Aspirational OPS with Fiscal Prudence of NPS: A Conceptual Framework for a Win-Win Solution[*]

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Abstract

This paper formulates a pension framework that suits the risk appetite of the employee while maintaining the fiscal prudence of the government. The proposed pension system creates a pension fund with defined contributions from the employee and the government, which is used to provide defined pension benefits to the employee upon retirement. A representative employee analysis reveals that the new system is cost-effective for a longer service period. The pension fund is linked to the market through active investment by fund managers. The fund generates a surplus for the government under good market conditions that can be utilised to compensate for the deficits in the lean years through suitable insurance mechanisms. Moreover, the risk is efficiently transferred from risk-averse employees to fund managers with a better risk tolerance. The insurance industry's competitive market characteristics support the potential for higher defined benefits under the new framework.

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1 Introduction

Increasing longevity and improved health facilities have dramatically increased the elderly population across the globe. In India, the proportion of the population in the age group of 60 years and above has nearly doubled in the last five decades, and the old-age dependency ratio is continuously rising (Nair, 2023). This raises concerns about the financial security of the elderly in a rapidly changing socio-economic scenario. Retirement pensions offer an insurance and consumption smoothing mechanism over the course of an individual's life. This paper looks into the ongoing policy debates on changes in the pension system for the government employees and attempts to design a framework which suits the needs of employees as well as fiscal prudence of the government.

The Old Pension Scheme (OPS) is a traditional defined benefit pension system which prevailed for the government employees in India. Due to increasing fiscal requirements to fulfil pension obligations under OPS, a new contribution based pension system was adopted by the central government in 2003 which was called National Pension System (NPS). Many of the states enacted the new pension system in the following years. Recently, there has been a rise in demand for reversion to risk-less OPS system for the government employees. This article deciphers the policy debates on the changes in the pension system and formulate a hybrid system and compare its performance with the existing systems.

We adapt several features of the existing pension systems and provide a new model that suits the risk appetite of the employee and the budgetary requirements of the employer. The new hybrid model provides defined pension benefits from a fund created through contributions from employees and employers during the service period. The fiscal requirements to provide a OPS-like pension benefits to an average employee are reduced by nearly 35 percent under the hybrid system. A representative employee analysis reveals that the hybrid model outperforms

the NPS pension regime with a service period longer than 30 years and retirement period less than 14 years.

The pension fund is linked to the market through continuous investing in various asset classes. The hybrid system performs better than OPS for an average market interest rate above 8 percent and the it outperforms the NPS with interest rate above 10.5 percent. The pension fund generates a surplus with exorbitant market performance, which can be used to cover the additional requirements under lean economic conditions. Moreover, the market competition and risk management capabilities of the fund managers open avenues for even higher pension benefits for the stakeholders under the new pension system.

The new model is tested for the existing investment structures under NPS and the fiscal requirements are less than OPS regime in each case. With risk transfer to private fund managers, more flexibility in fund investment can further lead to higher returns to the government. Moreover, the new framework offers choice of risk-free or market linked pension benefits to the subscriber after the retirement which he can choose according to his risk tolerance. Furthermore, the hybrid framework does not require additional operational costs as it is built upon the existing system.

The rest of the paper is organised as follows: Section 2 provides an overview of the various pension systems. Section 3 outlines the new pension model and its sensitivity analysis is performed in Section 4. Section 5 concludes.

2   The pension system

Primarily, two pension systems prevail in the world: the pay-as-you-go (PAYG) system and the fully funded (FF) system. The current working generation is taxed to pay for the pension

benefits of the retired under the traditional unfunded or PAYG pension systems. The PAYG pension system is not optimal for dynamically efficient economies (Blake, 2006). Their existence is justified by the myopic planning vision and misestimation of retirement benefits by the individuals (Findley & Caliendo, 2008). Population ageing puts more burden on the working generation for pension payments under PAYG. Henceforth, many economies have migrated to FF pension programs to overcome these deficiencies.

