

Do Indian Pensioners hold Diversified Portfolio?

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Abstract

Asset allocation, the decision of how much of a portfolio to allocate to different types of securities, is one of the fundamental issues in financial economics. The paper examines the portfolios created out of lump-sum pensionary benefits received by 495 government pensioners who retired between 1967 and 2002. The paper uses the available data for the household investment in financial assets between 1970 and 2002, and compares it with the investment in financial assets of the pensioners. It is found that pensioners in the sample remain under-diversified. They were found to have taken an alarming magnitude of idiosyncratic risk.

Despite being seemingly aware of the benefits of diversification, pensioners appear to adopt a “naive” strategy for diversifying their portfolios without giving proper consideration to the correlations among the assets that they invest into. Over the years, the average number of assets in pensioner portfolio has increased resulting in a decrease in the average portfolio variance. This may be ascribed to facts that reforms in Indian market opened floodgates for investment avenues and that these improvements resulted primarily from changes in the correlation structure of the Indian household investment market. Least diversified portfolios were found amongst pensioners who had lesser funds at their disposal and retirees of lower class (junior) categories. An analysis of a cross-sectional variations in diversification across demographic groups also suggest that younger, active and recent retirees are over-focused thereby holding under-diversified portfolios, not by chance but by choice. By and large, results indicate that pensioners face an intimidating task of constructing and maintaining a well-diversified portfolio despite realizing the benefits of it.

Keywords: Pensioners Portfolio, Portfolio Diversification, Household Assets, Equity Correlation Structure.

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I. INTRODUCTION

Risk in Indian security market, like in any other capital market has a large idiosyncratic component, much of which may be reduced through portfolio diversification. Virtually all asset-pricing models posit that securities are priced by a diversified, marginal investor who demands little or no compensation for holding idiosyncratic risk. As a consequence, most rational models of investor choice suggest that investors hold diversified portfolios to reduce or eliminate non-compensated risk. But do they?

The paper examines the portfolios created out of lump-sum pensionary benefits received by 495 government pensioners who retired between 1967 and 2002 from state, central and defence services. It is reasonable to ask at the outset what the goal of asset decumulation over the retirement period should be. If life spans, income and consumption streams were predictable, the simple life cycle model would imply that a rational and far-seeing retiree should draw down wealth steadily so as to maintain consumption, exhausting his asset stock just at death. At that date, the only assets remaining would be those intended to be passed on as bequests. Therefore a testable implication of this model is that older people would be expected to consume more than their income with declines in wealth funding the difference. One might also anticipate that dissaving would be greatest among childless older people, and least among older persons planning on leaving an inheritance to their children. In order to optimize the return and risk of a portfolio of investments made by a pensioner, the portfolio has to be diversified as a pensioner should not keep all his eggs in a single basket.

The paper uses the available data for the household investment in financial assets between 1970 and 2002, and compares it with the investment in financial assets of the pensioners. It is found that pensioners in the sample remain under-diversified. They were found to have taken an alarming magnitude of idiosyncratic risk. Despite being seemingly aware of the benefits of diversification, pensioners appear to adopt a “naive” strategy for diversifying their portfolios without giving proper consideration to the correlations among the assets that they invest into. Over the years, the average number of assets in pensioner portfolio has increased resulting in a decrease in the average portfolio variance. This may be ascribed to facts that reforms in Indian market opened floodgates for investment avenues and that these improvements resulted primarily from changes in the correlation structure of the Indian household investment market. Least diversified portfolios were found amongst pensioners who had lesser funds at their disposal and retirees of lower class (junior) categories. An analysis of a cross-sectional variations in diversification across demographic groups also suggest that younger, active and recent

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retirees are over-focused and hold under-diversified portfolios, not by chance but by choice. They assume that by doing so they can monitor a control over their investments. By and large, results indicate that though pensioners realize the benefits of diversification yet they face an intimidating task of constructing and maintaining a well-diversified portfolio. A complicating factor is that many pensioners, particularly older and poorer ones, appear to hold no equities at all. This is inconsistent with simple frictionless model of optimal portfolio choice, but may be explained if there is a fixed cost of participating in equity markets.

Rest of the paper is organized as follows: Section II incorporates literature review on reasons for non-diversification and a brief review on household investment behavior. The section also briefly discusses trend in financial assets of Indian household sector at macro level. Section III describes pensioner database and sample used in the study followed by the aggregate level diversification results. The cross-sectional variations in diversification across age, income and occupation categories are described in section IV, titled as 'Portfolio Diversification' and finally what appear in section V are the conclusions and summary.

II. LITERATURE REVIEW

Pensioners face an unknown date of death, uncertainty about human, financial, and physical capital, and substantial uncertainty about future paths of government and family support opportunities. They also confront tremendous risk in terms of future inflation³ and what this does to their retirement wealth. Accordingly, theoretical research has worked to incorporate these key aspects of uncertainty into a more richly formulated life cycle framework. Unfortunately, these modeling efforts yield few clear-cut testable implications about anticipated wealth decumulation patterns in old age (Browning and Lusardi 1996). But the fact remains that adding important uncertainty to life cycle saving models injects so much complexity that there are few testable predictions about expected saving dissaving in old age from these theoretical studies. About the most precise prediction that can be offered is that virtually no model would predict older peoples' assets to continue to grow during retirement; whether they decline or remain roughly constant is not theoretically predicted. Wealth falls with age for the elderly, particularly so among single people without dependents (who are least likely to be interested in leaving bequests). The range of average annual financial wealth spend-down is 2.4% per year, higher for the childless and lower for those with dependents. Whether this wealth draw down follows a smooth or a bumpy trajectory is as yet to be determined, though recent UK data suggest that older peoples' financial wealth declines quickly right after retirement, remains constant until a dozen or so years into the retirement period, and after that point dissaving sets in again (Disney 1996).

