# India's Economic Growth Since Independence: Transitions in the Trajectory

**Nyima Tenzing**[1]
**Praveen Rizal**[2]

## Abstract

India's economic growth experience has been sought to be understood in various ways. One of the popular organising frames is the frame of periodization. And among the many ways to devise a periodization, the statistical tool of structural break analysis can lend a very useful hand in this exercise. We have utilised a very specific type of structural break model to analyse the transitions in the trajectory of India's economic growth since its independence. We find that the technically derived transitions in the trajectory are, largely, in striking conformity with what would be expected given the history of India's economic growth.

**Keywords**: India's Economic Growth, Structural Break, Growth Trajectory, Economic Transitions.
JEL: O47, O53, N00, N15

## 1. Introduction

This year would be marking the 75th year of India's independence from British rule. While politically India may have been largely successful in both broad basing and deepening the democratic dispensation, on the economic front the nation has obtained a mixed bag of performances. The past 75 years have seen inadvertent missteps and brazen misadventures in economic stewardship as also some well-aligned steps which were in accord with the larger economic context of the nation. Scholars, both native and non-native, studying the story of economic growth and development of India have collectively and incrementally spawned a formidable literature that is both voluminous and voluble. While they differ in their respective explications, they all seem to converge on the broad exposition. So much so that the exposition has virtually attained a status of a stylised fact. The exposition proceeds somewhat like this. The first thirty years since independence were a period of very slow growth and increasing deprivations of the masses. But the following forty and odd years were a period of economic dynamism and increasingly high growth rates. This paper attempts to engage with this exposition in some detail. This is sought to be done by way of periodising the whole trajectory of economic growth since the advent of the active pursuit of economic growth after independence. While a periodization can very well be obtained by a subjective argumentation based on prior knowledge of the history of the period, we have desisted from treading that path. Instead, we embark on an objective path of statistically deriving the periodization by using a very specific method of structural breakpoint analysis. Once the periods are technically determined thus, we attempt to make *post hoc* sense of the obtained transition in the trajectory.

The paper is structured in the following way: the next section will review the related literature to situate the paper within the larger literature, and data and methods would be described in the next section. Thereafter, the breakpoint estimation would be briefly explained and this would be followed by the discussion section wherein we would discuss each of the periods as obtained through the statistical structural break exercise. The final section will conclude.

[1] Corresponding Author, PhD Candidate, Department of Economics, SRM University Sikkim, Gangtok, Sikkim-02, India
Email: nyima.tenzing@gmail.com
[2] Associate Professor, Department of Economics, SRM University Sikkim, Gangtok, Sikkim-02, India

## 2. Related Literature

Perhaps the earliest attempt to understand the economic growth and development of India by way of breaks or turning points in the time series of growth rates is Raj (1984). He undertook an analysis of the three-year moving average of GDP growth rates as well as sub-sectors growth rates and concluded that the trend growth rates of GDP have decidedly shifted for the better in the middle of the 1970s, higher than the 3.5 per cent *Hindu rate of growth*[3]. But his study was largely a critique of the then prevailing discourse on the growth stagnation of India. In other words, it was neither a comprehensive nor an independent study of the trends in the GDP growth rates of India.

A probable candidate for such a distinction is, perhaps, Nagaraj (1990). He first analysed the trend in the GDP growth rates by engaging in decadal growth rates analysis as well as an 8-year moving average of the GDP time series of 1951-1988. In both these analyses, the decade of the 1980s shows much higher growth rates. This is further rigorously tested by using a growth regression method. Not surprisingly, the regression testing shows a statistically significant break in the series in 1979-80. Further, to ascertain that this shift in the trend is a robust one and not merely because of the expansive public sector, the same regression is run without the component of the public administration and defence (PAD). The result remains unchanged. Clearly, there is a break in the series which is statistically significant. However, it is also true that the break dates are first arrived at through careful eyeballing of the data informed by prior knowledge of the economy. So, although the method as compared to Raj (1984) is statistically rigorous, the methodology is one of exogenously determining the breaks in the GDP time series. Interestingly, he reiterated the same analysis by updating it one and a half decades later in Nagaraj (2006).

Similarly, a contemporaneous study following almost a similar methodology to that of Nagaraj (1990) finds almost coinciding break dates of 1975-76 and 1980-81 (Bhargava & Joshi, 1990). However, these break dates are not statistically significant although there is a sizeable rupture in the GDP growth rate around these dates (Bhargava & Joshi, 1990).