Individuals save for pension benefits during their working years, which they reap after their retirement in the FF system. However, the transition in pension regimes is not pareto improving for the working population during the transition due to double payments for retirement benefits (Andersen et al., 2021; Feldstein, 1997). Literature suggests that PAYG and FF pension system cannot coexist with high risk aversion and short-sightedness of individuals (Andersen et al., 2023). Rising risk aversion with age makes fixed benefit pension programs more attractive in comparison to defined contribution pension systems (Futagami & Sunaga, 2022).

The central and state governments in India are some of the biggest employers in the world. The rules and regulations of retirement benefits for government employees affect a large stratum of individuals in India. As of 2022, around 7 million individuals are registered pensioners with the central government[1] only, and state governments' employees are not included in this count. In recent years, the number of pensioners has surpassed the number of active employees under the central government. The total value of assets under management in the National Pension System (NPS) is 2.5 lakh crores and 4.5 lakh crores for central government and state government schemes, respectively[2]. In view of this, the current policy debate of alteration in the pension rules certainly requires attention from researchers and policymakers.

Historically, India had a defined benefit pension system for government employees. Under

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[1]Pensioner Portal
[2]Handbook of National Pension System Statistics, 2023

this system, the employee receives half of his last withdrawn salary as a monthly pension. The employees need not contribute any amount to receive pension benefits. This defined benefit system, referred to as the Old Pension Scheme (OPS), follows a PAYG model where the pension costs are funded through taxing the current working population. With an increasing population and increasing life expectancy, the fraction of tax revenue spent on pensions has grown over the years. In 2003, the central government abandoned the OPS due to its adverse effects on the fiscal positions of the central and state governments. A new defined contribution system was adopted, which was termed the National Pension System (NPS). Sane & Thomas (2014) provide an assessment of NPS implementation and identify underlying issues with NPS. Higher asset management costs and lack of transparency and investment choices are the issues that require further attention.

The OPS has several other features, ranging from various saving schemes to a family pension after the death of the employee. The pension amount is also subject to changes in the dearness allowance (DA) rate, which is revised twice a year to adjust the salary to account for inflation. The government employee can contribute to the General Provident Fund (GPF), which will earn safe interest, and the final accrued amount will be given to the employee as a lump-sum payment at the time of retirement. The family also receives the pension after the death of the employee, which is a fixed proportion of the regular pension (currently 30 percent of the last withdrawn salary). The basic pension amount also rises with the attainment of a certain age.

Under the NPS, the employee contributes 10 percent of his salary, and the government (the employer) matches 14 percent of his salary to a fund that is later used to provide the employee's pension benefits. There are two options for an individual to manage the fund: active choice or auto choice. The individual manages the fund on his own under the "active choice" and makes investments in different asset categories according to his risk appetite. Although

there are some restrictions based on age and other portfolio factors. In the "auto choice", the fund amount is transferred to the PFRDA-registered pension fund managers[3]. The individual is given options for aggressive, moderate, and conservative investment, and accordingly, the fund is invested in equities, corporate bonds, and government securities. At the time of retirement, 60 percent of the accumulated fund is given to the employee as a tax-free lump-sum amount. The remaining 40 percent is used to provide annuities until the employee's death. In the event of death, the remaining fund amount is transferred to the family. The NPS is also available for general citizens on a voluntary basis starting in May 2009 who are employed in corporate or unorganised sectors. This has widened the scope of NPS, and it becomes critical to resolve the issues with NPS as a priority.

Recently, some of the state governments, like Rajasthan, Jharkhand, Himachal Pradesh, and Chhattisgarh, have announced the reversion to OPS. This decision has been taken in view of government employees' demands for a defined benefit pension system. Recognizing the fiscal implications of the issue, a proper outlook on the pension system is required. This paper aims to provide a solution that helps in better fiscal management with risk averse employees' preferences for a defined benefit pension system.