Reasons for Under-Diversification

The present study suggests that pensioners are unable to (or unwilling to) choose securities in a judicious manner and thereby remain under-diversified. They seem to follow a "naive" strategy for diversification and hold portfolios with few securities. They do not consider the correlations aspect of the securities they hold. These results are

³ Most of the government pensioners in India are safe guarded against inflation as their Dearness Allowance (DA) is revised twice a year based on cost of living index.

consistent with the findings of Rode (2000) who emphasizes the importance of “implementation” - investors may realize the benefits of diversification but they may face difficulty in implementing a well-diversified portfolio. As a result, investors may use simple “rules of thumb” to form their portfolios. The use of simple diversification heuristics has also been documented in Benartzi and Thaler (2001) who find that investors adopt a simple “1/n” rule when formulating their retirement-fund asset allocation decisions.

Lack of diversification may also result from psychological factors, in particular, due to an “illusion of control” (Langer 1975). In experimental settings it has been observed that when factors such as involvement, choice and familiarity are introduced into chance situations, people become more confident and they start to believe that they can control the outcome of chance events. Investors may develop an illusory sense of control because they are directly involved in the investment process and they make their own choices instead of relying on others (as in the case of mutual funds) for their investment decisions. Familiarity with a certain set of stocks may further exacerbate the illusion of control where investors may fail to realize that more knowledge or more information does not necessarily imply control over the returns. Huberman (2001) endorses that investors do indeed have a strong tendency to invest in stocks that they are familiar with. An illusion of control creates an inappropriate level of over-confidence and over-confident investors may mistakenly believe that they can earn superior performance by active trading and consequently they may choose not to diversify.

Merton (1987) suggests that due to search and monitoring costs investors may limit the number of stocks in their portfolios. Investors may also develop a false perception that they can manage their portfolio risks better by a thorough understanding of a small number of firms rather than diversifying. Using survey data from a set of large and experienced investors, DeBondt (1998) finds that such a belief is quite common among investors.

William N. Goetzmann and Alok Kumar find that investors with higher monthly portfolio turnover rates (active investors) hold fewer stocks. Their portfolios have higher normalized portfolio variance and they eventually earn lower risk-adjusted returns. These results are consistent with the findings of Odean (1998) who documents that over-confident investors trade more actively and thus earn a lower net return. The lower level of diversification among active investors is another manifestation of investor over-confidence.

Household Investment Behavior

Considerable empirical literature on household investment choice exists. Mitchell and Moore has sought to examine how people invest the assets they do have control over. One important conclusion is that this is a relatively new field, about which a great deal more remains to be learned. Researchers have been severely handicapped because they lacked good data on household asset accumulation patterns and asset holdings as well as other pertinent information about preferences and constraints. They also conclude that there are strong differences of opinion across the business and research communities regarding what mix people should hold in terms of equities, bonds, and other assets. If anything the so-called folk wisdom suggests that people should hold assets such as stock in their youth inversely correlated with their human capital, and move to less volatile holdings later in life. Uhler and Cragg (1971), have sought to understand the degree to which household asset allocation decisions conform to rational models of investor behavior. Blume and Friend (1975) use tax filing and survey data to investigate

diversification in household portfolios and find that the household portfolios are grossly under-diversified and the degree of diversification increases with wealth. Cohn, Lewellen, Lease, and Schlarbaum (1975) find that as wealth increases, a higher proportion of the total wealth is allocated to risky assets and investors exhibit decreasing relative risk aversion. A number of authors recently have focused on the apparent under-investment in risky assets and explore possible explanatory factors. Guiso, Japelli, and Terlizzo (1996) use Italian household survey data to test whether expected future borrowing constraints and exposure to non-diversifiable risks such as labor income risk (which may be reinforced by borrowing constraints) explain differences in equity holdings. Bertaut (1998) finds that the propensity to invest in equities is partly explained by lower risk aversion, higher wealth and higher education. Heaton and Lucas (2000) study the asset holdings of investors who hold stocks and find that entrepreneurial stakes substitute for investment in equities. Perraudin and Sorensen (1996) suggests that frictions restrict the ability of investors to hold a large number of assets. William N. Goetzmann and Alok Kumar claim that they are able to focus on the question of diversification within an asset class. They contend that it is important to point out factors such as entrepreneurial risk or income exposure to particular industry risk factors can and should affect the selection of individual assets within the equity portfolio. However, most income hedging arguments focus on systematic risk and neither of these important considerations is likely to convincingly explain long positions that include large idiosyncratic risk.

Demographics of Investment households in India.

Financial assets of household sector in India comprises currency, bank deposits, non bank deposits, life insurance funds, claims on government, provident and pension funds, shares and debentures including mutual funds and units of UTI. The average demand and rate of return characteristics of these assets are shown below:

Table. 1 Various Characteristics of Financial Assets Amongst Household Sector in India.

Composition of Financial Assets Amongst Household Sector (in %)									
Year	A	B	C	D	E	F	G	H	
1970-71 -- 1974-75	16.02	44.48	3.18	10.69	21.26	2.54	1.34	0.49	
1975-76 -- 1979-80	12.51	49.37	2.97	7.94	19.01	6.04	1.69	0.48	
1980-81 -- 1984-85	12.27	42.76	5.02	7.51	17.51	10.28	3.55	1.10	
1985-86 -- 1989-90	11.64	38.71	4.35	7.72	17.77	12.18	4.30	3.33	
1990-91 -- 1994-95	10.68	32.92	6.24	8.95	17.26	8.07	9.33	6.57	
1995-96 -- 2001-02	8.24	37.76	5.97	11.43	20.48	11.71	3.65	0.77	
Average	11.89	41.00	4.62	9.04	18.88	8.47	3.97	2.12	

Where A is Currency, B is Bank Deposits, C is Non-Bank Deposits, D is Life Insurance Funds, E is Provident and Pension Funds, F is Claims on Government, G is Shares and Debentures including Mutual Funds and H is Units of UTI.

Income is the key determinant of investment decision of Indian households. Median monthly income of investor households is more than double the median monthly income of Rs 3,060 (US \$ 65) of all households in the country. A vast majority of self-employed and salaried class including pensioners find a berth in investment households where they diversify their investment portfolio to balance risks. A study of *National*

*Council of Applied Economic Research (NCAER)*⁴ suggests (July 2000) that 12.8 million (8%) of all Indian households have invested directly in equity shares or debentures or both at end of financial year 98-99. 87.5% of such households had invested in equity shares whereas just 12.5% had invested in debentures. On the other hand, 15 million, (9%) households invested in units of mutual funds. Over all there are some 23 million unit holders in mutual funds. The fact that 36% of investor households before 1991 and 64% after 1991 became investors in equity shares suggests that the reforms in the Indian capital markets spurred the growth. Investor households (over December 1986) have increased at CAGR of 22% - (rural 30% and urban 19%). The study also suggests that Investor households are aware of risks in investing in equity shares.

