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PENSION LIABILITIES OF THE CENTRAL GOVERNMENT: PROJECTIONS AND IMPLICATIONS

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ABSTRACT

The commonly held belief that the Central government pension bill has the potential to reach an unsustainable level does not appear to be based on any realistic assessment of such liabilities in the future years. The future pension liabilities of the Central Government would be primarily driven by the structure and behaviour of employment in the Central Government in the past and the structure of prevailing pension system. This paper applies theoretically established models to the available time series on employment to estimate the growth in number of pensioners and make realistic projection of the future pension liabilities of the Central Government comprising five accounting departments such as Railways, Defence, Posts, Telecommunication and Civil. On the basis of these estimates it is concluded that if the present pension system prevails, the future pension liability of the Central Government would be reasonably sustainable.

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Pension Liabilities of the Central Government: Projections and Implications

Sibani Swain
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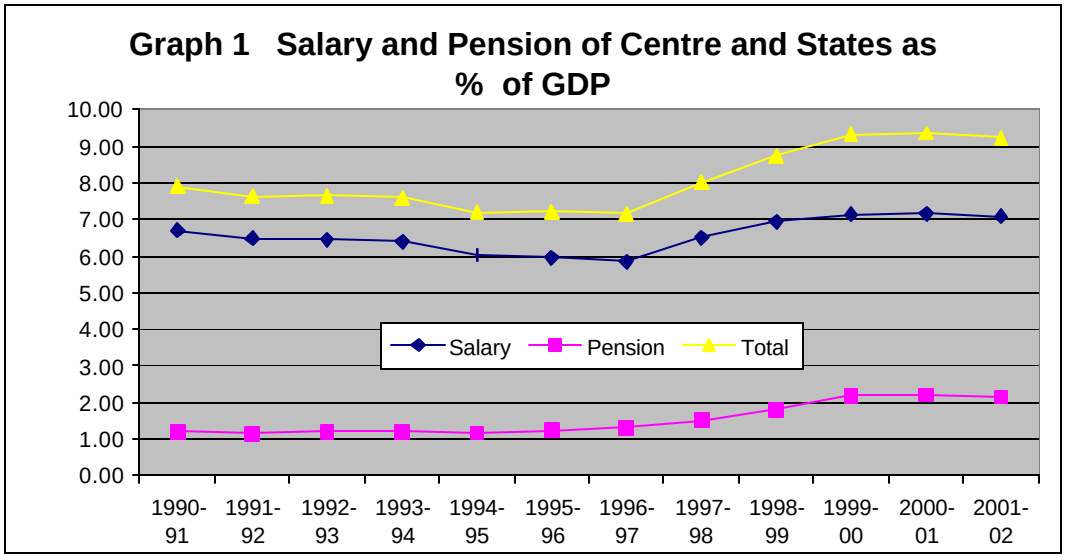
Introduction

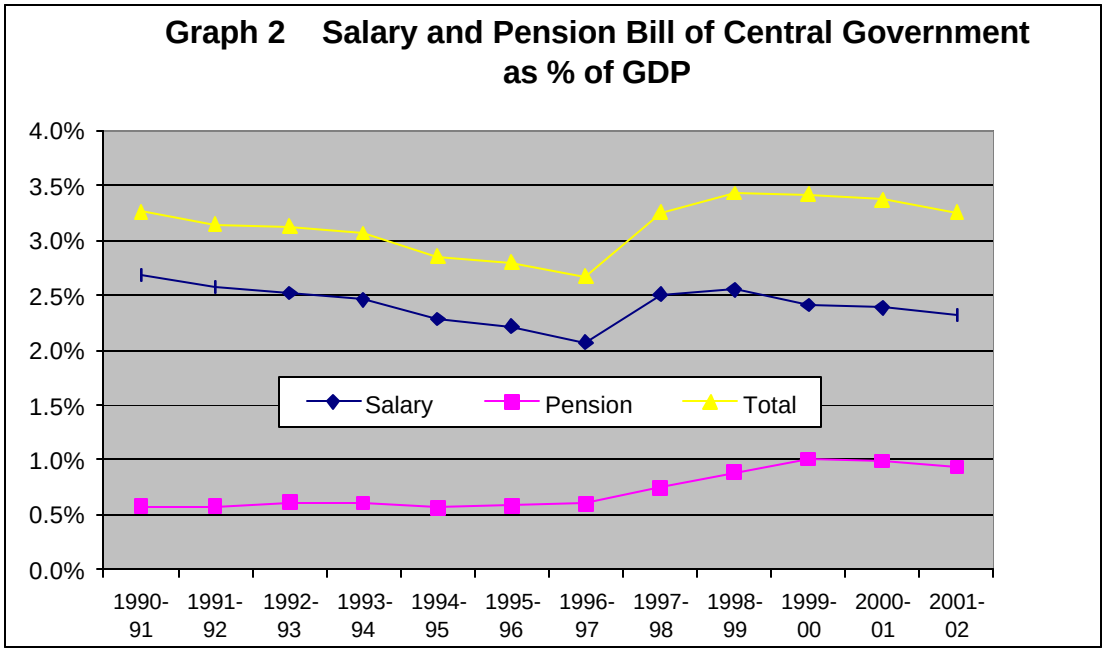
A consensus appears to have been reached among economists, financial experts, planners and policy makers that the present non-contributory and defined benefit nature of the pension system for all government employees is unsustainable and needs to be changed forthwith. Thus, pension reform has now become one of the key priorities in the Central government's fiscal reform agenda. The concern relating to government pension has its origin in the alarming increase in the manpower cost of the government in recent years. At present, the salary and pension bill of the employees of the Central government and State governments put together constitute about 9.2 percent of the gross domestic product (GDP)[1]. As can be observed from the Graph-1 below, the salary and pension bill of government employees has increased from 7.9 percent of the GDP in the year 1990-91 to the present level, the rise being attributed mostly to the implementation of Fifth Central Pay Commission (FCPC) award from 1997-98 onwards. The consequent fiscal stress is obvious.



[1] This does not include the salary and wage-bill of the employees of the local bodies

However, it can also be observed that a gradual downturn has already started in the ratio of government expenditure on salary and pension to GDP. The downturn is more pronounced in case of the Central government. The position of the Central government, in this regard, appears to be fairly comfortable as shown in Graph 2. The salary and pension payment to the Central government employees as a percentage of GDP at present (2001-02) has come down to the level of 1990-91 after peaking in 1998-99. The wage bill, taken separately, is lower in the year 2001-02 than it was in the beginning of 1990s. This is partly attributable to the Central government's effort to gradually prune down the number of employees and partly to the recent corporatisation of the telecommunication department, among others.[2] The Central government liabilities on account of the payment of retirement benefit to its employees, though still high at about 0.9 percent of GDP, has also started declining.

Graph 2 Salary and Pension Bill of Central Government as % of GDP



Thus, the commonly-held belief that the pension bill has the potential to reach an unsustainable level, or perhaps even exceed the wage bill, does not appear to be borne out by the recent trends or to be based on any realistic assessment of such liabilities in the future years. Nevertheless, there is near unanimity on the desirability of introducing pension reforms on grounds of both fiscal prudence and equity.[3] It appears that the high rates of growth recorded by

[2] The corporatisation of the operating arm of the Department of Telecommunication has taken the salaries of these employees off the government's rolls, but the pension liabilities continue to be borne by government under the pact entered with the unions.

[3] The equity argument stems from the perception that the existing pension scheme for government servants is vastly more generous than anything available in the private sector or even in public sector enterprises.

pension payments since the mid-1980s continues to colour perceptions, without any significant effort at assessing the causes or evaluating the likelihood of such trends persisting in the future. This may be of no major consequence if a decision to reform the government pension system has already been taken. However, transition to a contributory pension scheme for government employees from the present non-contributory defined benefit pension system does not seem to have been an easy task. Even after more than two years since the budget announcement (Union Budget 2001-02) regarding implementation of pension reform, the basic principles of the new pension scheme are yet to be firmed up. More importantly, resistance from the unions is yet to be faced. Under the circumstances, therefore, there appears to be some utility in at least clearing up cobwebs surrounding the numbers. If the government for whatever reason is unable to implement a new pension scheme, it should at the very least have a reasonably accurate idea of what its future fiscal liabilities will be.

A simple-minded projection of pension liabilities from the historical trend is obviously erroneous, since there is no reason to believe that government employment, which determines the potential stock of future pensioners, has followed a stable trajectory. Indeed, the evidence is to the contrary. By all indications, the maximum growth in government employment took place in the 1950s and 1960s, and slowed down significantly in the 1980s and 1990s. Moreover, the historical growth path observed in pension payments does not appear to correspond to any economic logic. Neither the rate of inflation nor the rate of increase in the number of pensioners (estimated) in the past supports the growth pattern of pension liabilities (more than 20% annually) that have been experienced during 1980s and 1990s.[4] It appears essential, therefore, that a more rigorous methodology be used for making such projections.

In the recent past, some attempt has been made to make projections for the future pension liabilities of the Central government under a 'no reform' or 'business-as-usual' assumption. At least two official reports which make such projections for the Central government, comprising of five accounting departments, namely Civil, Defence, Postal, Railways and Telecommunications, are available. **First**, the report of the "Working Group on an Assessment of Government of India Pensionary Liability" submitted in 2001 (referred to as the Working Group in rest of the paper) projects an annual growth rate of pension of about four per cent for the period 2000-2010 for all accounting departments of the Central Government taken together. **Second**, the report of "High Level Expert Group on New Pension System" submitted in 2002 (henceforth referred to as the

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This perception has gained strength since the implementation of the FCPC award, which is seen to have removed any disadvantages in salaries and wages that may have earlier been faced by government servants.

[4] This observation suggests that a close look be given to the past trends in pension payments, but that is not the purpose of this paper, which focuses on the future.

Expert Group) projects an annual growth rate of 4.8 per cent during 2000-2010 for all these departments.[5]

If the estimates of these reports are to be credited, then the future prospect of Central government finances under the 'Pension' head does not seem to be a matter of concern at all, since the projected growth rate of nominal pension payments is lower than the assumed inflation rate. Thus, even if the economy were not to grow at all in real terms, the pension bill to GDP ratio would decline secularly. In such a situation, shifting to a contributory pension system simply does not make sense, since it would involve additional fiscal outgo at a time when the fisc is under considerable strain, with benefits accruing only in the distant future, when fiscal pressures may have already eased.

However, going by the present pension structure, in which most components of retirement benefits are indexed to price change, it does not seem prudent to place our faith on such projections. The projected outcomes would be possible only under a scenario of declining number of pensioners in future years. However, the trends in employment in the government sectors during last 50 years, and improved life expectancy at age 60, do not support a declining figure for the number of pensioners for many years to come. All of this argues for developing a more appropriate model than used in these studies.

In an earlier study,[6] the authors have already developed a rigorous theoretical model for projecting both the number of pensioners and the pension liabilities from the existing data set available in India.[7] Using this model, it was estimated that with an assumed inflation of 6% and an estimated pensioners' growth of about 2.2%, a realistic assessment of future pension liability for the civil departments of the Central government alone would place the annual nominal growth rate of pensions at 7.6 per cent. The rather substantial discrepancy between this estimate and those made in the other studies suggests that it may not be wise to be overly sanguine about the future course of pension liabilities. This is, however, only a partial picture, since the Civil departments constitute just about 20% of the total pension bill of all departments put together. It would, therefore, be useful to also look into the future pension liability of the other four departments of the Central government, who maintain their separate accounts for the purposes of all transactions including that of payment of salary and pension.

The principal objective of this paper, therefore, is to make a realistic assessment of the future pension liability of the departments of Railways, Telecommunications, Posts and Defence, and to provide a comprehensive

[5] Both these projections are made in nominal terms under an assumed scenario of an annual inflation rate of 6 per cent.

[6] Sen and Swain, 2002.