3   A new pension framework

We propose a new pension framework built upon an amalgamation of features from the OPS and the NPS. The new system is motivated to ensure fiscal prudence from the defined contribution of the NPS and provide social security through defined benefits to the employees. We analyse the new system from a representative employee's perspective and compare it with the existing schemes. The pension is directly linked to the salary of the employee as contributions

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[3]There are 10 such registered entities. The details can be found at Pension Funds under NPS

are made in a fixed proportion of the salary under NPS, whereas fixed benefits are determined in a fixed proportion of the last withdrawn salary under OPS. The salary of the representative employee is determined by the basic and existing DA rate:

$$salary_t = (1 + DA_t)basic_t \tag{1}$$

We ignore other components of the salary to reduce complexity due to their relatively small contribution to the total salary structure. The pension benefits and costs are computed in present value at the time of joining the service:

$$PV = \sum [\frac{1}{(1 + \alpha)^t} pension_t] \tag{2}$$

where α is the discount factor considered for the present value calculations, $pension_t$ is the value of the pension benefit received after t years since joining the service. The pension benefits include one-time lump-sum payments at retirement and monthly annuities thereafter.

Table 1: Baseline inputs for pension calculation

A. Employee characterisitcs		B. Policy Variables	
Pay level	7	Initial DA rate	42%
Service period	30 years	DA increment	6%
Retirement period	15 years	First pay commission	7th year
Annual increment	3%	New pay commission	11 years
Promotion period	9 years	Family pension rate	30%
Promotional increment	5 %	Family pension period	10 years
C. Contributions		D. Other variables	
Employee toward GPF	10%	Average market interest rate	10%
Employee towards NPS	10%	GPF return rate	7.1%
Government towards NPS	14%	Discount factor	7%

Note: The table outlines the variables included in the pension benefits calculation with their baseline values considered for the quantitative analysis. Panel A consists of employee specific variables; Panel B highlights the key policy variables; Panel C reports the contributions from the employee and the employer; and Panel D contains the other variables that determine the pension benefits received by the employee.

There are many factors affecting the employee's pension benefits. Pension varies with individual specific factors such as service years, retirement years, joining pay-level, etc. The policy variables that affect the salary of the employee also play a critical role in pension calculation. DA, new pay commission enactment, and promotion rules are the factors that are controlled by the government. Moreover, in the defined contribution system, the market interest rate plays a pivotal role in determining the value of the pension fund at the time of retirement.

We consider a baseline condition for the quantitative analysis of the proposed system. A complete list of variables considered for the pension calculations has been provided in Table 1. The representative employee is assumed to join the service at pay level 7 (according to the pay matrix under the 7th pay commission). Every year, a 3 percent increment[4] is provided on the basic salary and the employee is promoted every 9 years[5] where he gets a 5 percent increment. The final salary of the employee is a combination of the basic salary and DA (equation 1). The DA is given to the employee to cope with the inflationary trends in the economy. We consider the initial DA rate to be 42 percent (same as the current rate) and annually a 6 percent increment in the DA rate. The new pay commission gives a significant boost to the salaries of government employees. We assume that at the enactment of the new pay commission, the new basic salary is computed by merging the existing basic and DA components of the salary, and a 20 percent hike is also provided on that. With the new pay commission, the DA rate is set to zero. We assume that the representative employee faces a new pay commission every 11 years. He faces his first pay commission change in the seventh year of service. The representative employee works for 30 years and receives pension benefits for 15 years.

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[4]We generate an annual time series of basic salary with a 3 percent increment rule. The salary structure matches with the pay matrix at different pay levels.

[5]There is a mandatory promotion rule after 10 years of service in most of the departments. Some employees receive early promotions based on their ability and vacancy at senior posts. Considering these scenarios, we take the average promotion period to be 9 years.