III. DATA AND SAMPLE

To test the level of diversification amongst government pensioners, four major cities in the state of Madhya Pradesh (MP) were chosen. As per the notification of the government of MP, five major cities (RAJBHOGI towns) are classified as A class cities, namely, **Raipur, Jabalpur, Bhopal, Gwalior and Indore (RaJBhoGI)**. Since a new state has been carved out in November 1999, the city of Raipur no more exists in MP. Hence only four cities were picked up. These four cities constitute more than two-third of the urban pensioners in MP, while 25% of total pensioners of MP, relevant to our study.

Table II. Population and Sample

Name of Districts	Population of Districts	Pensioners Population of district.	Pensioner Population relevant to study	Sample (%), of population relevant to study
Bhopal	13,50,000 (4.3%)	25166 (1.07%)	15100	150 (1%)
Gwalior	14,14,000 (4.5%)	17649 (0.75%)	10590	100 (1%)
Indore	18,30,000 (5.8%)	23076 (0.98%)	13846	150 (1%)
Jabalpur	26,45,000 (8.4%)	16537 (0.7%)	9923	95 (1%)
Rest MP	2,42,61,000 (77%)	152472 (96.49%)	NA	NA
Total	3,15,00,000 (100%)	23,50,000 (100%)		

Source : Census of India (M.P.) ; Various Government (M.P.) Treasuries ; Department of Public Relations; Director, Treasury Accounts and Pension, Government of M.P. Bhopal.

Profile of Pensioners

Data was collected by means of personal interview from these four major cities to the tune of 1% of the relevant population. Each category of pensioners viz. State, Central and Defence pensioners were given proportionate representation. Pensioners, who retired between the period 1967 and 2002 were covered. Thus 495 pensioners were interviewed out of a total relevant population of 49,459. Destitute Pensioners (DP), Special Family Pensioners (SFP), Family Pensioners (FP), Political Pensioners (PP) and Freedom Fighter

⁴ Based on a sample of 300,000 geographically dispersed rural and urban households, out of which a sample of 25,000 households was chosen for detailed canvassing by field staff through a pre-tested questionnaire. The responses of the households brought out the sum total of their experiences in investing in the securities market during the 1990s and the findings impounded the cumulative impact of market development during that period.

Pensioners (FFP) were not covered under the survey as they do not form part of the government service-pension. Government pensioners who retired at class IV level were not included in the survey as their retirement benefits are too meager to invest. A detailed pensioners profile is depicted in Annexure I of this report. The sample was further categorized into block of years of retirement ranging from 1967 to 2002 that also acts as a proxy to the age of the respondents. As all the respondents chosen retired on super annuation, their age can be easily ascertained. Thus the eldest respondent is the one who retired in 1967 and is presently 90 (55 + 35) years old. The superannuation age has since been raised to 58 and now 60 in different phases. There are very few respondents of 1960s and early 70s due to longevity factor as can be seen from the data in annexure I. Again, very few retirees are available during 1998 and 1999 as the government of India and later the government of MP raised the super annuation age from 58 to 60 years in 1998.

Respondents were also classified from the view point of their pensionary benefits received. Overall, seven such categories were formed ranging from below Rs. 50,000 to a maximum of above Rs. 5,00,000. The rationale for such classification was to judiciously cover the gamut of pensioners retiring between 1967 and 2002. Those who retired in 1960s and 70s were covered under the III pay commission when the upper ceiling on Gratuity was Rs.35,000, (later enhanced to Rs. 50,000). Gratuity limit was further enhanced to Rs. 2,50,000 in IV pay commission (1986) and Rs. 5,00,000. under the V Pay commission (1996). Gratuity being a major chunk of lump sum pensionary benefit, the pensioners of 1960s, 70s and 80s received lesser amount of retirement benefits than the pensioners of 90s and 2000s. The overall position of pensionary benefits received amongst the respondents is also depicted in Annexure I of this paper.

IV. PORTFOLIO DIVERSIFICATION

The observed degree of under-diversification among pensioners portfolio in the sample is quite surprising. Table III. provides portfolio size amongst the respondents. At the micro level the pensioners were asked about their investments made out of the lump-sum amount received as retiring benefits It has to be distinctly understood that the while the components of financial assets in household sector at macro level were only eight (8), choice of a group of twenty five (25) securities were offered to the pensioners. Though this list was selective yet it covered all investment avenues available to an investor in India. It was found that no pensioner has invested in more than ten (10) securities despite the choices available to them in the market.

Table III. Portfolio Size Amongst Pensioners

	Size of Portfolio Amongst Pensioners					
No. of Securities	1	2	3	4	5	
Respondents in No.	8	41	105	107	98	
Respondents in %	1.62	8.28	21.21	21.62	19.8	
	Size of Portfolio Amongst Pensioners					
No. of Securities	6	7	8	9	10	
Respondents in No.	55	47	23	9	2	495
Respondents in %	11.11	9.49	4.65	1.82	0.4	100

Almost 10% of pensioner portfolios contain only up to 2 securities and more than 50% of them consist of only up to 4 securities. It is commonly believed that a well-

diversified portfolio should consist of at least 10-15 stocks⁵. In our sample, at any given retirement time, less than 1% of the portfolios consist of 10 securities. It is possible that pensioners who hold relatively less diversified portfolios compensate by investing in their own business or setting up a business for children. However, it was found that the average asset allocation to own business is even less than 5% of the overall portfolio and the allocation differences across diversification deciles are not significant. In other words, there is no evidence that pensioners with less diversified security portfolios compensate by investing more in own business.

This pattern of holding concentrated portfolios is present throughout the 1967 – 2002 sample period though, over time, there has been an increase in the average number of securities held by the pensioners and is depicted in figure 1.A.