[7] One of the main issues raised in Sen and Swain (2002) is the pathetic state of data on retirements, pensioners and pensions in the Indian government, and therefore the need to develop a theoretical model which can address the issues within the constraints posed by the data.

projection of total Central government payments under the 'Pension Accounts'. While doing so, the paper also sheds some light on the dynamics of different kinds of pensioners, and thereby on some considerations that need to be taken into account while framing an alternative pension scheme for government employees.

The growth path of the government pension bill, by its very definition, is clearly driven by the pattern of growth in two variables: (a) the number of pensioners; and (b) the average pension per pensioner. It is important, therefore, at the first instance to get the correct number of beneficiaries who are likely to be covered under the government pension scheme. The second section in this paper discusses the state of the data relating to the number of pensioners and the need to devise alternative methods for making projections. It presents a model-based projection of the number of pensioners, with validation from past experience.

As per the present system of government pension, a government employee is entitled to a number of post-retirement benefits in addition to the monthly basic pension. These benefits are always included in the data pertaining to pensions, and thus need to be worked out while computing pensionary liabilities. While the monthly basic pension is applied to all the pensioners cumulated over time, other post retirement benefits accrue to fresh retirees only. Further, the basic monthly pension and other post retirement benefit are different for different category of pensioners. Hence it would not be appropriate to base our estimates on a single average pension figure. The third section of this paper discusses the present system of pension structure and other retirement benefits as it is applied to different categories of pensioners. The specificity of different accounting departments in conformity with present system of Central government pension scheme has also been highlighted in this section.

The projected annual pension liability for each department of Central government for the period ending 2009-10 is presented in the fourth section. The last section briefly puts the macro economic and fiscal implication of such projection. It would be useful at this stage to mention that our analysis in the following sections are confined to four accounting departments of the central government namely Defence, Railways, Posts and Telecommunication. The analysis relating to Civil department have been detailed in the earlier paper (*ibid*, 2002). However, the summary analysis includes the findings on all the five departments, including that on Civil departments, with a view to presenting a comprehensive picture.

Projecting the Number of Pensioners

The available information relating to annual retirements and annual recruitments in the past in the Central government departments and the cumulative number of pensioners along with the category-wise break-up are

highly unsatisfactory, to say the least. There are huge data gaps concerning these numbers in virtually all the departments. In the case of the department of Railways, which is the only department to document the number of pensioners and retirees annually for the past several years, there are inconsistencies between the time series on the number of retirees and that on the cumulative number of pensioners, which make their use problematic. The only statistical information available in the published documents with reasonable degree of reliability are the number and distribution of Central government employees across the five accounting departments for past few decades.[8] Thus, the past employment growth necessarily has to form the basis to make future projection of the number of pensioners by applying a theoretically justifiable model.

As per the theoretical model developed by the authors,[9] the annual rate of retirement, and the annual number of retirees derived there from, can be computed from the past growth pattern in employment by using certain parametric assumption relating to the average years of service rendered by the government employees and the in-service death rate. Similarly, net accretion made to the stock of pensioners can be estimated from the series of annual retirees by applying parametric values to the attrition rate of pensioners, which in turn is driven by the pattern of retirement. Since the growth pattern in employment observed in the past and nature of retirement vary from department to department, the parameters underlying the projection of the number of annual retirees and pensioners would differ across departments. This paper, therefore, takes into account this inter-departmental diversity and discusses the future growth in the number of pensioners separately for each accounting department.

Before presenting the model, it would first be necessary to define the different categories of pensioners which are covered under the prevailing pension regime. For the purpose of our projections, pensioners are divided into three categories. The first, and the most important, category comprises of the retired employees, commonly known as service pensioners (SP). The service pensioners (SP) retire from the service either due to superannuation or through voluntary retirement. On an average, a Central government servant, except for those in the Armed forces, renders service of 33 years before superannuating. The time series on SP can be directly computed from the data on annual number of retirees. The second category of pensioners comprises of switch-over family pensioners (SOFP). The SOFP are dependants entitled to receive family pension after the death of the spouse, who were already in receipt of pension. Thus the number of SOFP is a function of SP and their attrition rate. The demographic structure of the government employees along with the varied demographic characteristics for men and women put an increasing number of beneficiaries in the SOFP group. The third category of pensioners is termed as fresh family pensioners (FFP). The FFP are entitled to draw family pension due to in-service death of their spouse. The

[8] The employee's number for the armed forces, category-wise, have been obtained from the Ministry of Defence.
[9] *Op cit.* Sen and Swain (2002)

number of FFP can be directly derived from the employees' strength and the death rate of the age cohort to which the Government employees belong.

The available estimates on future pension liability of Central government distinguish between service pensioners and family pensioners. However, further segregation of family pensioners into SOFP and the FFP has not been made for the purpose of projection. In our opinion, it is important to distinguish between the two categories of family pensioners due to three compelling reasons. First, the structural dynamics of each of these categories are different as should be evident from their very definition. Second, these two categories of family pensioners are driven by different demographic factors with different average life expectancy and it is important to treat them separately for the purpose of projections. Third, the pension entitlements of the two categories of family pensioners are different and clubbing them together can lead to serious projection errors.

While the available statistics on the number of pensioners is in itself of questionable quality, there is absolutely no clue about the number of SOFP and FFP. Some rough estimates of family pensioners and service pensioners covered by each of the accounting departments are available in the published documents, such as Pay Commission Reports, annual publications of Ministries and Departments and report of the Working Groups. In the absence of any other reliable estimates, the exercise undertaken in this paper takes the base year (1999-2000) statistics from these reports. The first step in projecting the number of pensioners has been to break up the total number of pensioners of the base year (1999-00) to three categories of pensioners namely SP, SOFP and FFP. The available data on family pensioners for the year 1999-2000 as obtained from various reports and published documents have been taken as the basis of total family pensioners. The estimation of FFPs has been made for the year 1999-2000 by building up a time series of FFPs prior to 1999-2000 from the past data on employment of respective departments. The number of FFP has been netted out from the total family pensioners to obtain the number of SOFP for the base year[10].

After obtaining the base year figure for the three categories of pensioners, the projection of total number of pensioners for the period 2001-2010 has been made in two steps. First, the annual number of retirees has been estimated for each department on the basis of the following equations:[11]

$$R_t = r_t * (N_t) \qquad (1)$$

$$r_t = (1 - \lambda\delta)(g + \delta)/\{(1 + g)^{\lambda} - (1 - \lambda\delta)\} \qquad (2)$$

$$a_t = r_t + \delta \qquad (3)$$

[10] Pensioners' number under Railways Accounts does not provide any category-wise break up. The base year figure on total number of pensioners has been broken down into the three categories of pensioners by using past employment statistics.

[11] See Sen & Swain (2002) for derivation of these equations from the structural model.

where:

R_t = Number of retirees in year t

N_t = Number of employees in year t

r_t = percentage of employees retired in year t

λ = The average length (years) of service in government

g = average growth rate of the number of government employees over the period (t - λ) to t

δ = Average annual death rate for government employees, given the age distribution.

a_t = attrition rate of government employees in year t.

The model-based estimates of annual number of retirees, as derived from the equation, refutes the conventional wisdom based on rule of thumb principle that the number of employees retiring annually is a constant ratio of the number of employees and that this ratio is the inverse of the average years of service the employee puts in. It is only in the limiting case of g = 0% with value of λ = 33 years and δ = 0.0032 that r_t = 2.68%. Addition of annual average in-service death rate of 0.32% to the annual retirement rate in the limiting case makes the annual attrition rate of government employees equal to 3%, i.e. the inverse of 33 years.

It would be useful to look at some indicative figures of retirement and attrition rates given by the model at different rates of growth of the number of government employees as presented in **Table-1**. These figures have been derived under the assumptions that the average length of service (λ) is around 33 years and the average annual rate of in-service deaths (δ) is 0.32%.[12] As may be seen from the table, the 3% attrition rate obtains only when the rate of growth of the number of government employees over the past 33 years has been zero. If the growth rate had been positive, the retirement and attrition rates will be progressively lower. On the other hand, if there has been a process of downsizing in the past – i.e. the growth rate of employment is negative – the retirement and attrition rates tend to rise sharply. Thus, it becomes virtually impossible to specify a unique retirement or attrition rate independently of the past behaviour of government employment.

In interpreting this table, it must be borne in mind that the retirement and total attrition rates relate to a particular year, while the growth rate of government employment is the average over the previous 33 years. Thus the model is based on one critical assumption – that government employment has followed a steady-state growth path for a long period in the past. This is clearly not a realistic assumption and deviation from this assumption would have different implications on the behaviour of future retirement rate. On the whole, however, the divergences from a steady-state would show up as annual variations in the retirement rate around a mean, which would be determined by the average

[12] This value of δ has been obtained from the age-specific death rates for urban males in India for the age-group of 23 to 58 years.

growth rate over the concerned period. Thus the annual variations would tend to smoothen out over time.

Table 1: Retirement and Attrition Rates at Different Rates of Growth

Rate of growth of government employment	Retirement Rate	Attrition Rate
-3.0%	4.51%	4.83%
-2.5%	4.20%	4.52%
-2.0%	3.92%	4.24%
-1.5%	3.65%	3.97%
-1.0%	3.41%	3.73%
-0.5%	3.41%	3.73%
0.0%	2.68%	3.00%
0.5%	2.55%	2.87%
1.0%	2.36%	2.68%
1.5%	2.17%	2.49%
2.0%	1.99%	2.31%
2.5%	1.82%	2.14%
3.0%	1.66%	1.98%
3.5%	1.51%	1.83%
4.0%	1.38%	1.70%

Note: Columns 2 and 3 are computed from equations (2) and (3) respectively with assumed parameter values of $\delta = 0.0032$ and $\lambda = 33.33$.

It must further be noted that the parametric value of λ and δ used in deriving the numbers shown in the table may not be universally applicable. These values mostly hold good for civilian government employees in the Central Government in India. However, the service condition, pattern and structure of employment, age cohort of the fresh recruits, which have bearing on λ and δ, differ from department to department and these initial conditions would have implication for the value assigned to λ and δ. Accordingly, the retirement rate of each accounting department would have to be computed independently by assigning different values to λ and δ on a case-to-case basis in order to avoid projection bias. The following paragraphs explain the estimation of department-wise retirement rate and annual retirees over a period of time.

Retirements in Railways

The department of Railways accounts for more than half of the total civilian employees in the Central government. The employment statistics of Railways are available for an extended period of time starting from the pre-independence period. Observation of the time series on employment indicates fairly stable growth in post-1965 employment, which is the relevant period for this exercise. A slight down turn is observed in the employment after the year 1995, which may be

the effect of the downsizing effort of the government. Our estimation of the model in case of Railways, therefore, is based on the assumption of steady-state growth path of employment in the past.

Assigning values to the parameters λ and δ in case of Railways would require an understanding of the working environment of the employees, their job location, etc. Most of the railway employees belonging to the group C and group D categories[13] render their services either on-board inside the train or in remote location, hardly having any provision for catering to the basic needs like health and education facilities for their family members. In most cases, they are compelled to stay away from their families. Hence, there is reason to believe that it is in the interest of the employees to opt for voluntary retirement much before attainment of the age of superannuating. In this exercises, we assume that about 25% of the employees would opt for voluntary retirement after completion of 20 years of service, the minimum years required to qualify for pension. The balance 75% would have a normal service career of 33 years. Thus, on average a railway employee would render service for a period of about 30 years.

Early retirement age of the railway employee would imply relatively younger age cohort for these employees. Accordingly the average death rate would be less than normal rate of 0.3%. For our estimation a death rate of 0.28% has been assumed. After assigning value to the death rate and average year of service, the rate of retirement for the employees in Railways department have been computed as presented in the **Table–2.** As can be seen the result is consistent with the model findings depicted in Table 1. Higher employment growth rate in the preceding 30 years would lead to lower retirement rate and vice-versa.