In the new system, the representative employee and the government contribute to a pension fund that is used to provide defined benefits to the employee. We make the new framework comparable with the existing systems by considering the contribution like the NPS and the benefits same as OPS i.e., the employee contributes 10 percent of the salary, and the government adds 14 percent of his salary towards the pension fund, which is used to provide half of the employee's last withdrawn salary as a monthly pension after his retirement. The pension fund grows according to the average market interest rate as the funds are actively invested in the market. We assume the average market interest rate to be 10 percent annually for baseline calculations.

We calculate the pension benefits in present value terms when the employee starts the service. For the present value calculation, we consider a discount factor of 7 percent[6]. In the new system, other benefits like the family pension and GPF are also included. We assume that after the death of the employee, his family receives the pension for the next 10 years, which is counted according to 30 percent of the last withdrawn salary of the employee. The GPF is given to the employee as a lump-sum amount at the time of retirement, which is calculated from his contributions and a fixed interest rate over the years. We assume a GPF return rate of 7.1 percent (existing rate under the OPS regime).

We calculate the total pension benefits received by the representative employee and the cost incurred by the government to provide these benefits. For an employee with the same features as the baseline conditions, we observe a significant reduction in the fiscal cost to provide the OPS pension benefits under the new hybrid system. The present value of total benefits received by the representative employee and the total cost incurred by the government at the baseline conditions are reported in Table 2. The benefits include the monthly pensions received and

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[6]The baseline value of discount factor is picked in view of current interest rate trends in the Indian economy.

the one-time lump-sum amount paid at the time of retirement. We deduct the contribution made by the employee from the total benefits. The cost incurred by the government includes the contribution from the government towards the pension fund, the cost to provide a monthly pension to the employee, and the interest payment on the GPF. We observe that the benefits received under the NPS are higher than the OPS for the employee with baseline features, but the NPS returns are linked to market conditions while the OPS returns are fixed or risk-free. The behavioural aspects underlying the job security and permanent benefits in the government service and the recent support from the government employees for the reversion to the OPS indicate a high relative risk aversion among the government employees. The dynamic risk sharing literature supports the transfer of risk to less risk averse agents (Bolton & Harris, 2010; Hellwig, 2021; Zhao, 2007). The new pension system helps to achieve better risk sharing by transferring the risk to the government or the pension fund managers.

Table 2: Baseline perfromance of pension schemes

Pension Scheme	OPS	NPS	Hybrid
Employee Benefits	1,08,81,853	1,32,94,539	1,08,81,853
Fiscal Cost	1,08,81,853	65,50,323	69,02,405

Note: The table reports the pension benefits received by the representative employee and the cost incurred by the government to provide these benefits at the baseline characteristics. The numbers reported are the present value at the time of service joining in rupees.

We assess the impact of the factor on the performance of the new system through varying the factor and keeping other factors at the baseline level. We perform quantitative analysis from the employee's as well as government's perspective.

4 Effectiveness of new hybrid pension system

The benefits under the OPS and the new hybrid system are the same, according to the formulation. We compare the employee benefits under the OPS and the NPS at different service years, retirement years, average market interest rates, and discount factor. The top panel of Figure 1 plots the employee benefits against service years, with other factors fixed at the baseline level. The benefits under NPS rise with a longer service period as the value of accumulated funds rises. The rise in benefits under OPS is largely due to facing more pay commissions during the service. Under good market conditions (10 percent average annual returns), the benefits under NPS go past the OPS benefits if the employee serves for more than 23 years. The bottom panel shows that the fiscal cost for pensions rises with increasing service period under the OPS and the NPS, but the cost decreases under the new system as the fund size also grows bigger with increasing service period. The new system is cost efficient compared to the OPS for service of more than 15 years. For a longer service period (more than 30 years), the new system is even more cost efficient compared to the NPS.

