To reach the new growth paradigm, Indian economy has undergone a number of policy changes inclusive of the structural changes in the economy, global shocks and recessionary trends, major cyclical movements etc., and the combined effect of all these factors are reflected in the country's Gross Domestic Product.

In light of the above growth story, it is interesting to examine the dynamics of the Indian service sector, which is the major contributor and forerunner of the overall output in the economy. The present paper thus attempts:

(a) To find the exposure of GDP and its major sub-aggregates to cyclical fluctuations and then to compare stability of each sector.

(b) To decompose the GDP and its major sub-aggregates into three components (long-run trend, business cycle and short-run shock) to understand the pattern of economic growth and emergence of service sector.

2. Conceptualization and Literature review:

The study of Indian economic cycles has been increasingly important due to India's growing inter-relation with the world economy and the structural dynamism within the sectors. There are different approaches to study and evaluate cyclical fluctuations in an economy. To Burns and Mitchell (1946) the definition of business cycle is;

[2] See Virmani(2006)

> "A cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own"

In literature, there exist three different approaches to analyze the business cycles, viz., Classical Business Cycles, Growth Cycles and Growth Rate cycles. The Classical Business Cycles measure the ups and downs in the absolute levels of many economic activities at about same time in an economy. Whereas, Growth Cycles are defined as ups and downs through deviations of the actual growth rate of the economy from its long-run trend rate of growth. However, comparing both cycles, classical cycles tend to have recessions that are considerably shorter than expansions because of underlying trend growth, growth recessions and expansions have approximately same duration. One basic problem associated with the analysis of growth cycles is the determination of the trend component from the time series.[3] Due to the limitation of the growth cycles, growth rate cycles became tool of analysis in late 1980s. Growth rate cycles are the ups and downs in the growth rate of economic activity and the cyclical indicators are the month-to-month changes or the month to year changes. According to Klein (1998), the classical business cycles and growth rate cycles are more suitable for real time monitoring and forecasting.

Plenty of research has taken place on business cycle in Indian context. However, the methodology of tracking the cyclical movements and trend differs from one study to the

[3] Determining trend from HP filter/ BP filter/ PAT subject to frequent revisions. Generally de-trending methods generate different growth cycle chronologies therefore growth cycles are more suitable for historical analysis.

other. Some of the relevant studies in this context are reviewed here. Among the studies on growth and business cycles, Chitre (1982, 1986) constructed a composite index comprising of 15 indicators and identified five growth cycles during the period 1951-75. In addition, for the period 1957 to 1982, a 94 monthly time series was analyzed and 8 peaks and troughs using Bro-Boschan method were identified. The study highlights the synchronomous movements of various indicators in the economy. Dua and Banerji (2001) constructed composite index of leading indicators (CILI) to track these turning points to trace the fluctuations in aggregate economic activity and to determine the business cycle. The business cycles were found to average six years with recessions averaging just under a year. Hatekar (1993) used annual data for the period 1950-85 and described individual historical path of major macroeconomic variables and their comovements with other variables. Joshi (1997) examined the same using uni-variate Hodrick and Prescott (HP) filter method to decompose the trend and cyclical components in different macro economic variables. But the application of uni-variate filters is not sufficient enough to capture the changes in the economy. Mall(1999) characterized Indian business cycles based on non-agriculture GDP as the reference series as its cyclical movements were found very synchronous with variables like aggregate GDP, private consumption, investment, manufacturing output, domestic trade, IIP etc. Thus, most of the studies are based on calculation of coincident index. Further, a number of methods have been proposed for separating the trend from the cyclical component of a time series. The most popular of these is the Hodrick-Prescott(1997), Rotemberg(1999), Baxter-King filter(1995) etc. The present study has used the Hodrick-Prescott filter.

3. Data and Methodology

In order to fulfill the above objectives, annual data from 1952 to 2006 of GDP and it sub-sectors have been collected from the Central Statistical Organization of India. The first objective is to empirically find out the exposure of GDP and its major sub-aggregates to cyclical fluctuations. So, we decompose GDP into cyclical and trend components. This is done by applying the most widespread practice of decomposing, i.e., the procedure adopted by Hodrick and Prescott (1980). The HP Filter is a smoothing method which is used to obtain a smooth estimate of the long-term trend component of a series. It has an advantage over simple de-trending procedure based on linear trend that is a time varying method and allows the trend to follow a stochastic process. Whereas the traditional method assumes that the trend series grows at constant rate. HP filter computes the smoothed series y^T of y by minimizing the variance of y around y^T, subject to a penalty that constrains the second difference of y^T. The HP filter chooses y^T to minimize

$$\sum_{i=1}^{n} (y_t - y_t^T)^2 + \lambda \sum_{i=2}^{n-1} (y^T_{t+1} - y_t^T)^2$$