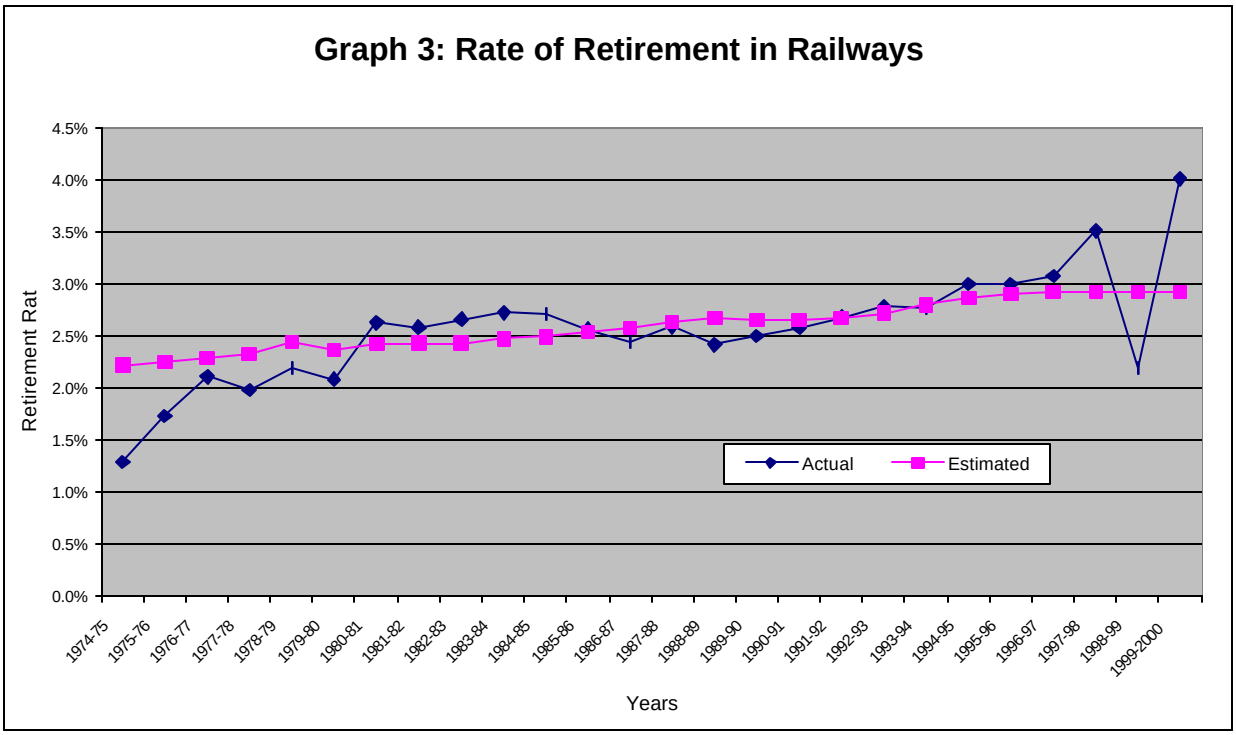
Table 2: Employment and Retirement in Railways

Year	Number of Employees	Quinquennial Growth rates	Growth rate Over 30 years	Rate of Retirement	Annual Retirees (est)
1960	1142776				
1961	1148287				
1962	1162505				
1963	1196102				
1964	1251296				
1965	1296018	2.5%	3.1%	2.0%	25729
1966	1326948		3.2%	2.0%	26133
1967	1340849		3.2%	2.0%	26211
1968	1345650		3.3%	1.9%	25782
1969	1338685		3.3%	1.9%	25893
1970	1344699	0.7%	3.2%	1.9%	26105
1971	1359571		3.2%	2.0%	26735
1972	1378931		3.1%	2.0%	27560
1973	1411000		2.8%	2.1%	29277

[13] Groups C &D together constitute more than 98% of the railways employees as per the Railways records.

1974	1432000		2.6%	2.1%	30701
1975	1441000	1.4%	2.4%	2.2%	31994
1976	1457000		2.3%	2.3%	32834
1977	1463983		2.2%	2.3%	33483
1978	1471000		2.1%	2.3%	34338
1979	1497000		1.8%	2.5%	36720
1980	1553000	1.5%	2.0%	2.4%	36777
1981	1572000		1.8%	2.4%	38119
1982	1575000		1.8%	2.4%	38322
1983	1583000		1.8%	2.4%	38480
1984	1592000		1.7%	2.5%	39351
1985	1603000	0.6%	1.7%	2.5%	39992
1986	1613000		1.5%	2.5%	40947
1987	1611000		1.4%	2.6%	41526
1988	1618000		1.3%	2.6%	42683
1989	1626000		1.2%	2.7%	43471
1990	1647000	0.5%	1.2%	2.7%	43800
1991	1652000		1.2%	2.7%	43971
1992	1654000		1.2%	2.7%	44268
1993	1645000		1.1%	2.7%	44769
1994	1625000		0.9%	2.8%	45469
1995	1602000	-0.6%	0.7%	2.9%	45878
1996	1586000		0.6%	2.9%	46121
1997	1584000		0.6%	2.9%	46303
1998	1579000		0.5%	2.9%	46295
1999	1578000		0.5%	2.9%	46173
2000	1577000	-0.3%	0.5%	2.9%	46247

The estimated annual number of retirees increases at a steady rate gradually. This is due to the assumption of the steady state growth in employment in the past. In reality there has been some fluctuation in the growth rate of employees in the past. The impact of this has to be reflected in the actual number of annual retirees. The **Graph 3** indicates a comparative picture of actual retirement rate and predicted retirement rate in the Railways since the year 1975. As can be observed, the discrepancy between the estimated rate and the actual rate of retirement over a period of 25 years is not very significant. The fluctuation of actual series around the theoretical series is negligible on average. Thus, the model finding, i.e. the predicted rate of retirements in case of railways employees, appears to be reliable and application of this model to make projection of annual retirements in future is expected to provide reasonably accurate estimates.



For estimating the retirement rate of railways employees during the period 2001-2010, it is assumed that the employment figure for future years would remain same at the base year (1999-2000) level. **Table 3** indicates the projected number of retirees in Railways during 2001-10. As can be seen, the rate of retirement increases gradually corresponding to a falling rate employment growth during this period.

Table 3: Projected Number of Retirees in Railways

Year	Number of Employees	Rate of Retirement	No. Retirees
2001	1577000	2.9%	45970
2002	1577000	2.9%	46241
2003	1577000	3.0%	46668
2004	1577000	3.0%	46930
2005	1577000	3.0%	47038
2006	1577000	3.0%	47222
2007	1577000	3.0%	47298
2008	1577000	3.0%	47373
2009	1577000	3.0%	47627
2010	1577000	3.0%	48002

Retirements in Defence

Next to Railways, Defence is the second largest employer in the Central government. The employees' strength in all the three wings of armed forces taken together touches more than 1.2 million. The service condition of the personnel in the armed forces, the age cohort of the employees and the pattern of retirement vary significantly from that of civil employees. Further, within the armed forces itself, service conditions and retirement pattern varies between Commissioned Officers (CO) and Personnel Below Officers Rank (PBOR). Application of the model (equation 2 and 3) in case of Defence would therefore require careful consideration of the values to be assigned to λ and δ.

In this case, there are two distinct series of employment statistics available separately for PBOR and CO. These two categories of personnel represent two distinct age cohorts and are governed by different service conditions. The officers, in general, render services for a much longer period than the PBOR. But average years of service rendered by CO would be less than that of civilian employees due to younger age of retirement for most of the service officers compared to their civilian counterparts. In our exercises, it is assumed that the period of service rendered by an officer on average would be 30 years. The average length of service for the PBOR has been estimated to be in the range of 20 years.

Early age of induction in the defence services and early age of retirement, particularly in case of PBOR, who constitute about 85% of the total employment in armed forces, imply a younger age cohort, on average, for defence employees compared to that of civilians. In the absence of death by violence during war or other such events, the younger age cohort should imply a significantly lower 'normal' in-service death rate. However, the empirical evidence indicates an average in-service death rate of about 1.2% among the defence personnel.[14] This could be attributed to the death caused by fighting against internal insurgency and combating terrorism, among others. Adoption of the model to defence employees, therefore, assumes in-service death rate of 1.2%, which is consistent with the observed statistics.[15]

Estimation of retirement rate in the model takes into account only those, who retire from the service after attaining the age of superannuation. However, in defence services there are a large number of retirements categorized under voluntary retirement, invalid retirement, compulsory retirement. In the past 10

[14] The death in–service among defence personnel for the last 10 years has been obtained from the Defence Pension Accounts Office.

[15] The value assigned to the death rate is same for PBOR and CO since separate figures for the two categories are not available.

years these groups constitute about 1.5% of the total employees. In our exercises we group them together under 'Voluntary Retirement' and estimate a series on voluntary retirements separately as a fixed ratio of employment for each year.

As explained above, the estimation of retirement rate for defence employees has been made in three steps. Retirement rate and number of retirees have been estimated separately for PBOR and CO by assigning different values of λ and δ in equation 2 of the model as has already been explained. The retirements occurring due to reason other than superannuation, termed as voluntary retirement in this case, has been estimated separately by assigning a fixed ratio (1.5%) to the employment data. The three categories of retirees are combined together to arrive at the total number of annual retirements in Defence department.

Table 4 and **Table 5** below contain the predicted rate of retirement and predicted number of retirees' respectively for PBOR and CO. The retirement rate for PBOR mostly remains at around 3.6% during the period 1990 to 2000. The retirement of CO during the same period is estimated to be within the range of 2.0 to 2.8%. Combining CO and PBOR the total number of defence personnel retiring annually due to superannuartion has been computed to be around 3.5%. In absolute numbers, more than 44000 army personnel are superannuating every year.

Table 4: Employment and Retirement of PBOR in Defence

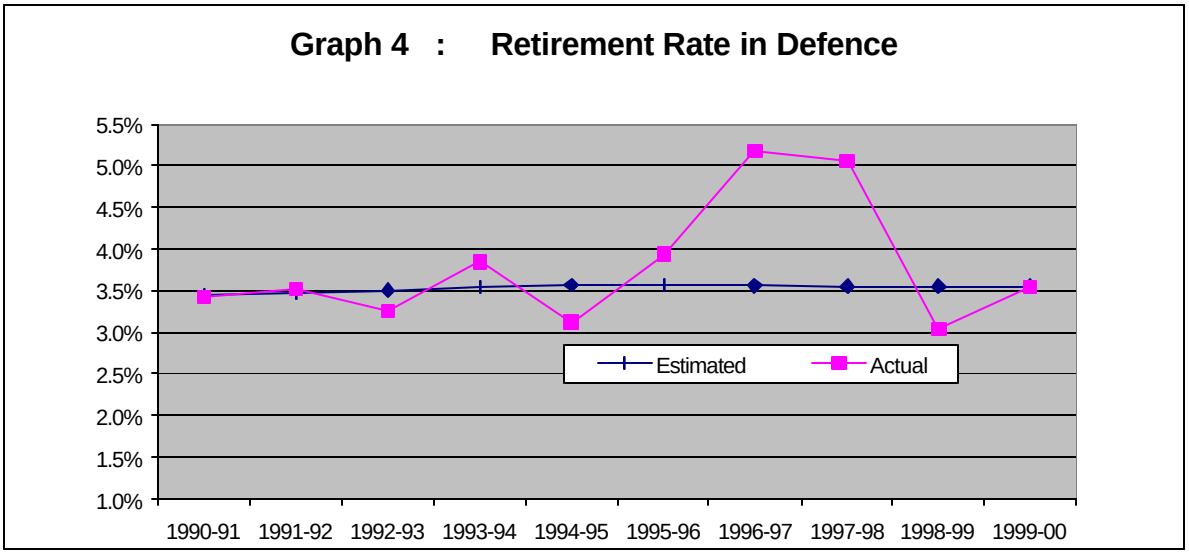
Year	Number of PBOR	Rate of growth over 20 years	Rate of Retirement	Annual Retirees
1960	346832		3.3%	11445
1961	398857	2.1%	3.3%	13289
1962	462701	2.8%	3.1%	14399
1963	536974	3.5%	2.9%	15537
1964	623391	4.3%	2.7%	16713
1965	723953	5.0%	2.5%	17933
1966	840990	5.8%	2.3%	19199
1967	850173	5.8%	2.3%	19344
1968	859748	5.6%	2.3%	19985
1969	869743	5.7%	2.3%	20142
1970	880191	5.7%	2.3%	20304
1971	891127	5.8%	2.3%	20470
1972	894562	5.7%	2.3%	20562
1973	898030	5.7%	2.3%	20655
1974	901531	5.7%	2.3%	20749
1975	905066	5.7%	2.3%	20843
1976	908635	5.7%	2.3%	20938
1977	914770	5.7%	2.3%	21058
1978	920948	5.7%	2.3%	21179
1979	927168	5.0%	2.5%	22979
1980	933430	4.3%	2.7%	24883
1981	939735	4.4%	2.7%	24961
1982	964076	3.7%	2.8%	27339
1983	989074	3.1%	3.0%	29883
1984	1014749	2.5%	3.2%	32580
1985	1041118	1.8%	3.4%	35393
1986	1068201	1.2%	3.6%	38238
1987	1084938	1.2%	3.6%	38767
1988	1102024	1.2%	3.6%	39310
1989	1119472	1.3%	3.6%	39867
1990	1137294	1.3%	3.6%	40441
1991	1155503	1.3%	3.6%	41031
1992	1144556	1.2%	3.6%	40856
1993	1132727	1.2%	3.6%	40656
1994	1118121	1.1%	3.6%	40385
1995	1109443	1.0%	3.6%	40243
1996	1130903	1.1%	3.6%	40794
1997	1145610	1.1%	3.6%	41229
1998	1159232	1.2%	3.6%	41640
1999	1167617	1.2%	3.6%	41933
2000	1172623	1.1%	3.6%	42152