The net benefits do not vary much due to the retirement period under the NPS, as the fund value at the time of retirement is used to provide the pension benefits (top panel, Figure 2). The employee, serving for 30 years, must reap the pension benefits for more than 23 years under the OPS to exceed the present value of the NPS benefits, which is less plausible considering the life expectancy trends in India (71 years in 2019). The bottom panel displays the dynamics of the cost against the retirement period lived by the employee. The cost rises as the employee lives longer under all three systems. The new system is fiscally better compared to the OPS for each value of the retirement period for an employee with baseline characteristics. The cost under NPS does not vary much with changing retirement period. The gap between the fiscal requirements under the OPS and the hybrid system widens with longer service period of the

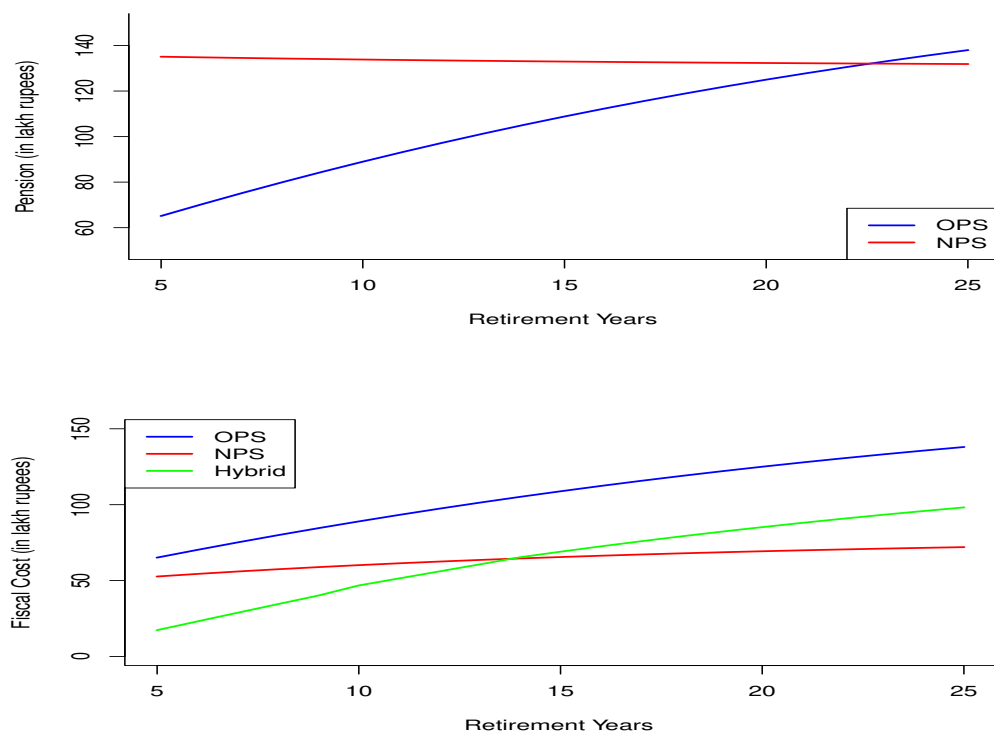Figure 1: Pension benefits and fiscal costs for different service years
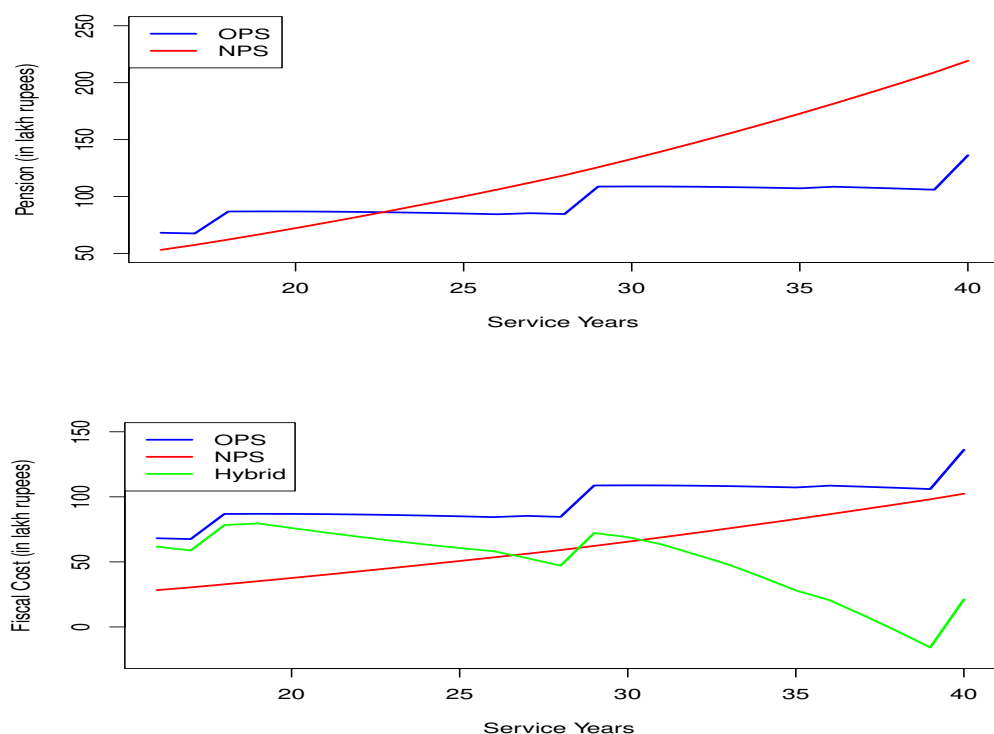
Note: The charts exhibit the performance of the pension systems with different service periods. The top panel plots the employee benefits under the OPS and the NPS, whereas the bottom panel shows the fiscal cost of providing pension benefits under different pension regimes.
Source: Author's calculations