Where, λ is the smoothing weight on y^T growth and n is the sample size. They propose a filter (henceforth: HP filter) for decomposing the cyclical and trend effects. Hodrick and Prescott suggested the value for λ as 100 for annual data. The advantages of the filter are flexibility, simplicity and reproducibility. Here we use the HP trend and cycle decomposition for the identification of structural trends in a very volatile sector. After estimating the trend series using HP filter on GDP growth, we again apply HP filter

method on the series of output deviation from its trend to derive cyclical movements and irregular components or short-term shocks. Such type of decomposition will give further understanding of the structural pattern.

For the present study, it is assumed that annual series of real GDP growth series (Y_t) has three components i.e. Trend, Cyclical movements and Irregular movements.

$$Y_t = T_t + C_t + I_t \qquad \text{--- (1)}$$

Where, T_t = Long-run trend

C_t = Cyclical movements

I_t = Irregular movements (shocks)

The HP filter is used in two stages to separate these components; first to extract the long-run trend (T_t) from the original series and then to filter out cycles (C_t) from the rest. The HP filter proceeds as follows;

It assumes that a series Y_t has two components; a smooth one (T_t) and deviations (Z_t) from T_t i.e.,

$$Y_t = T_t + Z_t \qquad \text{--- (2)}$$

such that over a long period of time the sum of deviations (Z_t) is near zero. We have applied the HP filter on Y_t to extract trend (T_t) component from it. By subtracting the T_t from the original series (Y_t) we get a new series (Z_t) that contains cyclical and irregular components.

$$Z_t = Y_t - T_t = C_t + I_t \qquad (3)$$

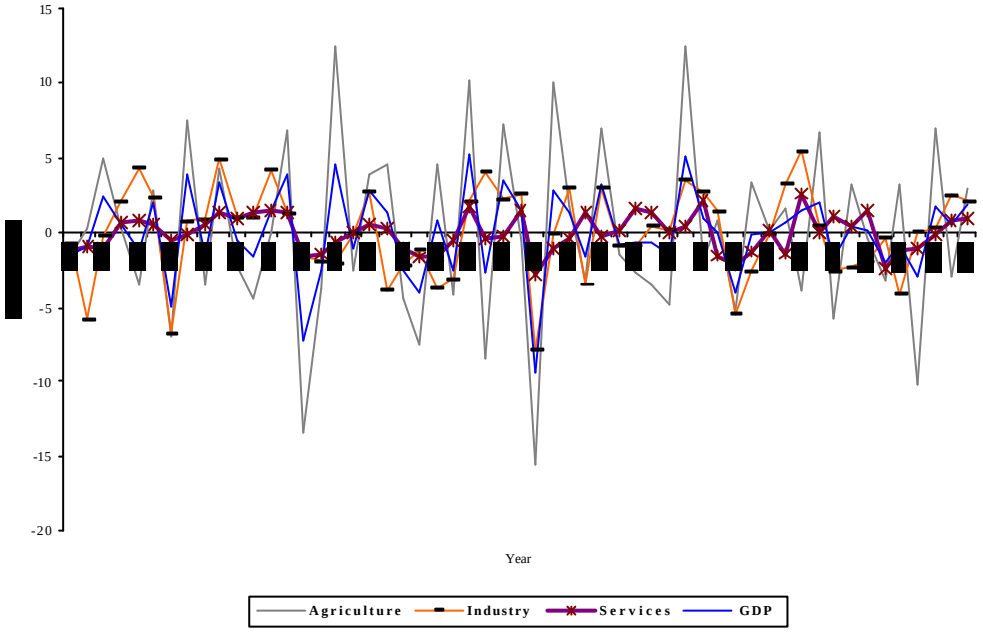
We again apply the HP filter on Z_t. In this second stage the HP filter wheedles out oscillations around the smooth component that is nothing but cycles C_t. The difference between Z_t and C_t represents shocks or irregular component (I_t).

4. Empirical Results

Figure 1 shows the cyclical movements (C_t) of three sectors, viz, agriculture, industry, services and the real GDP. It is interesting and insightful to compare the cyclical growth of each sector to the rest. However, the focus of the study is to compare the stability of service sector to other sectors. First, service sector displays less cyclical fluctuations when compared to the rest of the sectors; hence service sector seems to be more stable than Industry and agriculture. It can also be noticed that agriculture is highly volatile compared to other sectors. It can probably be attributed to the fact that the unstable nature of factors affecting the agriculture such as rainfall, prices etc.