Table 5: Employment and Retirement of CO in Defence

Year	No. Of Officers	Rate of growth Over 30 years	Rate of retirmt (model)	Annual Retirees
1960	15879		1.5%	238
1961	18261		1.5%	274
1962	21084		1.5%	316
1963	24355		1.5%	365
1964	28149		1.5%	422
1965	32549		1.5%	488
1966	37653		1.5%	565
1967	38198		1.5%	573
1968	38760		1.5%	581
1969	39340		1.5%	590
1970	39939		1.5%	599
1971	40558	4.1%	1.5%	623
1972	40812	4.1%	1.5%	626
1973	41080	4.1%	1.5%	630
1974	41360	4.1%	1.5%	633
1975	41654	4.1%	1.5%	637
1976	41964	4.2%	1.5%	640
1977	42859	4.2%	1.5%	647
1978	43774	4.3%	1.5%	653
1979	44709	4.2%	1.5%	680
1980	45664	4.2%	1.5%	687
1981	46641	4.3%	1.5%	693
1982	47412	4.3%	1.5%	699
1983	48199	4.4%	1.5%	705
1984	49004	4.4%	1.5%	711
1985	49827	4.4%	1.4%	717
1986	50668	4.5%	1.4%	723
1987	52170	4.6%	1.4%	732
1988	53722	4.7%	1.4%	741
1989	55328	4.7%	1.4%	750
1990	56987	4.4%	1.5%	835
1991	58703	4.0%	1.6%	929
1992	58969	3.5%	1.7%	1030
1993	57415	2.9%	2.0%	1134
1994	57535	2.4%	2.2%	1262
1995	56631	1.9%	2.5%	1405
1996	56781	1.4%	2.8%	1582
1997	56439	1.3%	2.8%	1600
1998	56785	1.3%	2.9%	1621
1999	58384	1.3%	2.8%	1649
2000	59299	1.3%	2.8%	1674

In order to validate our model as applied to Defence Accounts, it would be desirable to plot the predicted retirement rate against actual rate of retirement, which has been computed from the number of PPO's issued under Defence Accounts available for the last 10 years. **Graph 4** captures the estimated retirement vis-à-vis the actual retirement rate for the last decade. As can be seen, the actual rate of retirement has fluctuated around the predicted line during the 1990s in a symmetrical fashion, except for the spike in the years 1996-97 and 1997-98. Past employment data does not support such a large figure of actual retirement in defence in the year 1997 and 1998. It is worth mentioning here that in the absence of data on actual number of annual retirees, the number of PPOs issued annually has been used as proxy for the annual retirement. There is a possibility that the number of PPOs may overshoot the number of actual retirements due to issuance of some revised pension orders in that year. Thus, it seems reasonable to use the model for projecting the future retirement in Defence department.

Graph 4 : Retirement Rate in Defence



As in the case of other departments, the future employment in Defence is assumed to remain at the base year level during the 10 years period starting 2001. The model-based projection of the annual retirements is estimated to increase gradually to more than 46000 from the present level of about 43000. In addition to this, about 1.5% of the employees retire from the service voluntarily. **Table 6** summarises the aggregate retirement position projected for the defence employees for the period 2001 to 2010.

Table 6: Projected Employment and Retirement in Defence

Year	No. of Employees (PBOR+CO)	Retirees Superannuating	VR	Total Retirees
2001	1231922	43955	18479	62434
2002	1231922	44358	18479	62837
2003	1231922	44744	18479	63223
2004	1231922	45107	18479	63586
2005	1231922	45443	18479	63922
2006	1231922	45744	18479	64222
2007	1231922	45930	18479	64409
2008	1231922	46100	18479	64579
2009	1231922	46249	18479	64728
2010	1231922	46373	18479	64852

Retirements in Post

Application of the model to estimate retirement rate in the Department of Post assumes similar service condition for postal employees as that of civil departments. Therefore, the values assigned to λ and δ are 33 years and 0.32 per cent respectively. The past employment behavior in regard to Post follows a fairly stable growth path up to the year 1984, and thereafter there is a slow and steady decline in the number of employees. It would be worth mentioning here that the employment figure presented in the **Table 7** is confined only to the departmental staff. However, the Department of Post employs an equivalent number of personnel as extra-departmental employees, and these extra-departmental staff are not entitled to receive pension under the prevailing pension scheme. Our exercise assumes the present position concerning extra departmental employees to remain unchanged, and hence applies the model to the employees net of extra departmental ones for the purpose of theoretical projection. The predicted rates of retirement during the past thirty years have been presented in Table 7. As can be seen, there is slow and gradual increase in the retirement rate during last 3 decades. The predicted pattern of retirement is consistent with the past employment behaviour, which exhibited a declining long run growth pattern.

While it is important to establish the robustness of our estimation by placing the predicted value across the observed value of the retirement rate, non-availability of actual retirement data in case of the Department of Post prevents us from establishing such validation.

Table 7: Employment and Retirement in Post

Year	Number of Employees	Growth rate Over 33 years	Rate of Retirement	Number of Retirees
1960	157117			
1961	160000			
1962	165400			
1963	170982			
1964	176753			
1965	182718			
1966	188885			
1967	195260			
1968	201850			
1969	208662			
1970	215705			
1971	222985	2.3%	2.1%	4597
1972	227955	2.3%	2.1%	4699
1973	233036	2.3%	2.1%	4804
1974	238231	2.3%	2.1%	4911
1975	243541	2.3%	2.1%	5021
1976	248970	2.3%	2.1%	5133
1977	254519	2.3%	2.1%	5247
1978	260192	2.3%	2.1%	5364
1979	265992	2.3%	2.1%	5484
1980	271921	2.4%	2.0%	5545
1981	278000	2.4%	2.0%	5650
1982	293000	2.5%	2.0%	5823
1983	309000	2.6%	1.9%	6003
1984	310000	2.6%	2.0%	6074
1985	308053	2.5%	2.0%	6124
1986	298707	2.3%	2.0%	6119
1987	291957	2.2%	2.1%	6133
1988	291478	2.2%	2.1%	6195
1989	288421	2.1%	2.2%	6238
1990	286822	2.0%	2.2%	6294
1991	293225	2.0%	2.2%	6413
1992	291527	1.9%	2.2%	6469
1993	290035	1.9%	2.3%	6529
1994	290197	1.8%	2.3%	6608
1995	288552	1.7%	2.3%	6741
1996	288498	1.6%	2.4%	6892
1997	286378	1.5%	2.5%	7033
1998	293979	1.5%	2.5%	7255
1999	293072	1.3%	2.5%	7419
2000	294301	1.3%	2.6%	7607

However, the Working Group report contains some figures relating to the projected number of pensioners in the department of post for the years 2001 to 2010. The report also provides the basis for the estimation of such projected numbers. In order to satisfy ourselves with the model result, it was necessary to calculate backward the annual number of retirees from the projected number of pensioners. The implicit retirement rate derived therefrom has been compared to the model-based projection of the rate of retirement for the current decade as shown in the **Graph 5** below. As can be noticed our model-based projection almost converges with the Working Group numbers except for the years 2000-01 and 2002-03. It is therefore reasonably accurate to apply the model for purpose of our projection. **Table 8** below presents the retirement numbers in absolute terms.

Graph 5

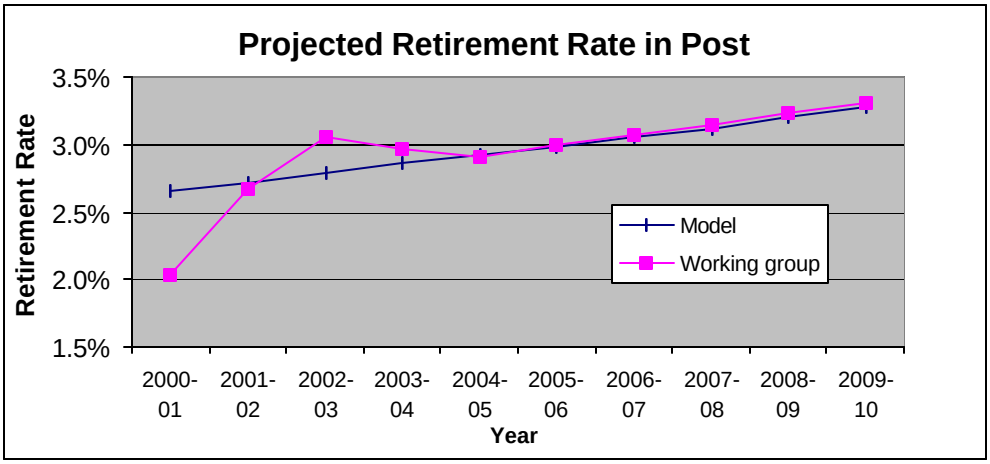


Table 8: Projected Retirement in Post

Year	Number of Employees	Rate of Retirement	No. Retirees
2001	**294301**	2.65%	7796
2002	**294301**	2.72%	7996
2003	**294301**	2.79%	8210
2004	**294301**	2.87%	8442
2005	**294301**	2.92%	8608
2006	**294301**	2.98%	8785
2007	**294301**	3.05%	8975
2008	**294301**	3.12%	9181
2009	**294301**	3.20%	9408
2010	**294301**	3.28%	9659

Retirements in Telecommunication

The terms and conditions of the service, average age cohort, demographic structure and pattern of retirement for employees belonging to the Department of Telecommunication are almost similar to that of Central government civilian employees. Hence it is reasonable to assign same value to λ and δ as that in case of civil departments. The average years of service rendered by an employee in the telecommunication department is, therefore, assumed to be 33 years and the in-service death rate assumes a value of 0.32%. However, the employment pattern in the Department of Telecommunication in the past indicates two distinct time phases. The observed employment statistics exhibited a very high growth, measuring 5.6% annually, during 1971 to 1981 as compared to a growth rate of around 2.5% both before 1971 and after 1981. The base data are presented in the **Table 9**. This growth pattern has obvious implications for retirements during the decade starting 2001. Therefore it may not be desirable to assume a steady-state growth path of employment in the case of Telecommunication.