Acharya, Ahluwalia, Krishna, & Patnaik, (2003) have analysed 50 years of economic growth since independence. This they have done by dividing these 50 years into four sub-periods[4]. However, they approached the periodization exercise through exogenous imputation to the growth rate series rather than letting the data determine the shifts and breaks in the series endogenously.

Notably, one of the earliest statistical structural break-oriented analyses of India's economic growth is, perhaps, the one that utilised a variant of the Quandt Likelihood Ratio (QLR) test (Wallack, 2003). This provides two distinct advantages over the classic Chow Test[5]. First, it does not overlook break dates that are not pre-selected. And two, it has less risk of ending up with a false break date than is the case if the candidate break date is selected exogenously based on some feature of the data. Based on their statistical test they found three robust break points in the GDP growth rates. Rodrik & Subramanian (2004) makes an emphatic case for productivity surge as the driving force in the uptrend in growth rates in the 1980s. This is accomplished by running a Bai & Perron structural breakpoint analysis of the Total Factor Productivity (TFP) time series. Simultaneously, they also performed the same structural analysis on per capita GDP and GDP per worker time series.

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[3] *A term coined by Professor Raj Krishna to derisively designate the average GDP growth rate of 3.5 percent in the first three decades since independence.*

[4] *The four sub-periods are: 1950-67 The Evolution of Industrial Development Strategy, 1967-1980 Inward Orientation and Industrial Stagnation, 1980-1990 Deregulation, Fiscal Expansion and Growth & 1991-2001 Economic Reforms, Growth and Slowdown.*

[5] *The Chow test tells you if the regression coefficients are different for split data sets where data split is done artificially.*

A radically different perspective is held by Hatekar & Dongre (2005). For them not only the 1980s were dynamic, they even assert that the real dynamic break in the growth rates came about in 1952. This argument is developed keeping in view the growth rates of the first half of the last century. This result is obtained with a similar QLR type test, albeit with a longer data series. However, it needs to be mentioned that the pre-independence GDP data are not strictly comparable to the post-independence data as the former data is of undivided India. Therefore, the paper may not be a pertinent critique of Wallack (2003), even though the authors have specifically sought to make it so. Be that as it may, it is instructive to see that the break dates are almost nearly coinciding in these two papers.

Another paper that analysed the structural break in the GDP series by using the growth regression Chow test is Virmani (2004) and developed further in Virmani (2005 & 2006). He too found 1980-81 as exhibiting a statistically significant break. He divided the fifty years since independence into two phases. He called these two phases the Indian socialism and Market reforms era, the former spanning the duration of 1951-52—to 1979-80 and the latter spanning 1980-81-2001-02. He further subdivided these two phases into two sub-phases each. This, however, is done based on an arbitrary criterion of regime change[6].

A similar approach is adopted by Panagariya (2008) in his detailed work on the growth trajectory of India. He too subdivides the entire period of analysis into four phases. And the basis of the subdivision is, ostensibly, breaks in the GDP growth rates but these breaks are not derived by any rigorous statistical analysis but rather a combination of summary trend analysis and prior beliefs about the growth trajectory. Indeed, his conclusions are a reaffirmation of his earlier work wherein he claimed 1992 as the real break in the growth rates (Panagariya, 2004). Similarly, a very recent study also adopted a similar approach and exogenously periodised the growth trajectory based on broad regimes readily identifiable in the political economy of India (Das, Erumbum, & Mallick, 2021).

Nayyar (2006) also has a similar conclusion to draw although he also contends that 1951 is a statistically more significant break than the break in circa 1980. The methodology, however, is not driven by any rigorous statistical exercise. Interestingly, around about the same time, another study took serious issues with these fixations on 1980 as a breakpoint in the GDP growth rates of India (Nayar, 2006). According to him, the real breakpoint is 1974 and not 1980 by any standard. Indeed, the spurt in the growth rates in the 1980s is a continuity of a break that originated in 1974. According to them, perhaps the 1977-79 interregnum of Janata establishment has a lot to do with confounding the otherwise clear-cut breakpoint of 1974. Balakrishnan & Parameswaran (2007), however, seem not to agree with such a finding. According to them, almost none of the sub-sectors of the GDP has a breakpoint anywhere near 1974. Instead, 1978-79 turns out to be the breakpoint in the GDP data series. They seemed to convey that the rudimentary reforms of the 1980s have put the GDP growth rates on a new and higher trajectory. Interestingly, they maintained substantially the same argument in their later paper (Balakrishnan, Das, & Parameswaran, 2017), although this time around they emphasise the cumulative causation of internal dynamics in addition to their earlier contention of rudimentary reforms effect. As for deriving the breakpoints, they used the Bai and Perron (BP) method of multiple structural break estimation wherein the breakpoints are not predetermined by the researcher's prior belief. They call it letting the data parametrise the model. But some element of arbitrariness is present in the process in that the Bai-Perron method requires trimming of the data at both ends of the sample[7].