When comparing industrial growth to agriculture, even though industrial growth rate did fair better than agriculture, it can be seen that the sector is also volatile. In this scenario, thus, it can be inferred that the service sector is comparatively less volatile and more consistent in the growth path over years. Therefore, it can be concluded that the stability of the service sector promises a favorable and sustainable growth in the future.

Figure1: Cyclical growth as annual deviation from long-term growth rate (1952-2006)



The above decomposition only shows the cyclical fluctuations of each sector or volatility for the given period of time. To get a clearer picture of the changing pattern of economic growth and emergence of service sector, we have to further proceed with the empirical analysis. As mentioned earlier, we dissect the GDP and its major sub-aggregates into long-run trend, cyclical movements and irregular movements (shocks).

Figure 2: Long-run Trend of Services, Industry and Real GDP and Agriculture

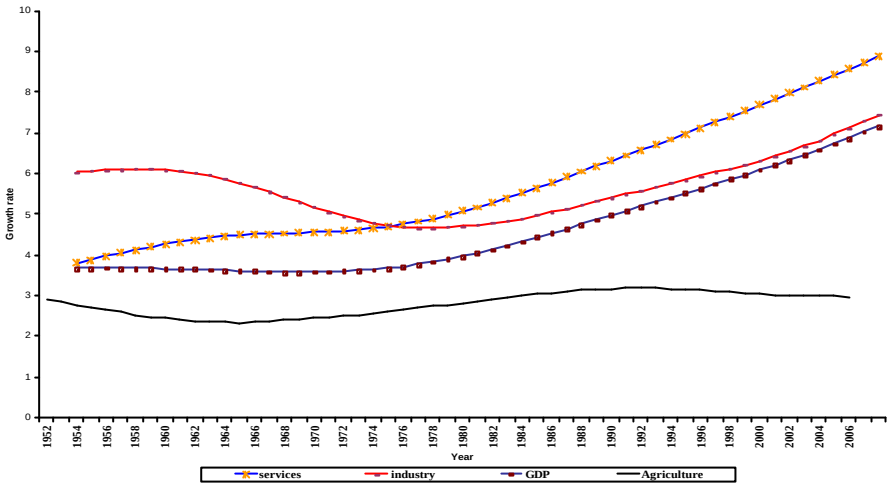


Figure 2, shows that the agricultural sector is more or less stagnant during the period 1952-2006, i.e., the growth rate is fluctuating around 3 per cent. It's a matter of concern in the case of agriculture, because more than half of the people are dependent on this sector and a series of reforms introduced from post-independent India has not helped the sector's resurgence.

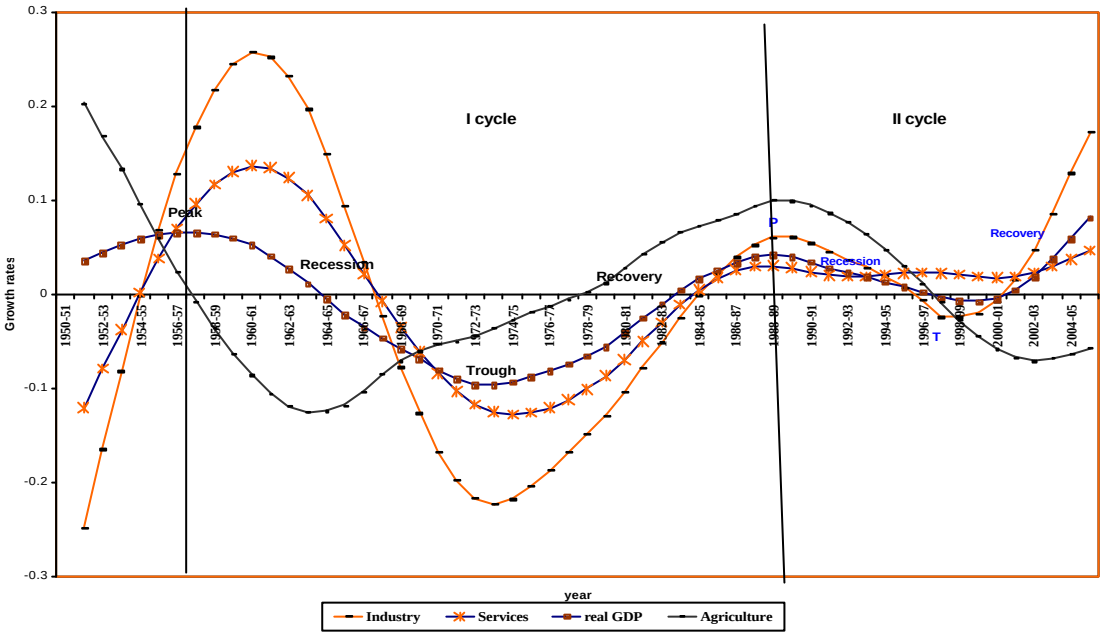
Though the performance of industry is certainly impressive since independence, the sector started decelerating in its trend growth from 1958 to 1980. Later on the sector picked up its growth. However, its growth rate is found to be much below the services, where as services and GDP are showing upward trend. It is pertinent to note that the steep fall in the industrial growth after 1965 is due to the periodic shocks that the economy received from the effects of war in 1965 and 1971, oil crisis in 1973, droughts in 1965-66. Moreover, the upsurge of supply constraints basically arisen from non-availability of critical inputs-power, imported raw materials, agricultural raw materials aggravated the