Table 9: Employment and Retirement in Telecommunication

Year	Number of Employees	Decadal Growth	Growth rate Over 33 years	Rate of Retirement	Annual Retirees
1960	124182				
1961	127310	2.5%			
1962	133166				
1963	139292				
1964	145699				
1965	152402				
1966	159255				
1967	160768				
1968	162295				
1969	163837				
1970	165393				
1971	167000	2.8%			
1972	176414				
1973	186358				
1974	196863			1.2%	2323
1975	207960			1.2%	2454
1976	219683			1.2%	2592
1977	232067			1.2%	2738
1978	245148			1.2%	2893
1979	258967			1.2%	3056
1980	273565			1.2%	3228
1981	287523	5.6%		1.2%	3393
1982	295396			1.2%	3486
1983	302498			1.2%	3569
1984	310041		3.5%	1.2%	3658
1985	317875			1.2%	3751
1986	327067			1.2%	3890
1987	335704			1.2%	3995

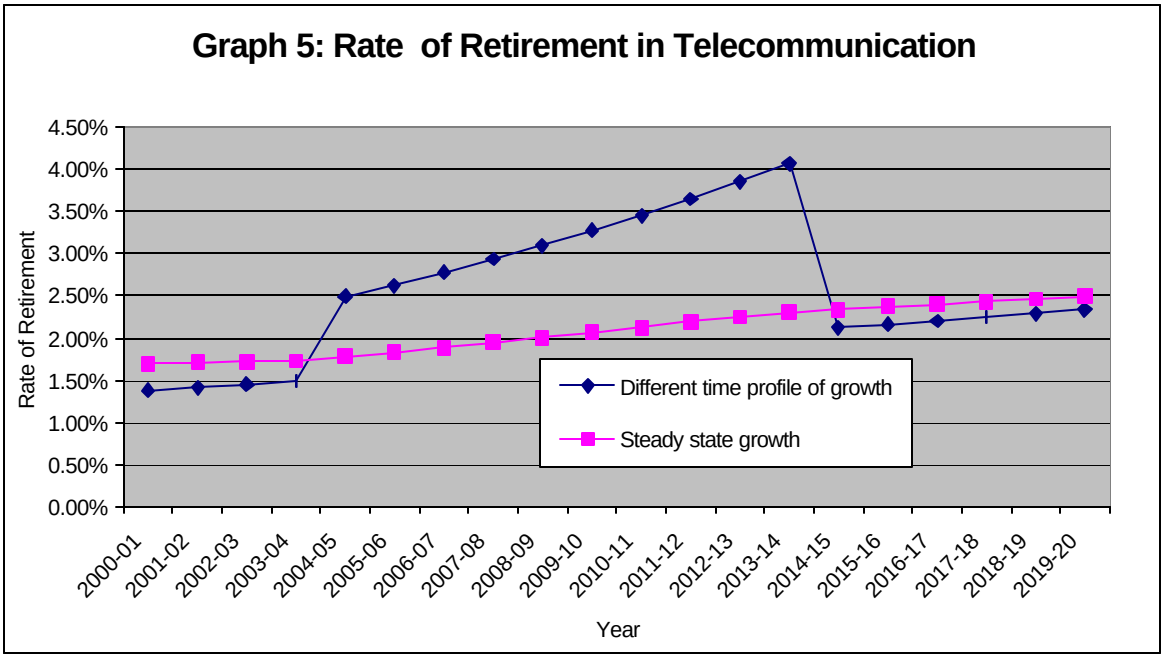
1988	344332			1.2%	4138
1989	351987			1.2%	4251
1990	358943			1.2%	4343
1991	376703	2.7%	3.6%	1.2%	4597
1992	374608			1.2%	4593
1993	386987			1.2%	4760
1994	397913			1.2%	4930
1995	422722			1.3%	5559
1996	424456			1.3%	5626
1997	432682			1.3%	5777
1998	429015			1.3%	5770
1999	428069			1.4%	5801
2000	424983		3.0%	1.4%	5802

The methodology for projecting future retirements in this case implicitly adopts the model described above, but computes the retirement numbers in a step-wise manner on a year-to-year basis. The predicted retirement rate and the corresponding number of annual retirees up to the year 2000 are presented in Table 9 above. Unfortunately, the actual number of annual retirees in the past for the telecommunication department is not available. Hence validation of the methodology by tracing a comparison between the actual values and predicted values has not been possible in this case. More relevant for the purpose of our study, however, is the projected rate of retirement and the corresponding number of retirees for the future years, which are presented in **Table 10**.

Table 10: Projected Retirements in Telecommunication

Year	Number of Employees	Rate of Retirement	No. Retirees
2001	426606	1.4%	5868
2002	426606	1.4%	6015
2003	426606	1.5%	6186
2004	426606	1.5%	6356
2005	426606	2.5%	10645
2006	426606	2.6%	11220
2007	426606	2.8%	11860
2008	426606	2.9%	12529
2009	426606	3.1%	13225
2010	426606	3.3%	13950
2011	426606	3.5%	14745
2012	426606	3.6%	15568
2013	426606	3.9%	16437
2014	426606	4.1%	17354
2015	426606	2.1%	9032
2016	426606	2.2%	9211
2017	426606	2.2%	9395
2018	426606	2.2%	9590
2019	426606	2.3%	9781
2020	426606	2.3%	9993

As has been explained earlier, these projections have been made by applying the model without assuming a steady-state time profile of past employment growth in telecommunication. This was necessary because, unlike in the case of other departments, projection of the annual retirees under the assumption of a steady-state growth path for telecommunication would lead to obvious downward bias in the medium term, although the longer-term projections would probably continue to remain more or less valid. The implication of the two alternative computational methodologies on the future rates of retirement is highlighted in the **Graph 5**. It can be clearly noted that the assumption of steady state growth in the past employment numbers for the telecommunication underestimates the rate of retirement for the period during 2004 to 2014. Over the longer term, however, the rates converge. Since the objective of this paper is to project the pension bill of the central government for the years 2001 to 2010, it is clearly appropriate to apply the model variant in this case.



As can be seen from the graph, the retirement rate is projected to increase from the present level of 1.4% to 2.5% in the year 2004-05. Thereafter, the retirement rate keeps increasing sharply till it reaches the level of 4.1% in the year 2014 and then suddenly drops to the level of 2.1% in the year 2015 and gradually increases thereafter.

Projecting the Number of Pensioners

After estimating the number of annual retirees as described above, the net accretion to the base year's stock of pensioners can be determined by the number of retirees (R) during the year, which is the gross accretion to the stock, **less** the number of deaths among the existing service pensioners, which is the attrition from the stock. However, the task is not so easy, since application of a constant ratio average death rate to the stock of pensioners may lead to gross statistical error arising due to adoption of the same simple rule of thumb principle in this case also. The assumed attrition rate of the pensioners referred to in various extant reports has been computed as the inverse of the number of years a pensioner is expected to survive. But this principle would be valid only in the limiting case where: (a) number of any given category of pensioners has remained constant over a period of time; and (b) the base data on the number of pensioners are in conformity with the past employment figure[16]. Past trends in government employment and the pension bill are clearly not supportive of these two presumptions. The present exercise therefore applies the following mathematical relationship[17] to compute the net accretion to the number of pensioners in different categories.

$$\mathbf{D}SP_t = R_t - R_{t-g1} \qquad (4)$$

$$\mathbf{D}SOFP_t = (1 - d_1)(R_{t-g1} - R_{t-g1-g2}) \qquad (5)$$

$$\mathbf{D}FFP_t = d\ (1 - d_2)(N_{t-1} - N_{t-1-g3}) \qquad (6)$$

Where:

$\mathbf{D}SP_t$, $\mathbf{D}SOFP_t$ and $\mathbf{D}FFP_t$ are net accretion to the stock of SP, SOFP and FFP respectively.

$\mathbf{g1}$ = average years of survival after retirement. It is assumed for simplicity that the entire cohort of retirees in a given year dies simultaneously after $\gamma 1$ years,

$\mathbf{d_1}$ = percentage of service pensioners with no dependents

$\mathbf{g2}$ = average years of survival of SOFP. It is assumed that the cohort of dependents who receive family pensions on the death of the pensioner in a given year die simultaneously $\gamma 2$ years later

$\mathbf{d_2}$ = percentage of government employees dying in service without dependants

$\mathbf{g3}$ = average years of survival of FFP. As in the other cases, death among fresh family pensioners is also assumed to be on a cohort basis.

[16] There are reasons to believe that base year figure of number of pensioners does not take into account all the past retirees under pension cover.

[17] For derivation see Sen and Swain, 2002.

Equations (4), (5) and (6), therefore, represent the annual net accretions to the number of SPs, SOFPs and FFPs respectively. It can be seen that most of the data, particularly for R and N over an extended period of time, required for making future projections have already been presented in earlier tables spanning Table 2 to Table 10. The basis of arriving at such employment and retirement numbers has also been explained. However, before entering into projections on number of pensioners, it is necessary to provide values for the parameters represented by the various δs and γs. Starting with δ, the average in-service death rate among government employees, the estimate of 0.32% (1.2% for Defence) used earlier continues to remain valid. As far as δ_1 and δ_2 are concerned, it is assumed that all government employees and pensioners have some dependants at their time of death, so that both these parameters can be taken to be zero. This is of course a somewhat extreme assumption, but it is probably not too far off the mark, at least as far as δ_2 is concerned.[18] Nevertheless, the possibility exists that the rate of accretion may be marginally over-stated.

The γ parameters are clearly determined by the assumed longevity of the different categories of pensioners. According to the life tables, the average life expectancy of a male at the retirement age of 58 years is 18 years, i.e. up to 76 years. The female life expectancy is 3 years longer; but with women representing only 11% of government employees, it makes only a marginal difference. Therefore, $\gamma 1$ has been taken to be 18 years as against 20 years normally presumed in various published documents. In the case of SOFPs, it is assumed that all government employees are male and that the average difference in the age at marriage between men and women is 5 years. This, coupled with a 3 years longer life expectancy of women, yields a value of $\gamma 2$ of 8 years as compared to the Working Group assumption of 10 years. The largest discrepancy, however, occurs in the case of fresh family pensioners (FFPs). As mentioned earlier, the average age for in-service deaths in government is 54 years, which, taken with the difference in the age at marriage, implies that the average age of a fresh family pensioner would be 49 years. Since the average life expectancy of women in that age group is 79 years, it implies that a FFP lasts for at least 30 years and not 25 years as assumed by the Working Group.

The assumed longevity of different categories of pensioners in the defence department would be altogether different from that of civilians, since defence pensioners would comprise a much younger age cohort. The average retirement age of a CO would be less than 58 years and is assumed to be about 52 years. Thus, an average longevity of 26 years has been assumed for army officers. However, the largest chunk of the pensioners belongs to the PBOR, who retire at a much younger age of about 40 years and an average life expectancy of a

[18] In the case of service pensioners, however, there is certainly a fair possibility that there may be no dependants at the time of death, since the probability of pre-decease of the spouse during the relevant age of the government employee, ranging between 23 to 76 years, is quite significant. In addition, at the age of death of 76 years, there may not be any dependent children.

PBOR has been assumed to be 36 years. So far as $\gamma 2$ is concerned, i.e. the average life expectancy of a SOFP in defence, we assign the same value of 8 years as in the case of other departments.

Finally, it needs to be reiterated that all our projections depend upon the assumption made about the future time path of the number of government employees. For simplicity it has been assumed that the number of government employees in all categories will be held constant at the base year level for the next ten years. The projections are no doubt sensitive to this assumption, and alternative numbers can be generated on the basis of different assumptions.