employee.

The pension benefits do not depend on market interest rates under OPS. The top panel of Figure 3 shows that the pension benefits under NPS increase with the average market interest rate. For an employee with baseline features, the NPS benefits exceed the OPS benefits if the average market interest rate is above 8 percent, which is a likely situation in an emerging market setting such as India. Another panel of Figure 3 depicts the most important feature of the new system: the pension fund creates surplus for the government when the average market interest rate is sufficiently high (above 11.5 percent). The cost to the government does not change under the OPS and slightly rises under the NPS, but the cost under the new system decreases

Figure 2: Pension benefits and fiscal costs at different retirement duration

exponentially with rising interest rates. This suggests that the poor performance of the new system due to recessionary market conditions can be recovered in subsequent profound years for the markets. If the service period is longer for the employee, the cost under the hybrid system further decreases, and the surplus is achieved at lower interest rates.

Individuals discount their future earnings according to their time preferences and expected economic conditions. Figure 4 shows that the NPS benefits exceed the OPS for a discount factor above 5 percent, with other factors fixed at the baseline level. The fiscal cost under the three systems converges at higher values of discounting. The fiscal benefits of the new system are higher for a representative employee with a higher pay level. The cost under OPS rises

Figure 3: Impact of market interest rate on pension benefits and fiscal costs