*6 The socialist era (Phase I) is subdivided into two sub-phases of two distinct growth regimes, Phase IA (1951-64) and Phase IB (1965-79). Similarly, the market reforms era (Phase II) is also further subdivided into Phase IIA (1980-91) and Phase IIB (1992-01).*

*[7] Although the authors stick to the thumb rule of 15 per cent trimming, it is an arbitrary decision nonetheless.*

It is clear from above that the analysis of economic growth in India has been attempted through both an exogenous as well as and endogenous method of structural breakpoints. And both the methods have yielded rich and stimulating insights and to that extent, enriched the literature. Taking this extant literature as the backdrop, this paper attempts to comprehend the trajectory of economic growth in India since independence.

## 3. Data and Methods

We used the CSO time series of 2004-05 base year for the period 1951-2014 and appended the World Bank series therefrom, i.e., 2015-2020[8]. The World Bank series does not disclose the base year anywhere on their website but it seems highly likely that their series is also based on 2004-05. Therefore, the reconstructed continuity in data may not be incompatible. Further, even if there is some incompatibility inherent in this reconstruction it may not affect the analysis in any substantial way as we are not engaging in any precision statistical exercises with the dataset. The analysis period runs into seven decades, i.e., 1951-2019.

The following exponential function can be used to estimate the structural breakpoints in the growth rates of GDP time series data.

$$LnY_t = a + gt + u_t$$

where *LnY, g, t & u* denote the log of income, growth rate, time trend and the error term. The subscript *t* stands for time. The two parameters of the function are *a* & *g* and the stability or otherwise of these parameters would determine whether and when a structural break in the series occurs. This intuition of the exponential model of GDP growth rates combined with the reasonable proposition that the GDP growth rates of a country over a long period would not be stagnant provides a useful framework for analysing the economic growth trajectory of a country over a long period time series. The present study adopts this analytical framework in its attempt to comprehend the long and tortuous trajectory of the economic growth of India since independence. Understandably, such an analysis requires that the time series data points are neatly partitioned into segments and differences in the parameters of these segments are tested for statistical significance.

There are, however, two distinctly different methods to approach this segmentation of the time series data points. They are known in the literature as the exogenous and endogenous methods. The exogenous method partitions the data set based on some prior information that the researchers have related to the data sets. This prior information can be as simple as a quick look at the graph plot of the data or it can be as esoteric as the knowledge of march of history of the country in particular and the world at large. The endogenous method is strictly data-driven and prior information of the researchers has no bearing on the kind of partition obtained

One such endogenous method is given by Bai & Perron (1998, 2003). They proposed an estimation framework for testing multiple structural breakpoints in a time series based on the least squares principle. Its superiority derives from the feature that not only does it allow for simultaneous estimation of multiple breakpoints, it does so on a standard distribution-based least squares regression model. If the time series of GDP growth rates is partitioned into n+1 segments with n break dates ($T_1$, …., $T_n$) and modelled as below:

$$LnY_t = a_1 + {}_{g1}t + u_t \text{ ----------} t = 1, \ldots, T1$$
$$LnY_t = a_2 + {}_{g2}t + u_t \text{----------} t = T1 + 1, \ldots, T2$$

.
.
.