It should be noted that the model does not in itself generate the stock of pensioners in any given year. It generates only the net addition to the stock of pensioners in each year by calculating the annual accretion to and attrition from a given stock. In order to utilize the model results, therefore, some base year estimate of the stock is necessary on which these annual changes can be applied. As it turns out, the only year for which this data are available is 1999-2000, during which a special survey was undertaken. Since there is no earlier data on the stock, there is no possible way of checking either the consistency between the stock and the flows or on the accuracy and veracity of the base year stock figures. Thus, the projections are sensitive to this one point base figure.

On the basis of the above assumptions and assigned parametric values, category-wise projections of pensioners have been made for the period up to 2009-10 for each department. These are presented in **Tables 11** to **14** below.

Table 11: Projected Number of Pensioners in Railways

Years	Service	SOFP	FFP	Total
1999-2000	657465	245075	115639	1018178
2000-01	667214	255903	116247	1039364
2001-02	677187	266575	116802	1060564
2002-03	686266	277959	117267	1081491
2003-04	695416	288721	117673	1101810
2004-05	704523	297923	118054	1120500
2005-06	712952	306573	118390	1137915
2006-07	720823	314572	118706	1154101
2007-08	727818	322685	119003	1169506
2008-09	734506	330728	119227	1184461
2009-10	740449	339073	119294	1198817
CAGR	**1.2%**	**3.3%**	**0.3%**	**1.6%**

Table 12: Projected Number of Pensioners in Defence				
Years	**Service**	**SOFP**	**FFP**	**Total**
1999-2000*	1433428	249174	273641	1956243
2000-01	1475206	257872	284165	2017244
2001-02	1515785	268108	294671	2078564
2002-03	1556210	278817	305160	2140186
2003-04	1595900	289115	315630	2200645
2004-05	1635217	298246	326082	2259546
2005-06	1674056	307036	335992	2317084
2006-07	1712860	314898	345277	2373035
2007-08	1751685	321493	353796	2426973
2008-09	1790506	326743	361424	2478673
2009-10	1829297	330545	368015	2527857
CAGR	**2.5%**	**2.9%**	**3.0%**	**2.6%**

Table 13: Projected Number of Pensioners in Post				
Years	**Service**	**SOFP**	**FFP**	**Total**
1999-2000	112678	47234	12110	172022
2000-01	114471	48175	12338	174984
2001-02	116393	49052	12534	177979
2002-03	118479	49807	12714	181000
2003-04	120803	50457	12876	184135
2004-05	123278	51107	13021	187405
2005-06	125867	51695	13148	190710
2006-07	128603	52166	13258	194027
2007-08	131491	52576	13348	197415
2008-09	134486	52971	13420	200877
2009-10	137676	52971	13420	204066
CAGR	**2.0%**	**1.2%**	**1.0%**	**1.7%**

Table 14: Projected Number of Pensioners in Telecom				
Years	Service	SOFP	FFP	Total
1999-2000	62250	20750	17000	100000
2000-01	64548	21866	17831	104245
2001-02	66905	22932	18631	108468
2002-03	69340	23944	19400	112684
2003-04	71807	24941	20135	116883
2004-05	78457	25880	20835	125172
2005-06	85539	26790	21497	133826
2006-07	93148	27648	22120	142916
2007-08	101333	28506	22700	152539
2008-09	109960	29534	23237	162731
2009-10	119318	30468	23727	173512
CAGR	**6.7%**	**6.0%**	**3.4%**	**5.7%**

Although the category-wise projections are essential for estimating the future pension liabilities of the government, and indeed for any forward-looking exercise on the behaviour of pensions and pensioners, it is also useful to know the total number of pensioners that could exist at any given point in time for monitoring and control purposes.[19]

Table 15 provides the summary position relating to the projection of the total number of pensioners annually for the years 2001-2010 comprising all departments, including especially the civilian departments, which have otherwise not been examined in detail in this paper.[20] The data relating to the future projections of the number of pensioners reveals that the total number of pension accounts are projected to rise from about 3.83 million in 1999-2000 to about 4.83 million by 2009-10, implying a 2.3% annual rate of increase increase in the total, albeit with interdepartmental variations. The highest annual average growth has been projected for the department of telecommunication. This can be attributed primarily to the past employment pattern in this sector, particularly during the period 1971 to 1981, as has been already discussed. This high level of growth would continue to remain for quite some time even beyond 2010. However, pensioners in Telecommunication constitute less than 4% of the total Central government pensioners, and hence have negligible impact on the total number. The most dominant segment in the entire central government pension system is the Department of Defence, comprising more than half of the total pensioners. The estimated growth path for defence pensioners is relatively high at 2.6% mainly due to the very fact that defence personnel retire at a younger age.

[19] The data that should readily be available from the pension disbursing agencies, such as banks and treasuries, are the number of pension accounts handled by them. This information may not be available by categories very readily, but the totals should not pose a problem.

[20] The detailed analysis of the Civilian departments using the same methodology is available in Sen and Swain (2002).

Table 15: Projected Total Number of Pensioners

Years	Civil	Railways	Telecom	Post	Defence	Total
1999-2000	**582775**	**1018178**	**100000**	**172022**	**1956243**	**3829218**
2000-01	603070	1039364	104245	174883	2017244	3938806
2001-02	620929	1060564	108468	177871	2078564	4046396
2002-03	637449	1081491	112684	180872	2140186	4152682
2003-04	652744	1101810	116883	183980	2200645	4256062
2004-05	666916	1120500	125172	187219	2259546	4359353
2005-06	680057	1137915	133826	190495	2317084	4459377
2006-07	692253	1154101	142916	193791	2373035	4556096
2007-08	703581	1169506	152539	197181	2426973	4649780
2008-09	714111	1184461	162731	200684	2478673	4740660
2009-10	723908	1198817	173512	204022	2527857	4828116
CAGR	**2.20%**	**1.60%**	**5.70%**	**2.10%**	**2.60%**	**2.3%**

Structure of Pensions and Other Retirement Liabilities

As mentioned earlier, the time path of future pension liabilities of the Central government would be partly driven by the increase in number of pensioners and partly by the average pension payment per pensioner. As has already been estimated in the previous section, the number of pensioners is likely to grow at an average annual rate of 2.3% over the decade, which is clearly not a very alarming figure. However, a substantial portion of the increase in pension payments would be due to the increase in the general price level since a large portion of the total pension bill is indexed to price change. Thus, even in the absence of any further pay revision, the pension liability of the Central government would increase steadily at a rate which would combine the twin effects of the increase in number of pensioners and the increase in the average pension payment on account of a general process of inflation.

A convenient way of estimating the likely future path of the aggregate pension bill would be by regressing the annual pension payments on the stock of pensioners and a price index. However, as has already been mentioned, this path is closed to us since no reliable time series on the stock of pensioners exists, either for the total or for any individual department. Moreover, the structure of pensions, which is complex enough as it is, has undergone substantial revisions from time to time, which reduces the reliability of any time-series estimate. There is thus no option but to estimate average pensions from first principles, i.e. by working it out from the prevailing pension rules. The complexity of the pension system in the Central government requires that each and every component of the retirement benefits be separately accounted for so as to ensure accuracy and

precision. In order to arrive at a reasonable projection of Central government's pension bill, it will, therefore, be necessary to understand the present pension structure and other retirement benefits applied to different categories of pensioners and the extent to which each component of pensionary benefits is driven by inflation. This section discusses the pension structure as it prevails at present.

The retirement benefits provided to the employees of all the five accounting departments of the Central government are similar in their composition. For instance, each accounting department provides for a basic pension along with dearness relief, commutation of pension, retirement gratuity, death gratuity, leave encashment, and restoration of commutation to the pensioners who survive more than 15 years after retirement. While the basic composition of the retirement benefit is similar, the average expenditure per capita under each component varies from department to department depending upon the wage structure, service condition, age-cohort of the employees and retirement pattern. For example, average basic pension would be subject to inter-departmental variations, because of difference in service structure and average age of retirement. Rules of commutation for Defence employees are different from that of the civilian employees belonging to the departments other than Defence. Hence, it has been felt necessary to estimate the future projection of pension separately for each category of pensioners in each department. The following paragraphs describe the component with formula for estimating the pension bill.

Basic Pension

As per prevailing pension rules, the monthly basic pension of a normal service pensioner for full qualifying service of 33 years is 50 per cent (pro-rated as per years of services rendered) of the average basic salary drawn by the employee during last 10 months of service before retirement. A SOFP draws 30 per cent of the average basic salary as monthly basic pension. The basic pension of the FFP is 50 per cent of the average salary for the initial 7 years. Thereafter basic pension gets reduced to 30 per cent of the basic salary. All the three variants of the basic pension are linked to one common factor i.e. the average basic salary of the retiree or deceased, as the case may be. Thus, the first step in estimating the average basic pension of different category of pensioners is to estimate the average basic salary of the government employees belonging to each accounting departments.

Our study estimates the average basic salary of government employees for each department as the weighted average of the average basic salary of different groups of Central government employees as described below.

$$B = \Sigma\, p_i b_i / \Sigma\, p_i \qquad (7)$$

where :

B = average basic salary

b_i = average basic pay of the employees belonging to i^{th} class of government service

i = 1,2,3,4 (same as group A, B, C & D respectively)

p_i = number of new retirees[21] belonging to i^{th} class of Government service

The average basic salary arrived at for each department separately as per the above-mentioned formula has been used to estimate the basic pension of all pensioners of the concerned department. In this computation, the implicit assumptions are that: (a) the group-wise distribution of total pensioners (Class I, Class II, Class III and Class IV) is same as that of new retirees or existing working population as the case may be; (b) the average pay of superannuating pensioner and deceased employee are assumed to be same;[22] and (c) every pensioner has 33 years of qualifying service, which makes them eligible to draw 50 per cent of the average basic salary as pension. In case of railways pensioners, basic pension has been pro-rated for 30 years of average service.

Commutation of Pension

As per prevailing pension rules for Central government employees, the service pensioners can commute 40% (45% for Defence employees) of his/her pension after retirement in pursuance of the implementation of FCPC recommendations. Commutation of pension is a lump-sum payment made to the new retirees as per the following formula[23].

$$C = (0.4) * (0.5) B * 12 * f \quad (8)$$

where:

C = average value of commutation per pensioner

B = average monthly basic salary

f = commuted value factor (determined by age at next birthday)

The commuted value factor as prescribed in the commutation table would be about 10 years (15 years for Defence) for a pensioner who submits the application for commutation within the first year of his/her retirement.

For the purposes of estimation in this study, it is assumed that every retiree applies for commutation within the first year of his/her retirement. The payment on account of commutation of pension is thus estimated by multiplying the number of new retirees by the average value of commutation per pensioner. The monthly

[21] Class-wise distribution of employees has been taken for the departments where class-wise distribution of retirees is not available.

[22] As has been mentioned, the average age of in-service deaths in civilian departments is 54 years as compared to the age of superannuation of 60. Thus, the average pay should be lower for the former. However, the difference is not large enough to merit any adjustment.

[23] For defence employees: C = (0.45) * (0.5) * B * 12 * f

basic pension of the SPs has accordingly been adjusted downwards after netting out the commuted pension.

Dearness Relief (DR)

The DR paid to the pensioners on the basic pension is fully linked to inflation. DR was 37% of the basic pension in the year 1999-2000 and 43% in the year 2000-01. Our estimate incorporates the actual DR payable up to the financial year 2000-01. Thereafter, an annual price increase of 6% has been applied to the Dearness Relief for our estimation purposes on the basis of the assumption of full neutralization of inflation over the basic pension as per the FCPC effect. It is useful to note here that all the exercises undertaken so far to assess the future pension burden of Central government have either ignored the impact of price change or ignored the DR formula subsequent to commutation of pension. For the service pensioners, who receive basic pension less commutation, DR is calculated over full basic pension, and not on the post-commutation value.