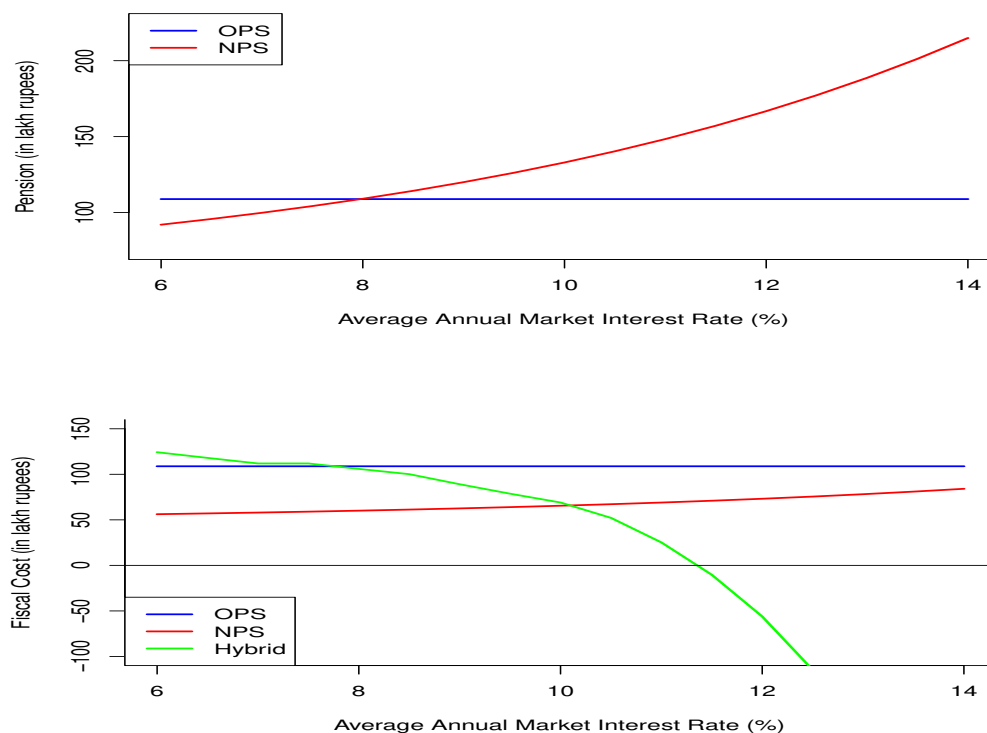
Note: The charts show the performance of the pension systems with different values of average annual market interest rates. The top panel plots the employee benefits under the OPS and the NPS, whereas the bottom panel shows the fiscal cost of providing pension benefits under different pension regimes.
*Source*: Author's calculations

more steeply with rising pay levels compared to the NPS and the new system.

Overall, the NPS benefits are higher for an employee under good market conditions, but there is a risk associated with them. Poor market conditions at the time of retirement hamper the NPS fund's value to a large extent. Also, the difference in the present value of benefits is not large for the employees at lower pay levels, at which most of the employees start their work life. With high risk aversion and the certainty of fixed benefits under the OPS, a large stratum of government employees in India favours the OPS[7]. But the fiscal burden of the OPS is much higher compared to the NPS, and with an increasing population of retirees and a high life

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[7]More than 90 percent of government employees supported the OPS in a survey conducted in Jharkhand.

Figure 4: Impact of discounting on pension benefits and fiscal costs
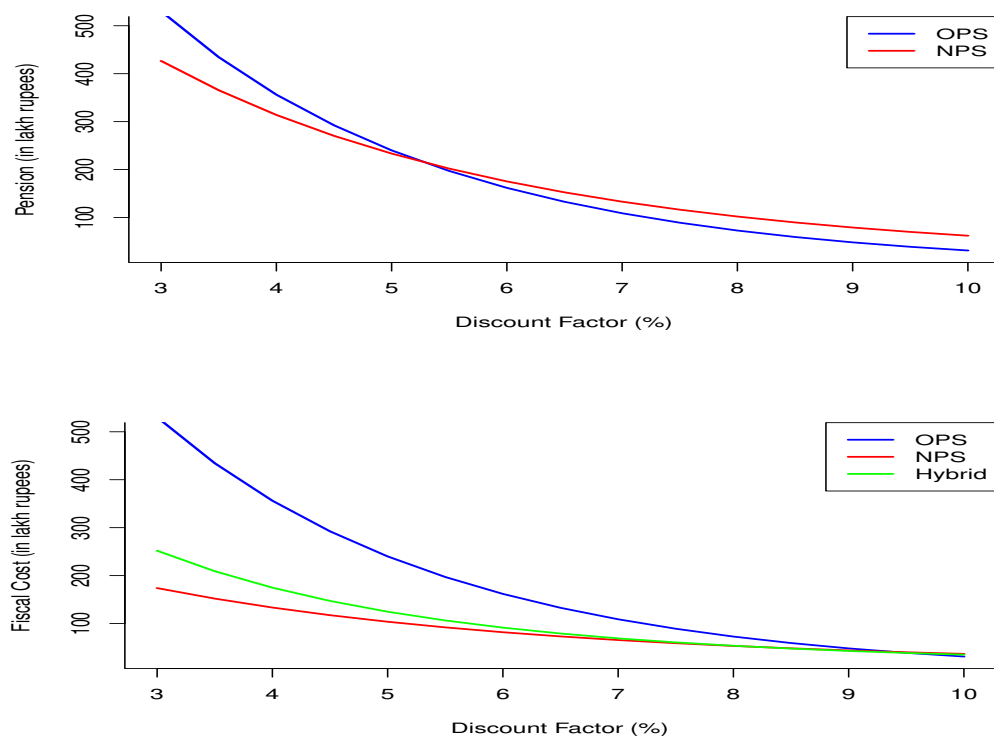
Note: The charts show the performance of the pension systems with different values of discount factor. The top panel plots the employee benefits under the OPS and the NPS, whereas the bottom panel shows the fiscal cost of providing pension benefits under different pension regimes.
Source: Author's calculations