[8] *The newer base year series does not have back series up to 1951.*

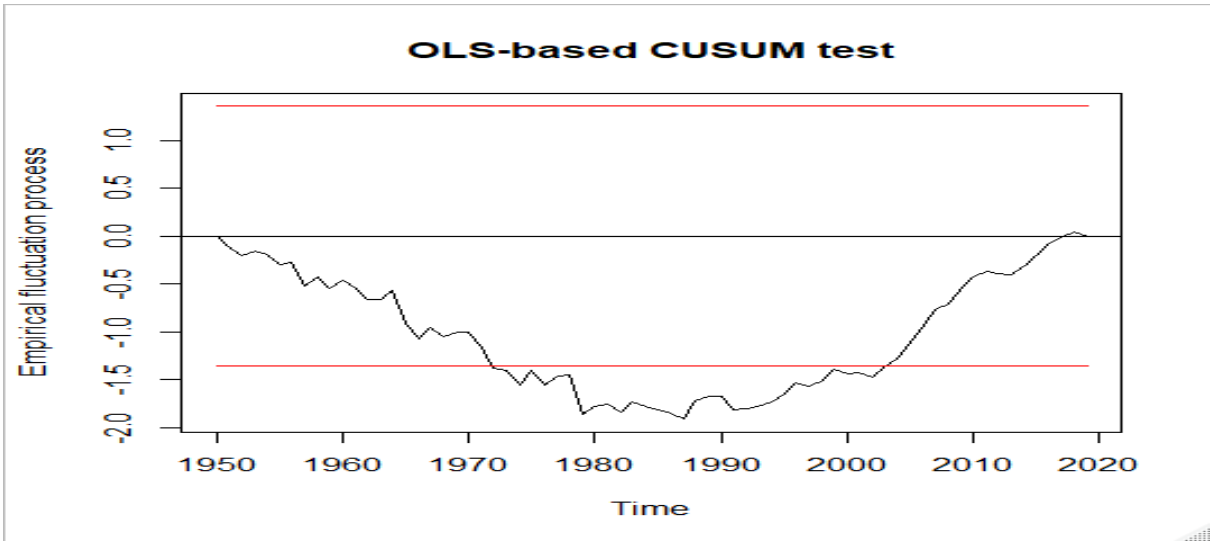
$$LnY_t = a_n+1 + g_{n+1}t + u_t. \text{ ----------} t = T_n+1, \ldots, T$$

Being an endogenous approach the number of break points in the data set ($T_1$, …, $T_n$) are treated as unknown and estimated from the data. It is estimated as global minimisers of the sum of squared residuals from the OLS regression given above by a dynamic programming algorithm. This gives a set of several breakpoints running from zero to n. The next step is to choose the breakpoints from the set of breakpoints given by the estimation procedure. Here SupF statistics could help decide on the number of breakpoints. However, this test assumes non-trending regressors and is not a compatible test for the GDP growth rates time series for obvious reasons. This is where Bayesian Information Criteria(BIC) prove helpful. The minimum BIC is indicative of a robust option among the available choices in the set of the number of breakpoints. We use this estimation procedure in the following section.

## 4. Estimating Breakpoints

It is reasonably safe to presume that there are breakpoints in the GDP growth rates of any country if that time series spans a reasonably long temporal interval. Therefore, it is a foregone conclusion that the GDP growth rates of India from 1951 to 2019, spanning 70 long years, would have at least one, and possibly many, breakpoints in its GDP growth rate time series. This intuition notwithstanding, we can statistically ascertain whether or not a time series is stable in its parameter. This is done by running a CUSUM[9] test on the series. When we ran the test on our time series data set of GDP growth rates, we found that the test too confirms the existence of breakpoint in the series. We present the result of the test below:

**Figure 4.1: CUSUM Test**




It is clear from the above figure that the series is not stable in its parameter. For a series to be stable in its parameter, the CUSUM statistic line should lie within the stability boundary depicted by two red lines. However, in this case, the CUSUM statistic is breaching one of the stability boundaries. In other words, what is otherwise a forgone conclusion is further confirmed by this statistical test. Now, the next logical step is to find out the breakpoints the presence of which are indicated both statistically and intuitively as above.

BP method of estimating structural breakpoints uses an OLS regression model. So, it makes sense to find out whether the coefficients are statistically significant. Quibbling about structural

*9 CUSUM (Cumulative Sum) tests are used to assess whether there are structural changes (or structural breaks) in a regression equation of interest.*

breakpoints of a model that is statistically insignificant to begin with, is, to say the least, a fool's errand. In our case, we found the following result.

```
Residuals:
Min            1Q      Median        3Q       Max
-10.3253     -1.5894   0.3788    2.2864    5.0361

Coefficients:
             Estimate  Std. Error  t value  Pr(>|t|)
(Intercept)     5.1238     0.3682    13.92   <2e-16 ***
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Signif. codes:  0 '***'  0.001 '**' 0.01 '*'  0.05 '.' 0.1 ' ' 1

Residual standard error: 3.058 on 68 degrees of freedom
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As can be seen, the t statistics is highly significant, the p-value is very close to 0. With this in the background, we can proceed with the estimation of the actual breakpoints in the series.

The result of the estimation is depicted below:

```
Corresponding to breakdates:

m = 1              1987
m = 2         1979      2002
m = 3   1964 1979      2002
m = 4   1964 1979 1992 2002
m = 5   1964 1974 1987 1997 2009

Fit:

m   0     1     2     3     4     5
RSS 636.0 497.8 472.3 462.7 459.5 468.8
BIC 357.5 349.1 353.9 361.0 369.0 378.8
```

There are five different sequential sets of breakpoints. The conundrum now is to choose among these sets that are indicated by the estimation method. Two methods for resolving this issue are suggested in the literature. Bai & Perron (1998) proposed a test based on SupF to decide on the number of breakpoints but this is applicable in cases where the regressor is non-trending. Another way is to observe the information criteria of the model. Wang (2006) reported that the Bayesian Information Criteria (BIC) is superior to other information criteria. The breakpoints set with the minimum BIC is the most appropriate set to choose. This is what the statistical rigour suggests insofar as the selection of the breakpoint set is concerned. Following this dictum, we are advised to choose the set which has a single breakpoint as can be seen from the table above.

However, a single breakpoint in the 70 years long time series of GDP growth rates of a big and diverse country like India is counter-intuitive even if such an eventuality is backed by statistical rigour. It is highly unlikely that the trajectory of economic growth has only two regimes in these 70 long years. Therefore, notwithstanding the statistical rigour, there is a strong case for looking at other available choices. In this regard, the researcher's prior pertinent information has to be drawn on and made to bear on the decision taken. Moreover, the remaining available choices of the set of breakpoints are statistically robust by the simple fact that these emanated from the very same estimation process, to begin with.

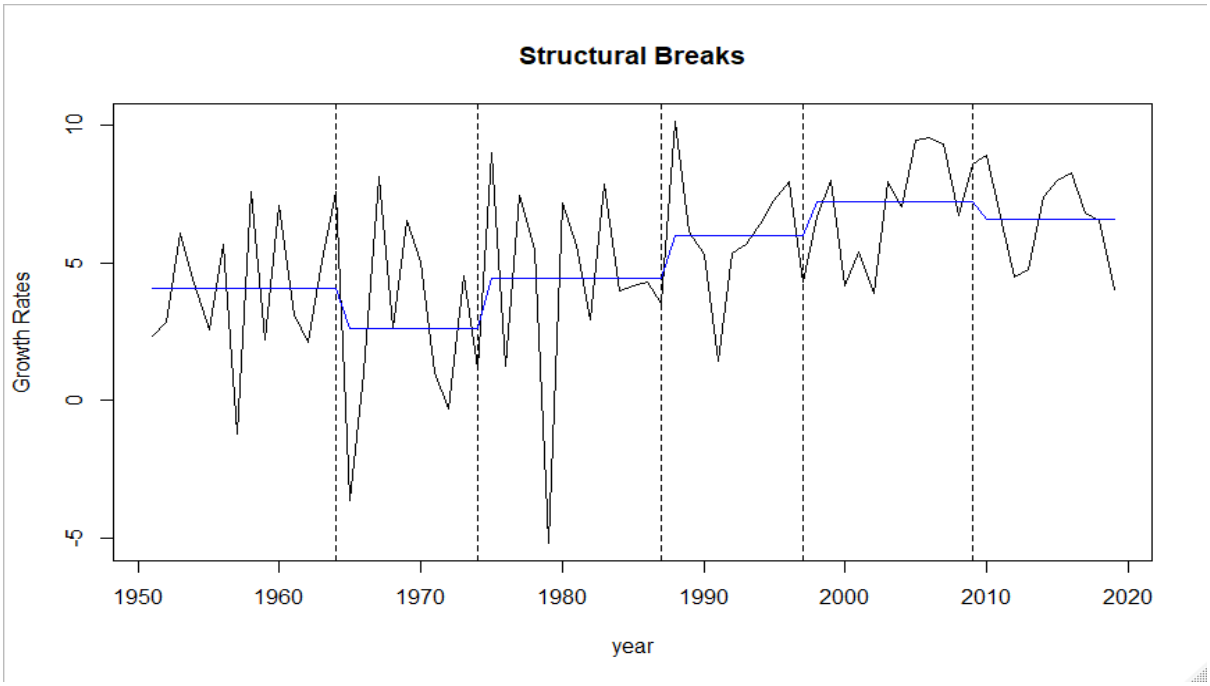
Once we were convinced that one breakpoint is not in accord with what is indeed the actual trajectory of the growth rates, we appraised each of the remaining available choices. The two breakpoints set is also not plausible as it fails to reflect either the stagnation of the late 1960s and 2010s or the upturn of

the late 1980s and 1990s. Given that these are undoubtedly some of the watershed moments in the history of economic growth of India, it is not very difficult to consider this set improbable. The three breakpoints set do capture the stagnation of the late 1960s, in that it is a better choice if only it had not missed the upheavals of the late 1980s and 1990s on one hand and the tumult of the 2010s on the other. Similarly, the four breakpoints set too misses the important turning points of the late 1980s and 2010s. However, the five breakpoints set quite neatly reflect all the important turning points of India's economic growth from 1951-2019. These five breakpoints coincide with 1964 1974 1987 1997 2009. Interestingly, all these turning points are amply debated and discussed in various papers in the literature, albeit not from a holistic perspective.

These five breakpoints indicate that there are six economic growth regimes in these 70 years. Out of these, two regimes are of growth stagnation and the remaining four are of growth acceleration as the trend line clearly shows in the figure above. This can also be inferred from the average growth rates of the individual growth regimes which are shown in the table and graph below.

| Regime | 1951-64 | 1965-74 | 1975-87 | 1988-97 | 1998-2009 | 2010-2019 |
|---|---|---|---|---|---|---|
| Growth Rate | 4.09 | 2.6 | 4.43 | 6 | 7.23 | 6.77 |