Death-cum-Retirement Gratuity (DCRG)

At present, retirement gratuity admissible to a pensioner is 16.5 times of the last monthly emoluments drawn (basic pay + DA) at the time of retirement if the retiree has 33 years of qualifying service to his credit. In our calculation, the estimate of retirement gratuity presumes every retiree to have completed 33 years of qualifying service. In so far as the death gratuity is concerned, the pension rule has been more liberal in that the death gratuity is almost double of the retirement gratuity pro-rated with the number of years of service one has put in. An average service period of 29 year has been presumed for the deceased government employee[24] belonging to departments other than defence. For defence employees, retirement gratuity and death gratuity have been adjusted downward in conformity with 20 years of average service. The average service period for the deceased government employee has been presumed to be 15 years. This makes the death gratuity to be 29 times of the last monthly emoluments drawn by the deceased. The relevant formulae, therefore, are:[25]

$$RG = (B+DA) * 16.5 \quad (9)$$

$$DG = (B+DA) * 29 \quad (10)$$

Leave Encashment

The maximum number of days of earned leave that can be accumulated and encashed on retirement is 300 days or 10 months. Our estimate assumes every pensioner to have accumulated 300 days of leave. For a deceased employee, accumulated days of leave are taken to be equivalent of 7.5 months.

[24] The mean age for in-service deaths has been estimated as 54 years.

[25] These formulae are for civilian employees; with appropriate adjustments for defence.

This component of retirement benefit has been clubbed with the sub-head DCRG in our estimation table.

Restoration of Commutation

Till April 1985, the reduction in the monthly pension on account of commutation was a lifetime commitment. As per a Supreme Court judgment, however, the commuted amount of pension was restored after 15 years period with effect from 1st April, 1985. Accordingly, restoration of commutation has been estimated separately for the service pensioners who are likely to survive after 15 years of their retirement. This component assumes importance in the context of increased life expectancy at age 60. For computation of pensioners, who survive after 15 years of their retirement, the annual attrition rate as presented in Tables 10 to 13 has been assumed. This aspect of pension entitlements has probably been completely ignored in the estimation made by the Working Group.

The component-wise post-retirement benefit, as explained above, has been computed per beneficiary under each department separately and applied to the total number of pensioners and annual retirees as the case may be to arrive at the total pension bill of each department. As has already been mentioned, the year 1999-2000 has been taken as the base year for our study and the projections on the category-wise pensioners for each department for the period 2001 to 2010 made in the previous section have been used.

Validation of the Methodology

Before making any projections on the likely pension bill of the government, it is necessary to validate the methodology by comparing the base year estimate with the actual pension bill of the government as per the accounts. Unfortunately, it is not possible to do so with each item of pension entitlements, since data are not maintained in this manner for all departments. All that is available are the broad aggregates. With the assumptions and the pension structure as explained above, an estimation has been made, in the first instance, of the total pension bill of each accounting departments of the Central government for the base year 1999-2000. The base year figure of the department-wise total pension bill as per our estimates are provided in **Table 16** along with the actual pension bill.

Table 16: Department-wise Pension Bill of Central Government 1999-2000

(in Rupees Crore)

Departments	Estimate	Actual	Difference (%)
Civil	3248	3286	- 1.16
Railways	4056	4022	+ 0.85
Post	681	677	+ 0.59
Telecom	455	437	+ 4.12
Defence	8433	11024	- 23.50

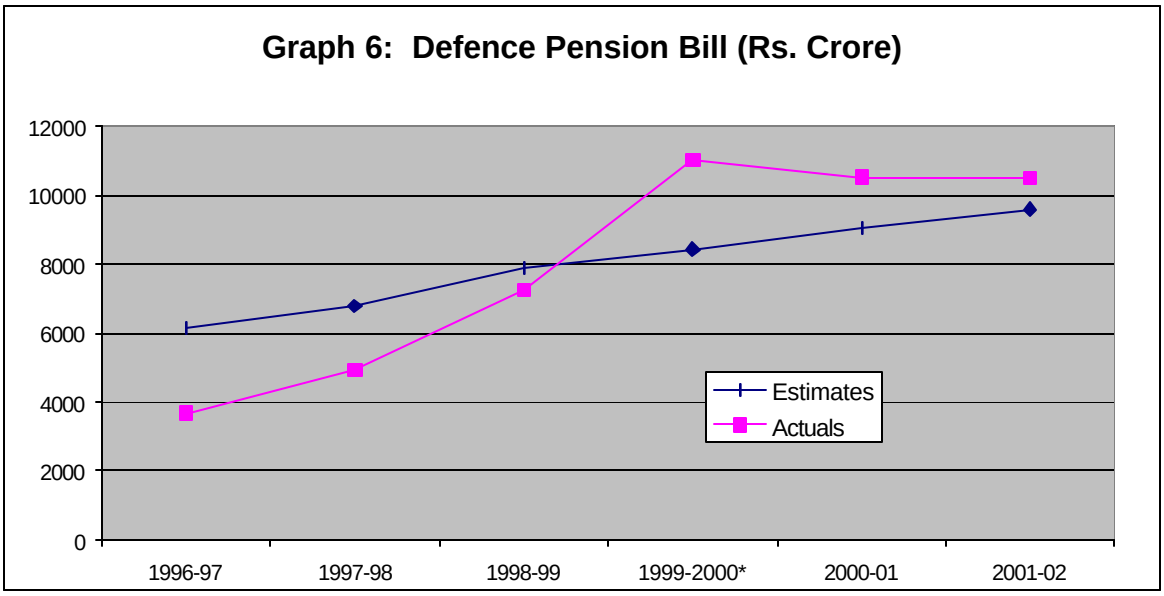
As can be observed from the table, the civil pension estimated at Rs.3248 crores for the year 1999-2000 is comparable to the actual pension bill of the central government amounting to Rs. 3285 crores. The difference is marginal, of only about 1%, which could be due to either errors arising out of our approximations or from some left over arrear payment on account of delays in giving effect to the FCPC award. The base year estimates for the Department of Post and the Railways are almost identical to the actuals. For the Telecommunication department, however, our estimate is somewhat higher than the actual, by about 4%, probably because of approximation errors. For projections this is not so much of a problem, since it will tend to overstate the likely pension bill and not to underestimate it.

As regards the Defence department, however, a substantial difference of over 23% is observed between the estimated pension bill and the actual pension bill for the year 1999-2000. A gap of this magnitude calls for further analysis since it can lead to substantial projection errors. One obvious reason could be a large component of arrear payments being included in the actual pension bill. The very fact that the Fifth Central Pay Commission award was implemented for defence only in the year 1998, and most of the benefits on account of pay revision to the pensioners were given in the year 1999-2000, there is a concentration of arrear payments in this year. In addition, the centralized system of pension administration under defence accounts, with the beneficiaries largely scattered all over the country, including in remote corners, has resulted in staggered implementation of full-scale pension revision. Hence, arrear payments in defence pension spill over to the financial years beyond 1999-2000 as well. There is evidence of significant amount of arrear bills in the years 2000-01 and 2001-02 as well.

One way to validate our estimates in the presence of arrear payments would be to compare the actual pension bill of the defence account and our estimates continuously for a six year period starting from 1996, the year from which the pay revision became effective. Since arrear payments are supposed to more or less exactly cover the underpayments made in the earlier years, the hypothesis is that our estimates should be in excess of the actuals in the first three years and less than the actuals in the subsequent three, with the totals for the six year period being roughly equal.[26] **Graph 6** presented below depicts the comparative picture of the estimated pension bill and the actual accounts of defence pension from 1996-97 onwards. As can be observed, the estimated values, starting from a higher level, exhibit a smooth upward movement, whereas the actual pension payments start from a lower level and increase steeply, with a sudden surge during the years 1998 to 2000. Thus, the pattern of differences between the two series confirms our *a-priori* expectation that the divergence

[26] It should be noted that our estimated series is based on the average pension payments calculated on the basis of the post-Pay Commission pension structure and applied to the estimated number of pensioners in each year.

between the estimated and the actual pension payment in defence arises essentially from arrear payments.



However, one further step is necessary to validate our contention – that the excess of the estimates over the actual prior to 1998 are almost equally compensated for by the excess of actual over estimates in the three years succeeding the year 1998-99. In absolute terms, as shown in **Table 17**, the total pension bill as per the defence pension account (Rs 47,950 crore) for all these six years almost matches the total of the estimated pension liability (Rs 47,928 crore) for the same years, with a negligible deviation of 0.1 percent. The downward movement of the actual pension bill after 1999-00 is also indicative of the fact that defence pension is still having sizable arrear bill and there would be convergence of the actual account with the estimated number in the subsequent year itself.[27]

Table 17: Pension Payment to Defence Employees

(Rs. Crore)

Years	Estimated	Actual
1996-97	6155	3683
1997-98	6801	4947
1998-99	7901	7270
1999-00	8433	11024
2000-01	9043	10539
2001-02	9595	10487
Total	**47928**	**47950**

[27] In fact the RE-2002-03 and BE-2003-04 of the defence pension are Rs 10,092 crore and Rs. 11,000 crore respectively as against our estimates of Rs. 10,059 crore and Rs. 10,837 crore.

Projection of Pension Bills

After establishing the validity of the methodology as described above, the pension liability of all the five accounting departments of the central government has been projected up to the year 2010 under a scenario of 6% annual inflation. These projections adopt the projected time profile of the number of pensioners in each category for all the departments computed by us as presented in the earlier section. The additional assumptions undertaken for these projections are:

- The existing pension structure would prevail throughout, including full neutralization of inflation over basic pension.
- No other Pay Commission recommendation would be implemented for the pensioners.
- No presently non-pensionable categories of government employees would be brought under pension cover.

Table 18 indicates, in summary form, the department-wise projections of the pension liability of the Central government over the ten-year period ending 2009-10. In conformity with our *a priori* expectations that the pension bill should grow at a rate only somewhat lower than the sum of the rate of growth of pensioners and the rate of inflation, this exercise projects the total government liabilities on account of pension payment and provision of other retirement benefit to increase at an annual average growth rate of 8.1%, with the number of pensioners growing at 2.3% per annum and an assumed inflation rate of 6%. A comparison of Table-18 with Table-15, however, shows that the postulated relationship holds for the Civil and Defence departments, but not for the departmental enterprises of Railways, Telecom and Posts, where the pension bills grow faster than the sum of the two components.

Table 18: Projected Pension Payments to Central Government Employees

(Rs. Crores)

Years	Civil	Railways	Telecom	Post	Defence	Total
1999-2000	3250	4056	455	681	8433	16875
2000-01	3488	4669	618	866	9043	18684
2001-02	3767	5023	675	935	9595	19995
2002-03	4056	5400	736	1008	10147	21347
2003-04	4355	5789	801	1086	10994	23026
2004-05	4684	6207	1059	1171	11898	25020
2005-06	5041	6662	1186	1264	12886	27038
2006-07	5409	7128	1329	1363	13941	29170
2007-08	5833	7651	1494	1476	15070	31524
2008-09	6249	8181	1673	1592	16227	33923
2009-10	6734	8800	1884	1727	17561	36706
CAGR	**7.6%**	**8.1%**	**15.3%**	**9.8%**	**7.6%**	**8.1%**

The reason for this lies in the composition of the pensioners and the rate of accretion to each of the pensioner categories. Since the average pension varies from category to category, the aggregate pension payments reflect the composition. A clearer picture emerges from the detailed break-down of the departmental pension bills. The component-wise projection of the pension bill for each accounting department is provided in the **Annexure**. As has been explained in the previous section, a substantial portion of the retirement benefits is indexed to inflation through payment of Dearness Relief (DR), which is applied to the basic pension. The share of basic pension-cum-dearness relief in the total pension bill for the year 1999-2000 ranges between 61 to 63 percent for all departments. The share increases to a level ranging from 69% in the Department of Post to 75% in case of defence pensions. The increased share of this component is in conformity with the assumption of full neutralization of inflation on the basic pension. In fact, this component would increase at a higher rate than the rate of inflation due to the very fact that the number of pensioners who receive the basic pension and dearness relief, would also increase annually at a rate of more than 2%. In addition, basic pension is paid to the pensioners after adjusting for the value of commutation, whereas the dearness relief is calculated on the full amount of basic pension.