situation. Meanwhile, the policy initiatives after 1980s helped to recover the sector to great extent.

The main finding of this study is that a major breakthrough happened in Indian economy in the year 1975, when the industrial sector receded and service sector emerged as the dominant sector. After the breakthrough year 1975, the service sector has shown a consistent and accelerating upward trend movement. This accelerated growth in the service sector helped to increase the real GDP growth at higher level during the period 1976-2006, where the remaining sectors have shown comparatively lesser contribution in GDP. 'As per Economic Survey, 2000-01, liberalisation of the economy in the 1990s and encouragement of private investment in industry and infrastructure have induced sustained high growth of service sector. Besides, IT software and services has emerged as one of the fastest growing segments of the economy' (Hansda, 2002).

It is necessary to analyze the cyclical movements of real GDP and the major sectors in India, in order to see the nature of the business cycles. Figure 3 shows business cycle movements of GDP and sub-aggregates in India. It shows that there are two business cycles that occurred in India during the period 1952-2006., i.e., India witnessed one business cycle with its peak starting from 1957-58 to 1988-89 and the other business cycle with its peak from1988-89.

Figure 3: Business Cycle



The first business cycle (1957-58 to 19877-88) of the real GDP lasted 30 years during which the recession started following the peak year 1957-58 and it touched the bottom of trough period 1973-74. The recession was experienced for 16 years during which the sectors such as industry and service showed similar experience. However, agriculture showed an early recovery during 1964-65, where as others started recovering in 1974-75. One of the features of this cycle is that the agriculture creeped nearly 25 years in the recovery phase. The major reasons for the early recovery in the agriculture sector might be attributed to the green revolution and agriculture reforms that took place during this period. It is interesting to note that the industry and services have a same peak year i.e. 1960-61 and both are moving in the same time path during recession, trough and recovery. The finding also shows that services took 14 years in recession and again 14

years for recovery. The long period of recession in these sectors as compared to agriculture might be attributed to the oil price shock during 1973-94, drought in 1965-67, the political instability etc which hindered the momentum of growth.

Table 2: 1st Business Cycle (1957-58 to 1987-88)

	Peak	Recession	Trough	Recovery
GDP	1957-58	1958-59 to 1972-73	1973-74	1974-75 to 1987-88
Agriculture	No peak	1957-58 to1962-63	1963-64	1964-65 to1987-88
Industry	1960-61	1961-62 to 1972-73	1973-74	1974-75 to 1987-88
Service	1960-61	1961-62 to 1973-74	1974-75	1975-76 to 1987-88

Table 3: 2nd Business Cycle (1988-89 to last)

GDP	Peak 1988-89	Recession 1989-90 to 1998-99	Trough 1999-00	Recovery 2000-01 to 2005-06
Agriculture	1988—89	1989-90 to 1997-98	2002-03	2003-04 to 2005-06
Industry	1989-90	1989-90 to 2001-02	1998-99	1999-00 to 2005-06
Service	1989-90	No recession	No trough	No

The second business cycle in Indian economy started with the peak year 1988-89 and turned into the recession in the year 1989-90 to 1998-99 (Table 3). It is interesting to note that the cyclical movements of industry, agriculture and services are more or less drifting in the same pattern unlike the first cycle. Except services, rest of the sectors had to undergo recession followed by a trough. Whereas, the services never took a negative slope rather it began to creep in the above the cycle and it is showing a consistent path over the years. Some possible reasons for growth in service sectors are increased splintering (Bhagwati, 1984) which occurs across sectors, policy liberalizations and exports.