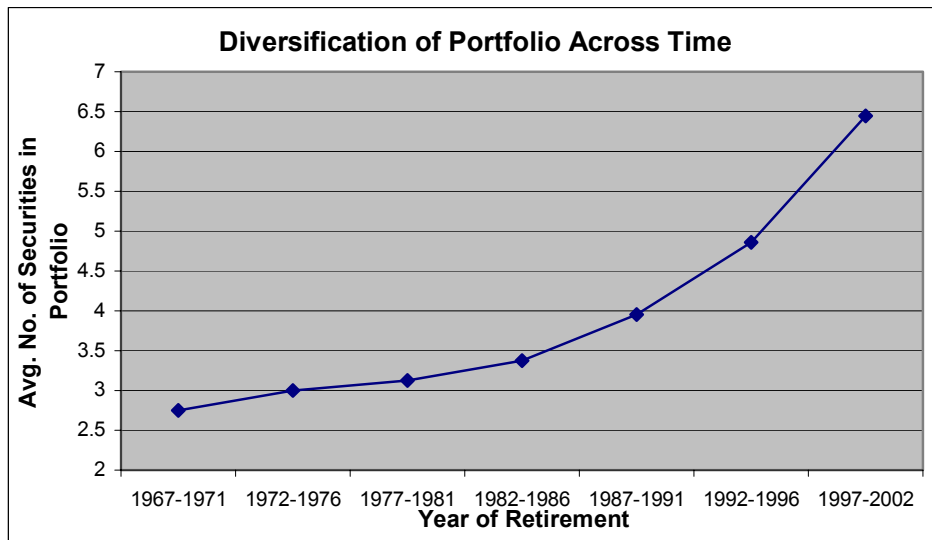


Fig. 1. A.

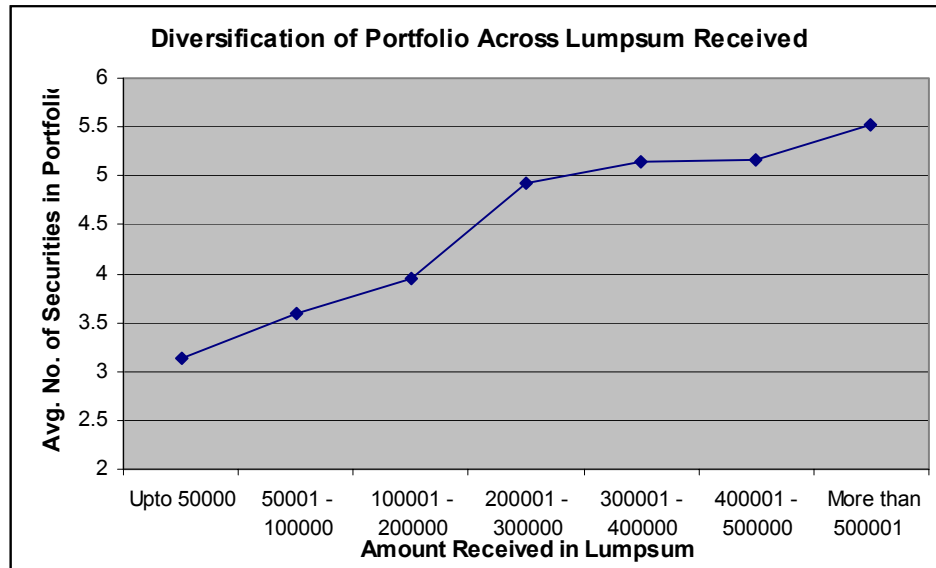


Fig. 1. B.

⁵ This is a conservative estimate. Statman (1987) estimates this number to be 30.

Similarly, Fig. I. B depicts that the average number of securities are higher (greater diversified) for those who had more funds at their disposal to invest.

In order to quantify the degree of under-diversification among the pensioner portfolios, three different (but related) measures of diversification have been used. The first measure is a normalized version of the portfolio variance. The expected portfolio variance of an equal weighted portfolio with N stocks is defined as:

$\sigma_p^2 = (1/N) \underline{\sigma}^2 + \{(N-1)/N\} \underline{\text{cov}} \quad \dots\dots 1.$	Where is $\underline{\sigma}^2$ is the average variance of all stocks in the portfolio and $\underline{\text{cov}}$ is the average covariance among stocks in the portfolio.
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The normalized portfolio variance is obtained by dividing the portfolio variance by the average variance of securities in the portfolio:

$D_1 = N V_{\text{EWP}} = (\sigma_p^2 / \underline{\sigma}^2) = \{(1/N) + [(N-1)/N] [\underline{\text{cov}} / \underline{\sigma}^2]\} / [1 + [(N-1)/N] \underline{\text{corr}}] \quad \dots\dots\dots 2.$

where **corr** is the average correlation among securities / equities in the portfolio. Portfolio variance in a normalized unit is measured so that portfolios of different sizes can be aggregated. The expression for normalized variance clearly indicates that the portfolio variance can be reduced in two different ways. Firstly, it can be reduced by increasing the number of securities in the portfolio (i.e., by increasing N) and secondly, it can be reduced by a proper selection of securities such that the average correlation among the securities in the portfolio is lower. Variance reduction through proper securities selection reflects “skill” in portfolio composition while addition of securities in the portfolio without lowering the average correlation is a reflection of a “naive” notion of diversification. In the limit, when $N \rightarrow \infty$, the portfolio variance (σ_p^2) converges to the average covariance among the stocks in the portfolio ($\underline{\text{cov}}$) and the normalized variance converges to 1. The degree of diversification can also be measured as the deviation of a portfolio from the market portfolio (Blume and Friend 1975). The weight of each security in the market portfolio is very small, so the diversification measure is approximately:

$D_2 = \sum_{i=1}^N (w_i - w_m)^2$	$= \sum_{i=1}^N \{w_i - (1/N_m)\}^2$	$\approx \sum_{i=1}^N w_i^2 \quad \dots\dots\dots 3.$
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where N is the number of securities held by the pensioner, N_m is the number of securities in the market portfolio, w_i is the portfolio weight assigned to security i in the pensioner portfolio and w_m is the weight assigned to a security in the market portfolio ($w_m = 1/N_m$). A lower value of D_2 is indicative of a higher level of diversification. Finally, the number of securities in the portfolio as a “crude” measure of the degree of diversification was used:

$D_3 = N. \quad \dots\dots\dots (4)$

Diversification Over Time and Demographics of Diversification

At Macro level the investment in financial assets of household sector has undergone wide spread changes in last 30 years. Data from 1970-71 to 2001-02 suggest that investment in currency and bank deposits has steadily declined in the period while investment in shares and debentures including mutual funds have gone up. Similarly, investment in units of UTI too has risen sharply except in last five years or, much of which can be ascribed to the UTI scam of late 90s. Investment in other assets of the household has more or less remained steady or grew at a slow pace. Similarly the rates of return and risk associated with them have changed too. Returns from all eight groups of assets have risen steadily in the 30 years period. Table IV suggests that highest average returns are from shares and debentures while it also carries the highest risk.

**Table IV. Return Risk Characteristics of Household Sector at Macro Level.
(The Benchmark Portfolio)**

Average Returns on Financial Assets Amongst Household Sector (in %)								
Year	A	B	C	D	E	F	G	H
1970-71 -- 1974-75	-13.21	6.45	4.20	4.10	6.20	4.70	6.04	6.07
1975-76 -- 1979-80	-4.66	7.69	5.60	5.10	7.40	5.55	8.92	7.14
1980-81 -- 1984-85	-9.29	8.83	8.30	6.60	8.70	5.90	13.22	9.61
1985-86 -- 1989-90	-6.66	8.99	10.07	7.60	11.60	7.45	17.92	13.70
1990-91 -- 1994-95	-10.98	9.93	13.11	8.10	12.00	10.18	24.13	16.13
1995-96 -- 2001-02	-5.45	9.48	10.38	8.79	11.14	7.19	4.66	3.50
Average	-8.38	8.56	8.61	6.71	9.51	6.83	12.48	9.36

Where A is Currency, B is Bank Deposits, C is Non-Bank Deposits, D is Life Insurance Funds, E is Provident and Pension Funds, F is Claims on Government, G is Shares and Debentures including Mutual Funds and H is Units of UTI.

Average Risk on Financial Assets Amongst Household Sector								
Year	A	B	C	D	E	F	G	H
1970-71 -- 1974-75	9.06	0.68	0.45	0.22	0.45	0.40	0.42	0.65
1975-76 -- 1979-80	7.36	0.58	1.34	0.82	0.55	0.03	4.42	2.00
1980-81 -- 1984-85	5.26	0.19	0.27	0.55	0.57	0.19	9.10	2.00
1985-86 -- 1989-90	1.52	0.04	1.98	0.34	0.89	0.69	20.13	8.23
1990-91 -- 1994-95	2.13	0.80	0.83	0.22	0.00	1.49	10.41	13.61
1995-96 -- 2001-02	1.70	1.40	2.46	0.27	1.18	0.75	7.74	6.96
Average	4.50	0.62	1.22	0.40	0.61	0.59	8.70	5.57

To better quantify the level of under-diversification among pensioner portfolios, we compare the pensioner portfolios with the simple benchmark household portfolio. Several sets of pensioner portfolios are formed, each set containing 15 securities portfolios, where $n = 2, \dots, 5$. The average risk characteristics of each of the random set of portfolios is compared with the average characteristics of matching pensioner portfolios. The household portfolio represents the risk-return ‘trade-off’ the pensioners could have achieved with a passive trading style just by investing in one of the many available household assets. The set of random portfolios represents the risk-return trade-off a ‘naive’ pensioner could have achieved by arbitrarily picking securities. So these portfolios by no means constitute a ‘desirable’ set but rather they represent the ‘minimum’ level of risk-return trade-off the pensioner portfolios should exhibit. Past 32 years of annual returns data is used to estimate the means and the standard deviations of the household portfolio and pensioners portfolios.

Tab. V. Return Risk Characteristics Across Macro and Micro Portfolios

A. Returns Across Macro and Micro Portfolios			
Year	Household Portfolio	Pensioner Portfolio	Difference
1970-71 -- 1974-75	3.07	6.03	96.32
1975-76 -- 1979-80	5.34	8.15	52.67
1980-81 -- 1984-85	6.48	7.73	19.22
1985-86 -- 1989-90	8.83	11.40	28.99
1990-91 -- 1994-95	10.33	12.83	24.25
1995-96 -- 2001-02	6.21	6.18	-0.59
Average	6.71	8.72	29.91

B. Risk Across Macro and Micro Portfolios			
Year	Household Portfolio	Pensioner Portfolio	Difference
1970-71 -- 1974-75	1.54	4.04	162.10
1975-76 -- 1979-80	2.14	3.82	78.67
1980-81 -- 1984-85	2.27	3.84	69.64
1985-86 -- 1989-90	4.23	7.52	78.00
1990-91 -- 1994-95	3.69	6.94	88.11
1995-96 -- 2001-02	2.81	5.01	78.70
Average	2.78	5.20	87.08

Comparing the standard deviation of observed pensioner portfolios with that of randomly chosen household portfolios, we again find that pensioner portfolios have relatively higher risk exposures. The normalized standard deviation of pensioners portfolios is approximately 87% higher than the normalized standard deviation of benchmark household portfolios and this difference increases with the size of the pensioner portfolio. This clearly indicates that the portfolios in our sample are not better than even those portfolios that in a sense provide a lower bound on the attainable risk-return trade-off.

At the micro level, as administered by the questionnaire amongst the pensioners during the 1971-72 to 2001-02 sample period, the average number of stocks in pensioners' portfolios has increased from 2.75 to 6.45. implying that diversification has certainly improved in their portfolios. Summary of the average return and risk characteristics are shown below in table VI. These observations are compiled out of a total of twenty five (25) investment options / securities that are available in India. A detailed analysis of Macro and Micro level observations are provided in Annexure no. II.