Besides basic pension-cum-dearness relief, the other components of retirement benefits such as DCRG and leave encashment are linked to inflation since these benefits are based on the last monthly emolument (basic + DA) drawn by the retiree/deceased. The gratuity is applied to the annual retirees/deceased. Hence it is possible that this component would increase at a higher rate than the annual inflation if the number of annual retirees increases over the ten-year period for which projections have been made. The only un-indexed components of the pension liability of government are commutation of pension and restored commutation. Any annual increase in these components would be attributed solely to the increased number of annual retirees. Further, government's liability under restored commutation has a potential to increase in future because of the gradual increase in the life expectancy of the population at age 60 and above.

In brief, the projected growth rate of pension liabilities of 8.1% per annum in nominal terms is consistent with the assumption of 6% annual inflation and the projected pensioners' growth of about 2.3%. This projection is only 0.2 percentage point less than the sum of inflation rate and growth rate of pensioners. This gap is explained by the un-indexed component of pension bill, which pulled down the projection a little. Thus, the implicit elasticity of the pension bill to the inflation rate is 0.96, which is a clear indication of the extent to which pensions have become indexed post FCPC. In stark contrast, the estimate of pension bill contained in the two high level Committee reports mentioned earlier in this paper projected an annual increase of pension bill of about 4% and 4.8% during the same period, with inflation assumed to be 6% and the annual increase in the

number of pensioners projected to be much more than 2.3%[28]. The implicit elasticity as per the Working Group estimates works out to a mere 0.16, which implies a very small degree of indexation. Even a cursory perusal of the FCPC recommendations will reveal the unrealistic nature of this level of indexation.

In absolute terms, the projection of lower growth rates of the pension bill by the two high level committees cumulates to sizeable underestimation over time as compared to our estimates. In 2009-10, for instance, the Working Group has estimated a pension bill of Rs. 29,890 crore as compared to our estimate of Rs. 36,706 crore – i.e. an underestimation of 23%. The extent of underestimation in the Expert Group report is lower at about 11% but still sizable. It needs to be emphasised that inaccuracy in estimation of the pension bill, especially with these levels of underestimation, if accepted as the basis for action may lead to gross errors in budgeting and policy intervention.

Conclusion

One of the more inexplicable recent decisions of the government has been the concerted move to shift away from the existing defined-benefit pension system to a defined-contribution system for all new government employees. This is especially so since both the expert bodies set up by the government to examine the likely future time path of pension liabilities have come up with projections which indicate that the pension bill is likely to grow significantly slower than even the inflation rate, let alone the expected growth of nominal GDP. Thus, these projections suggest that the pension bill as a percentage of GDP is likely to decline sharply in the coming years, which is a potent argument for not tampering with the present system. Clearly then, the government has not placed much credence on these projections while taking its decision. At the root of this obvious disbelief is probably the high growth rate of pension payments in recent years, which does not appear to be consistent with the projections. The projections made in this paper are considerably higher than the earlier estimates and suggests that the government was probably right in not entirely trusting the expert groups' projections.

Nevertheless, our projections too do not support the need for an immediate change in the pension system. The projected growth in the pension bill estimated at 8.1% per annum in nominal terms, as computed in our study, implies little more than 2 per cent growth in real terms. This projection should not cause much concern for an economy which has been growing at a real rate or more than 5.5% annually for last two decades. Thus, it should be possible for the economy to support the present Central government pension system under an economic scenario in which the economy maintains the historical growth path. The position could be even more comfortable in the future if the Indian economy grows at an

[28] The Working Group Report (2001) projects an annual growth of more than 3 per cent in number of pensioners. The Expert Group Report (2002) does not provide the projected pensioners' number.

accelerated rate, as is being widely anticipated. Thus, there does not appear to be any imminent danger of the pension bill going out of control even under the present pension system.

There is, however, an important *caveat* that needs to be noted, since it has the potential for seriously disturbing the projections. The net addition to the stock of pensioners is the outcome of accretions arising out of retirement and attrition due to deaths.[29] The composition of this process of change is illustrated for the case of service pensioners (SPs) in **Table 19**. As can be seen, the rate of net addition is significantly lower than the rate of annual accretion in all cases due to fairly high attrition rates. If, for whatever reason, pension accounts are not closed or converted on the death of the pensioner, the net addition figure could rise significantly and, at the limit, may even approach the gross accretion rates. In such a situation, the rate of growth of the pension bill could possibly even exceed the rate of growth of nominal GDP.

Table 19: Composition of Change in Service Pensioners

(average annual change 1999-00 to 2009-10)

	Civil	Railways	Telecom	Post	Defence	Total
Accretion	4.9%	6.7%	11.5%	7.0%	4.0%	5.2%
Attrition	3.2%	5.5%	4.8%	5.0%	1.5%	3.0%
Net Addition	1.7%	1.2%	6.7%	2.0%	2.5%	2.2%

As far as gross accretions are concerned, the systems which are in place for issuance of pension payment orders appear adequate for ensuring that no major misuse takes place.[30] The fairly close correspondence between the model-based estimates of retirees and the actual PPOs issued is a confirmation of this judgement. On the other hand, the system for closure of pension accounts is weak at best, and there is ample scope for manipulation. Thus, the possibility certainly exists that the actual rates of attrition may fall well below estimated, which would lead to higher growth of pension payments than projected in this paper.

In conclusion, therefore, the macroeconomic sustainability of the Central government pension bill under the current pension system will depend on the following policy and administrative considerations being met:

- Employment pattern of government employees would remain stable with no future growth. In fact, all the five Central government departments discussed in our study seem to have started

[29] Equations (4), (5) and (6) clearly bring out the nature of this process, whereby for each category of pensioners there is a well-defined source of annual accretion and attrition.

[30] Although, from time to time, cases of fraudulent PPOs are uncovered, the numbers do not appear to be large.

consolidating their position on employees' number, which has either remained constant or declined marginally.

- No upward revision in the pension structure or in the coverage of government employees would take place in the future.

- Pension administration would be efficient enough to maintain appropriate lists of all categories of pensioners and timely deletion of the names in the event of their attrition from the pensioners' list. This is one area which is of serious concern as of now and requires significant improvement.

Thus, in the absence of further upward pay revision or in the pension structure and with improved system of pension administration, the pension bill of the Central government should be economically sustainable. The present concern relating to the government pension system is perceived more in terms of the governments' ability to sustain the Pay As You Go (PAYG) system of pension, in which the entire pension bill is charged to the Consolidated Fund of India and met out of the revenue receipt of the Central government. Our assessment of the future pension bill indicates that if the buoyancy of Central government revenue receipt can be maintained at least at 1.00, then the claim of the pension bill on revenue receipt would decline steadily. The fiscal sustainability argument in favour of the on-going pension reform, therefore, seems to be rather weak.

ANNEXURE

Projection of Pension Payments at 6% Annual Rate of Inflation

Railways

(Rs. Crores)

Years	Basic Pension+DR			Commutation of Pension	Retiremt Gratuity (Service)	Death Gratuity (FFP)	Restored Commutn	PENSION BILL Total
	Service	SOFP	FFP					
1999-2000	1753	615	343	411	593	128	212	4056
2000-01	1889	671	360	562	846	134	208	4669
2001-02	2085	740	383	565	902	142	206	5023
2002-03	2282	818	407	571	965	151	206	5400
2003-04	2485	901	432	574	1029	160	208	5789
2004-05	2711	986	460	576	1093	169	213	6207
2005-06	2959	1075	488	578	1164	179	218	6662
2006-07	3210	1169	519	579	1235	190	226	7128
2007-08	3501	1271	551	580	1312	202	234	7651
2008-09	3775	1381	585	583	1398	214	244	8181
2009-10	4111	1501	621	588	1495	226	257	8800
CAGR	**8.9%**	**9.3%**	**6.1%**	**3.6%**	**9.7%**	**5.8%**	**2.0%**	**8.1%**

Defence

(Rs. Crore)

Years	Basic pension+DR			Commutation of Pension	Retiremt Gratuity (Service)	Death Gratuity (FFP)	Restored Commutn	PENSION BILL Total
	Service	SOFP	FFP					
1999-2000	3917	608	806	1249	803	191	859	8433
2000-01	4338	657	869	1252	840	199	889	9043
2001-02	4682	712	933	1260	881	207	921	9595
2002-03	5038	765	993	1267	916	214	954	10147
2003-04	5604	841	1083	1275	976	227	987	10994
2004-05	6218	920	1180	1281	1040	241	1018	11898
2005-06	6882	1004	1283	1287	1108	255	1066	12886
2006-07	7601	1091	1393	1291	1178	271	1116	13941
2007-08	8381	1181	1507	1295	1252	287	1168	15070
2008-09	9224	1272	1628	1298	1330	256	1221	16227
2009-10	10136	1364	1752	1300	1412	322	1274	17561
CAGR	**10.0%**	**8.4%**	**8.1%**	**0.4%**	**5.8%**	**5.4%**	**4.0%**	**7.6%**

POST

(Rs. Crores)

Years	Basic pension+DR			Commutation of Pension	Retiremt Gratuity (Service)	Death Gratuity (FFP)	Restored Commutn	PENSION BILL Total
	Service	SOFP	FFP					
1999-2000	341	121	41	41	61	24	51	681
2000-01	368	129	43	97	154	26	50	866
2001-02	407	139	46	100	167	27	49	935
2002-03	447	150	50	102	182	29	48	1008
2003-04	490	161	53	105	198	30	48	1086
2004-05	538	173	57	107	214		48	1171
2005-06	593	185	61	110	232	34	49	1264
2006-07	650	198	65	112	251	36	50	1363
2007-08	718	212	69	115	272	38	52	1476
2008-09	785	226	74	117	295	41	54	1592
2009-10	868	240	78	121	322	43	56	1727
CAGR	**9.8%**	**7.1%**	**6.7%**	**11.4%**	**18.0%**	**5.8%**	**0.9%**	**9.8%**

Telecommunications

(Rs.Crore)

Years	Basic pension+DR			Commutation of Pension	Retirement Gratuity (Service)	Death Gratuity (FFP)	Restored Commutn	PENSION BILL Total
	Service	SOFP	FFP					
1999-2000	204	47	63	34	51	38	17	455
2000-01	225	63	68	79	125	40	17	618
2001-02	254	71	74	81	136	42	17	675
2002-03	284	78	81	84	149	43	17	736
2003-04	316	86	89	86	162	45	18	801
2004-05	372	95	96	144	287	47	18	1059
2005-06	437	104	105	152	321	48	20	1186
2006-07	511	114	113	161	360	50	21	1329
2007-08	600	124	122	170	403	52	24	1494
2008-09	696	137	131	179	451	54	26	1673
2009-10	816	149	141	189	504	55	30	1884
CAGR	**14.8%**	**12.2%**	**8.4%**	**18.7%**	**25.7%**	**3.8%**	**5.8%**	**15.3%**

Civil

(Rs. Crore)

Years	Basic pension+DR			Commutation of Pension	Retirement Gratuity (Service)	Death Gratuity (FFP)	Restored Commutn	PENSION BILL Total
	Service	SOFP	FFP					
1999-2000*	1546	248	225	312	472	174	275	3250
2000-01	1677	267	242	346	546	129	283	3488
2001-02	1861	291	264	346	578	137	290	3767
2002-03	2049	318	287	346		145	298	4056
2003-04	2242	346	311	346	650	153	306	4355
2004-05	2457	378	339	346	689	163	313	4684
2005-06	2695	412	366	346	730	172	320	5041
2006-07	2936	449	393	346	774	183	328	5409
2007-08	3219	489	426	346	821	194	339	5833
2008-09	3489	533	461	346	870	205	346	6249
2009-10	3818	580	499	346	922	218	352	6734
CAGR	**9.5%**	**8.9%**	**8.3%**	**1.0%**	**6.9%**	**2.3%**	**2.5%**	**7.6%**

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