5. Conclusion

This paper has analyzed the exposure of India's GDP emphasizing the service sector to cyclical fluctuations and also tries to explore the stability and sustainability over future. The paper has also decomposed, statistically, the real GDP of India into three components viz., long-run trend, business cycles and short-run shocks. It shows that service sector in India has grown faster than agriculture and industry. A comparative analysis of stability of the sector with the rest reveals the long period of sustained growth path from 1952-2006, which emphasizes the consistency of the sector. Whereas, agriculture and industry seem to be highly volatile and there is a sharp decline in the volatility of India's real GDP. Hence, the decline in the GDP growth volatility seems to reflect the macro-economic stability of the country. A key feature of India's long-run trend is the stagnant growth of agriculture (around 3 per cent) from 1952-2006 and subsequent receding of industrial sector and subsequent emergence of service sector in the economy. Hence, the study points out the year *1975* as the breakthrough year where the real break happened in India's growth scenario. Further, the results also show that the economy has undergone one complete business cycle during the period of study and another ongoing cycle. Compared to the long-run trend and shocks in the economy, business cycle could project some important dimensions of the study. For instance, agriculture had undergone nearly 25 years of recovery phase during 1964-1988, which showed the sector more or less tuning well to the subsequent reforms. With regard to services, the cycle was more consistent than the rest in the first cycle and the second cycle services never took a negative slope after the peak year 1989-90. All the above

facts bring forth, that service sector could catch up in India and its growth was found to be stable in the period of study.

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Appendix 1: Annual Growth Rates of Components of Gross Domestic Product at factor cost and constant (1999-00) prices (per cent)

Year	Agriculture	Industry	Services	GDP
1952	1.5	5.3	2.7	2.3
1953	3.2	0.2	3.1	2.8
1954	7.7	5.8	2.9	6.1
1955	2.9	8.2	4.7	4.2
1956	-0.9	10.4	5.0	2.6
1957	5.4	8.5	4.7	5.7
1958	-4.5	-0.6	3.8	-1.2
1959	10.1	6.9	4.2	7.6
1960	-1.0	6.9	5.0	2.2
1961	6.7	11.0	5.7	7.1
1962	0.1	7.0	5.4	3.1
1963	-2.0	6.8	5.8	2.1
1964	2.3	9.9	6.0	5.1
1965	9.2	6.8	5.8	7.6
1966	-11.0	3.8	2.9	-3.7
1967	-1.4	3.4	3.1	1.0
1968	14.9	3.2	3.9	8.1
1969	-0.2	5.0	4.6	2.6
1970	6.4	7.7	5.2	6.5
1971	7.1	1.0	4.9	5.0
1972	-1.9	2.6	3.7	1.0
1973	-5.0	3.6	3.1	-0.3
1974	7.2	0.9	3.3	4.6
1975	-1.5	1.5	4.3	1.2
1976	12.9	6.7	6.6	9.0
1977	-5.8	8.8	4.6	1.2
1978	10.0	7.0	4.8	7.5
1979	2.3	7.4	6.6	5.5
1980	-12.8	-3.2	2.4	-5.2
1981	12.9	4.8	4.4	7.2
1982	4.6	8.0	5.2	5.6
1983	-0.3	1.5	7.0	2.9
1984	10.1	8.1	5.6	7.9
1985	1.6	4.2	6.1	4.0
1986	0.3	4.3	7.6	4.2
1987	-0.4	5.7	7.5	4.3
1988	-1.6	5.6	6.4	3.5
1989	15.6	9.0	6.8	10.2
1990	1.2	8.4	8.7	6.1
1991	4.0	7.1	5.2	5.3
1992	-2.0	0.3	4.6	1.4
1993	6.7	3.3	5.7	5.4
1994	3.3	5.8	7.2	5.7
1995	4.7	9.3	5.9	6.4

1996	-0.7	11.6	10.1	7.3
1997	9.9	6.7	7.6	8.0
1998	-2.6	3.7	8.8	4.3
1999	6.3	4.1	8.3	6.7
2000	2.7	4.6	9.5	6.4
2001	-0.2	6.4	5.7	4.4
2002	6.3	2.7	7.2	5.8
2003	-7.2	7.1	7.4	3.8
2004	10.0	7.4	8.5	8.5
2005	0.0	9.8	9.6	7.5
2006	6.0	9.6	9.8	9.0

Source: calculated from CSO.