expectancy, the fiscal requirements to fulfil pension obligation rise. The adoption of NPS was a step to improve the delicate fiscal positions of the central and state governments.

The new system utilises the defined contribution system of the NPS to create a fund that is market linked. This pension fund is used to provide defined benefits to the employee through active participation in investment activities in the market. Under the current NPS framework, the pension fund value at the time of retirement is used to provide the benefits; there is no active participation in the market post-retirement. The new framework brings flexibility in the investment options and transparency in the pension benefits. The fiscal requirements are significantly lower under the new framework than the OPS (Table 3). With fund directly linked

to equity market, it creates a surplus for the government.

Table 3: Fiscal cost with selected investment strategy

	Aggressive	Moderate	Conservative	Market
Fiscal Cost	64,80,719	74,15,252	89,46,305	-76,89,469
Improvement over OPS	44,01,134	34,66,601	19,35,548	1,85,71,322

Note: The table reports the fiscal requirements under the new framework with various investment structures for the pension funds. Aggressive, moderate and conservative structure are same as adopted in the NPS system while market represents the direct investment to equity asset class. The numbers reported are the present value at the time of service joining in rupees for a representative employee.

5   Conclusion

The government of India installed a new defined contribution pension system in 2003 after detailed consideration of the adverse impacts of the OPS on the fiscal position of the state and union governments. There has been a surge in demand for reversion back to the OPS, which questions the viability of the existing NPS. This article proposes a hybrid framework that satisfies the needs of a risk averse employee while maintaining the fiscal prudence of the government. The proposed system bridges the gap between the OPS and the NPS. The liability of the pension is not transferred to the next generation as the employee continues to have a defined contribution. The major strength of the proposal is that it provides options for the employee to bundle the schemes according to his preferences. Under good economic conditions, the fund generates an adequate surplus, which should be transferred to a "Risk Fund". The "Risk Fund" can be utilised to meet the shortfall during the lean years through a suitable insurance mechanism. Such an insurance mechanism would fail only in the case of a prolonged recession.

The pension fund and "Risk Fund" management can be entrusted to market-based intermediaries with minimal assurance of OPS benefits to the employee. The competition in the insur-

ance market is likely to result in intermediaries offering "OPS Plus" benefits to subscribers. The proposed architecture provides a minimum safety net to the employees and is unlikely to suffer the demographic risks associated with defined benefit pension programs.

The new pension system should work in emerging markets with high market returns, which are directly linked to high returns to the pension funds. It transfers the risk from a risk-averse individual to an institution that is risk neutral and capable of absorbing short term economic shocks. The employee is better off with the option to choose between the OPS and the NPS and the chance of getting "OPS plus" benefits under profound economic conditions.

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