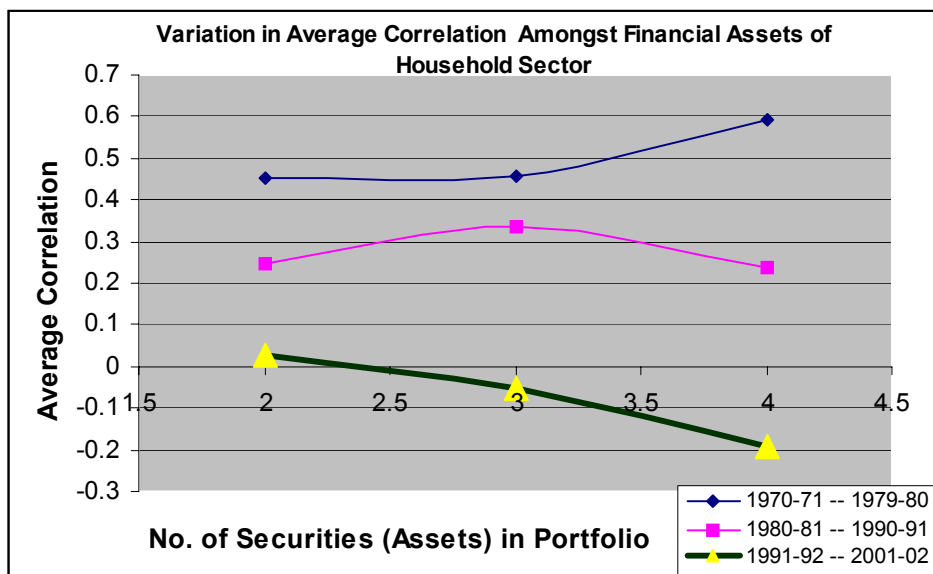
Table VI. Risk Return Characteristics at Micro Level

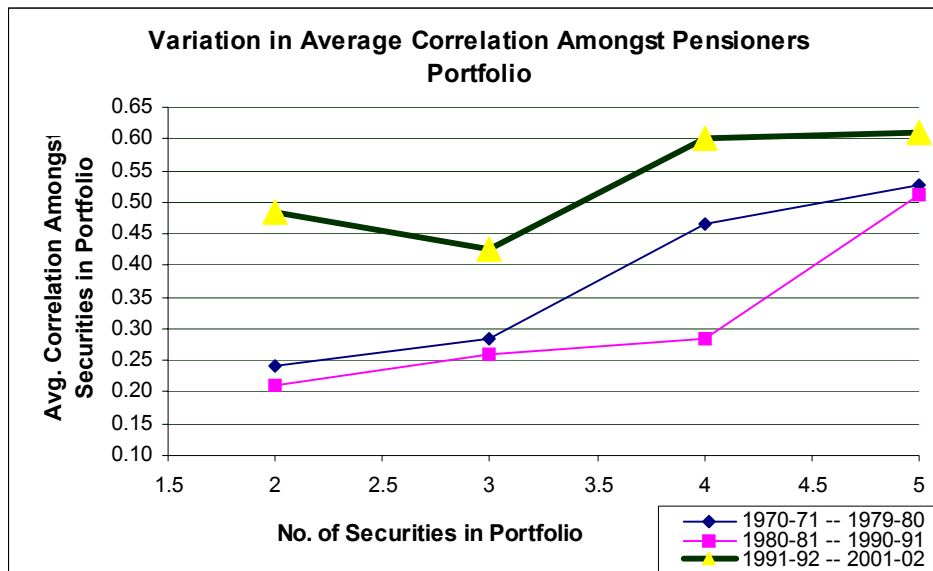
Risk Return Characteristics at Micro Level			
Year	Avg. Securities	Average Returns	Risk (Std. Dev.)
1970-71 -- 1974-75	2.9	6.025	4.041
1975-76 -- 1979-80	3.05	8.154	3.820
1980-81 -- 1984-85	3.33	7.729	3.845
1985-86 -- 1989-90	3.88	11.396	7.523
1990-91 -- 1994-95	4.8	12.830	6.937
1995-96 -- 2001-02	6.45	6.175	5.014
Average	4.068	8.718	5.197

The normalized portfolio standard deviation has steadily decreased from 7.523 to 5.014 in last fifteen (15) years from 1985-86 till 2001-02. On surface, these two results seem to imply that the average diversification characteristics of pensioner portfolios have improved over time. However, when we compare pensioner portfolios with a benchmark of randomly chosen household portfolios, we find that the risk exposure of pensioner portfolios are significantly higher than that of the benchmark portfolios and in fact, during the 1980-81 to 1994-95 period the extra standard deviation has increased from approximately 70% to 88%. Thus it may be safely concluded that the improvements in pensioner portfolios result primarily from changes in the correlation structure of the security market that has undergone changes in recent past due to reforms.

In figure 2. a. and b., we show the variations in average correlation amongst a set of randomly chosen portfolios for financial assets of the household securities (2.a) and variation in average correlation structure of pensioner portfolios (2.b) for various set of securities in portfolios. Clearly, the average correlation for both sets of portfolios decreases during the 1970-71 to 1990-91 time period but at each yearly time period, the average correlation among stocks in randomly chosen household portfolios is significantly higher than the average correlation among stocks in actual pensioner portfolios. In the financial assets of the household sector, the portfolio consisting of four (4) securities (assets) has the lowest of all correlations meaning thereby an increase in the safety of portfolio. Contrary to this, in the post reforms period of 1991-92 the average correlation in Pensioners portfolio shoots up at significantly higher level. This can be corroborated by the fact (Table VI) that risk at micro level has been highest in the period following 1985-86, the prelude to reform period.

Figure II. Variation in Average Correlation Amongst Securities at Macro (II.A) and Micro Level (II. B.)





In the analysis above we have combined portfolios of different sizes and find that at an aggregate level increase in portfolio standard deviation over time is driven primarily by changing market correlation structure. However, potential improvements in portfolio variance cross-sectional are not revealed by this analysis.