**Figure 4.2: Structural Breakpoints in GDP Growth rates (1951-2019)**




## 5. Regimes of Economic Growth

### 5.1. Statist Era

On the eve of independence India as also other newly independent South Asian countries, was under no doubt so far as two things were concerned. One, that it requires economic growth if it is to successfully preserve its newly won independence and two, that it cannot afford to let itself evolve into a developed country in a patient and time-consuming fashion similar to what western developed countries have done. In fact. it needed to 'telescope' the growth process. Hence, an active and interventionist state was very much a foregone conclusion. This 'developmental state' took to the instrument of economic planning as a default choice in India and elsewhere in these newly born nations. It also needs to be mentioned

that the initial successes of the erstwhile USSR in economic planning around that time further buttressed what was, perhaps, already a strong conviction among the policy elites of the time.

Within the broader statist era, there are two clear regimes as indicated by the structural breakpoints estimation. For lack of a better nomenclature, they are called as below:

1. **Fabian Socialism (1951-1964)**
2. **Indian Socialism (1965-1974)**

### 5.2. Capitalistic Era

The socialistic way of managing the economy seems to have come to an end with the dawn of 1974. The first month of the year saw the rescission of the wholesale wheat trade nationalisation. This was followed by the ruthless and unrelenting break-up of the threatened railway union strike. These radical steps were followed by many other initiatives that seemed to fly in the face of socialist ethos which was professed and proclaimed since the advent of active economic management in the country following its independence. Of course, the rhetoric of socialism endured in the official communications but it was conspicuous by its absence in the substance of these official communications since. More and more reliance was placed on the price mechanism in the allocation of resources and efficiency criteria started to exert their weight over the ostensible equity considerations hitherto dominant. Then came the emergency era in 1975 which comprehensively shielded the government from the popular pressures and allowed it to privilege the price mechanism in the economic management arena.

Interestingly, our statistically driven structural break exercise too shows a neat break in 1974. The period following this breakpoint exhibits multiple breakpoints and hence multiple growth regimes. However, a common theme undergirding these breakpoints and growth regimes is one of progressively more and more reliance on price mechanisms and restraint on administrative control as a tool of economic management. Again, for lack of a better nomenclature, these four regimes are called as below:

3. **Liberalisation (1975-1987)**
4. **Reforms (1988-1997)**
5. **Consolidation (1998-2009)**
6. **Retreat (2010-2019)**

## 6. Conclusion

To comprehend the march of the economic growth process of a large and diverse country such as India is a formidable challenge in itself. This challenge is further compounded when the temporal span of the said process runs into several decades. The paper has sought to tackle this challenge by way of periodising this temporal span based on the statistical breakpoint method. By doing so, we could bring some method to the madness, so to speak. Nevertheless, the preceding analysis is audacious as well as ambitious, for it attempts to collapse the long history of economic growth and capture it within the pages of a single article. We sincerely hope it is meaningful as well.

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**Declarations**

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## Ethical approval

This article does not contain any studies with human participants or animals performed by any of the authors.