To identify the main factors that may be responsible for the observed levels of under-diversification among the pensioners in the sample, variations analysis in diversification across four demographic variables was performed: (i) age, (ii) education level, (iii) income and (iv), opening up of economy. Previous studies have established that risk aversion increases with age and wealth. If this is indeed true, portfolio diversification (an indirect indicator of an investor's risk aversion) must increase with age and income. In addition, if class level and income are proxies for the amount of information (and education) pensioners have, an analysis of cross-sectional variations can reveal if better-informed pensioners hold better diversified portfolios. More importantly, having known that there exists a strong relationship between the level of diversification and portfolio performance, results from this section can help target the investor groups that are likely to suffer the most from the lower levels of diversification.

The degree of diversification has decreased with age during both the sub periods. The average D₂ diversification measure for pensioners in the age group of 60-70 (the top age decile) is 0.53 during the liberalization sub-period while the average D₂ is only 0.37 for the top age decile that consists of pensioners in the age group of 70-85. In order to understand why diversification decreases with age, relationship was established between age and level of liberalization. Are younger pensioners more diversified because of a better developed market? Is it that liberalization has opened floodgates for well-diversified securities in the Indian capital market? Or is it that the investment options available to the pensioners of 70s and 80s were limited as compared to the pensioners of 90s? If this is tenable, then opening up of the economy in the early 90s and age factor can be combined.

During both sub-periods, it is found that the lower class pensioners (class II and III) category and the state government category holds the least diversified portfolios while pensioners in the class I and retired from the central government category fall on

the other end of the diversification spectrum. For example, during the 1992-2002 sub period, pensioners in the state government class II and III category hold 3.56 securities (the average normalized standard deviation is 0.356) on average while pensioners in the central government and class I retired category hold 5.89 securities (the average normalized variance is 0.302). Study investigates variations in diversification across different income categories. Pensioners were divided into 3 broad income groups of lump-sum received: (i) low income: up to Rs. 2,00,000.; (ii) medium: Rs. 2,00,001 to 5,00,000.; and (iii) high category: above Rs. 5,00,000. During the 1981-1991 sub-period, the diversification differences across income categories are not statistically significant. However, during the 1992-2002 sub-period, the degree of diversification is higher for the high income category. The low income category holds on average of 4.17 securities while the average number of stocks held by pensioners in the high income category is 5.84.

In addition, since the average correlation among the securities in pensioners portfolio has declined over the time period 1971-72 to 1990-91, it has lead to a significant decrease in the variance of pensioners portfolios till 1989-90. During the period, 1991 – 92 i.e. post reforms period, there is no decrease in either the excess average correlation (relative to benchmark portfolio of financial assets of household sector) or the excess normalized variance. On the contrary a sharp increase in average correlation of pensioners portfolio and its standard deviation suggests that pensioners adopt an investment strategy that may be called at best a “naive diversification”, as they construct portfolios without considering the correlation structure among the securities.

It is possible that pensioners do not diversify appropriately due to the small size of their portfolio or due to the age factor that goes against them. The inability of pensioners to buy in round lots and overall higher equity prices may prevent smaller portfolios from diversifying. However, given that the mean portfolio size of pensioner in the sample is Rs. 2.89 Lakhs, in post reforms time period, these factors are less likely to be the dominant factors responsible for the observed lack of diversification among pensioners’ portfolios. Clearly, pensioners that hold larger portfolios are more diversified and may earn higher risk-adjusted performance but there is no evidence that pensioners that hold a larger number of securities are able to reduce the variance of their portfolios through better security selection. This indicates that pensioners with larger portfolios have may better diversified portfolios merely because they hold a larger number of securities and not due to any inherent superior portfolio composition skills.

At any given instant of time, the aggregate value of pensioner portfolios is close to Rs.1.75 lakhs indicating liquidation of the lump sum retiring benefits. Furthermore, the average ratio of account size to annual income level including pension is approximately 2.0 if maximum portfolio value is used as a measure of portfolio size and 1.53 if the average portfolio value is used as a measure of portfolio size. The portfolio size to income ratio is much higher for lower income groups. For example, this ratio is 3.62 for pensioners that earn less than Rs. 60,000 per year and 2.79 for pensioners with annual income between Rs. 80,000 and Rs.1,20,000. So the money in the investment accounts do not represent an insignificant fraction of the entire household portfolio.

Similarly, this ratio reduces with the age of the pensioner. The older the pensioner, the lesser is the ratio, meaning thereby that the investments made out of the lump-sum pensionary benefits are liquidated with age. Pensioner consumes the wealth, that was accumulated at retirement endorsing the universal fear of ‘outliving the resources.’

On the cross-sectional differences in the sample, degree of diversification varies dramatically across pensioner accounts. Diversification level increases with income but

reduces with age reflecting an increasing degree of risk aversion with income and decreasing with age. The degree of diversification also varies across occupation categories. Pensioners that belong to class II and III and noncommissioned defense personnel categories hold the least diversified portfolios in the sample while pensioners who retired at class I are on the other end of the diversification spectrum where they hold the most diversified portfolios. The cross-sectional variation in diversification across occupation categories further suggest that risk aversion may increase with seniority.

V. SUMMARY AND CONCLUSIONS

Present study examined the portfolios of 495 pensioners across pre and post liberalization period in India. It revealed that a vast majority of pensioners were under-diversified. Portfolio of pensioners who retired in 1990s and 2000s were found to have a greater degree of diversification as compared to those who retired in 1970s and 80s. Such improvement in diversification results primarily from changes in the Indian capital market structure and to a limited extent, correlation structure of the Indian security market.

The research has also sought to examine how people invest the assets they do have control over. One important conclusion is that this is a relatively new field, about which a great deal more remains to be learned. Researchers have been severely handicapped because they lacked good data on household asset accumulation patterns and asset holdings as well as other pertinent information about preferences and constraints. These limitations have begun to be relaxed recently with new datasets, and researchers are now moving into the field with enthusiasm. We also conclude that there are strong differences of opinion across the business and research communities regarding what mix people should hold in terms of equities, bonds, and other assets. If anything the so-called folk wisdom suggests that people should hold assets such as stock in their youth inversely correlated with their human capital, and move to less volatile holdings later.

Government pensioners in the sample were conscious of the benefits of diversification and yet they assume a naive-diversification strategy by holding portfolios of limited securities without considering the correlation structure among the securities. As per the cross-sectional variations in diversification across demographic groups, pensioners in low income and lower classes (junior) categories hold the least diversified portfolios. In addition, it is observed that very few young and active pensioners are slightly over-focused and hold under-diversified portfolios. Overall, results indicate that notwithstanding the fact that diversification reduces risk, pensioners face an intimidating task of constructing and maintaining a well-diversified portfolio.

What implications do the widespread presence of under-diversified portfolios have for asset pricing? If pensioners diversify “naively”, they may falsely believe that they hold diversified portfolios and as a result the perception of market risk will vary across pensioners. Consequently, pensioners are likely to demand different amounts of risk compensation for holding securities, in accordance with their heterogeneous but mistaken beliefs. If the degree of under-diversification among the pensioners in the sample is a good representation of the level of diversification among the pensioner population in India, asset-pricing models should be calibrated to take into account the level of under-diversification among the pensioner population.

Annexure I. Pensioner's Profile

I. A. Population of Pensioners Across Four Major Towns

City	State	Central	Defence	Total
Jabalpur	5026	2509	2388	9923
Gwalior	6245	2998	1347	10590
Bhopal	10291	3697	1112	15100
Indore	10541	1998	1307	13846
Total	32103	11202	6154	49459

Sample of Pensioners selected from above Population				
City	State	Central	Defence	Total
Jabalpur	45	25	25	95
Gwalior	62	28	10	100
Bhopal	103	37	10	150
Indore	110	20	20	150
Total	320	110	65	495

Percentage (%) of Population used as Sample				
City	State	Central	Defence	Total
Jabalpur	0.90%	1.00%	1.05%	0.96%
Gwalior	0.99%	0.93%	0.74%	0.94%
Bhopal	1.00%	1.00%	0.90%	0.99%
Indore	1.04%	1.00%	1.53%	1.08%
Total	1.00%	0.98%	1.06%	1.00%

I. B. Lump-sum Pensionary Benefits Received

Rs.	State	Central	Defence	Total
Upto 50000	19	4	1	24
50001 - 100000	48	14	1	63
100001 - 200000	68	23	17	108
200001 - 300000	72	22	10	104
300001 - 400000	47	15	12	74
400001 - 500000	43	15	15	73
Above 500000	23	17	9	49
Total	320	110	65	495

I. C. Year wise Sample Spread

Year wise	Sample Size
1967 - 72	10
1973 - 77	9
1978 - 82	43
1983 - 87	102
1988 - 92	100
1993 - 97	144
1997 - 2002	87
Total	495

Annexure II. Risk Return at Micro Level

II. A. Average Returns on Securities Amongst Pensioners (in %)								
Year	a	b	c	d	e	f	g	h
1970-71 -- 1974-75	26.29	4.20	7.02	-11.21	5.05	4.20		5.50
1975-76 -- 1979-80	17.70	5.10	8.33	-4.66	5.84	5.60		7.60
1980-81 -- 1984-85	10.75	5.50	9.67	-9.29	6.92	8.43		11.44
1985-86 -- 1989-90	12.41	5.50	9.87	-6.66	10.33	9.34	9.00	13.45
1990-91 -- 1994-95	3.92	5.50	11.03	-10.98	12.75	10.08	9.60	21.25
1995-96 -- 2001-02	1.23	4.64	10.69	-5.45	10.73	8.97	9.43	7.52
Average	12.05	5.07	9.43	-8.04	8.61	7.77	9.34	11.13

Year	i	j	k	l	m	n	o	Average (a-o)
1970-71 -- 1974-75			7.00		6.18			5.86
1975-76 -- 1979-80			6.68		7.04		22.32	6.50
1980-81 -- 1984-85			7.77		8.29		17.81	6.20
1985-86 -- 1989-90		28.48	2.74		12.93	13.92	26.84	7.91
1990-91 -- 1994-95	15.38	13.51	13.54	12.88	16.34	14.80	42.85	7.89
1995-96 -- 2001-02	11.78	-11.32	6.03	10.79	14.93	13.25	-0.60	5.97
Average	13.58	10.23	7.29	11.83	10.95	13.99	21.84	6.72

II. B. Average Risk on Securities Amongst Pensioners (in %)									
Year	a	b	c	d	e	f	g	h	
1970-71 -- 1974-75	21.16	0.45	0.74	11.96	0.45	0.45		0.83	
1975-76 -- 1979-80	19.52	0.22	0.72	7.36	0.08	1.34		3.62	
1980-81 -- 1984-85	8.43	0.00	0.24	5.26	0.66	0.35		3.02	
1985-86 -- 1989-90	10.84	0.00	0.05	1.52	1.58	0.38		1.59	
1990-91 -- 1994-95	7.69	0.00	1.00	2.13	0.62	0.30	0.55	4.83	
1995-96 -- 2001-02	3.89	0.90	1.53	1.70	0.41	1.08	0.73	9.76	
Average	11.92	0.26	0.71	4.99	0.63	0.65	0.64	3.94	

Year	i	j	k	l	m	n	o	Average (a-o)
1970-71 -- 1974-75			0.00		0.33			5.15
1975-76 -- 1979-80			0.88		0.64			4.69
1980-81 -- 1984-85			1.64		0.80		18.06	2.56
1985-86 -- 1989-90		26.03	7.28		1.82	1.04	38.15	2.28
1990-91 -- 1994-95	0.48	54.92	0.89	0.63	0.94	0.37	28.72	2.14
1995-96 -- 2001-02	2.05	17.06	8.52	1.87	1.79	2.09	21.85	2.50
Average	1.26	32.67	3.20	1.25	1.05	1.17	26.70	3.22

a	Bullion	i	Regular Income Mutual Funds
b	Savings Bank Deposits	j	Growth Mutual Funds
c	Bank Fixed Deposits	k	Unit Linked Insurance Plan
d	Cash	l	Public Sector Bonds
e	GOI / RBI Bonds	m	Private Sector Bonds / Debenture
f	Small Savings Instruments	n	Deposits of NBFCs
g	Deposit Scheme for Retiring Govt. Employees, 1989.	o	Equity Shares of BSE Sensex.
h	UTI's Unit Scheme 64		

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