

SUSTAINABLE OR NOT?

NYC

PENSION COST PROJECTIONS
THROUGH 2060



NEW YORK CITY COMPTROLLER
JOHN C. LIU

JUNE 2011

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About the New York City Comptroller's Office

The New York City Comptroller, an independently elected official, is the Chief Financial Officer of the City of New York. The mission of the office is to ensure the financial health of New York City by advising the Mayor, the City Council, and the public of the City's financial condition. The Comptroller also makes recommendations on City programs and operations, fiscal policies, and financial transactions. In addition, the Comptroller manages the assets of the five New York City Pension Funds, performs budgetary analysis, keeps the City's accounts, audits City agencies, and registers proposed contracts. His office employs a workforce of more than 700 professional staff members. These employees include accountants, attorneys, computer analysts, economists, engineers, budget, financial and investment analysts, claim specialists, and researchers in addition to clerical and administrative support staff.

About Retirement Security NYC

Retirement Security NYC is a major initiative launched by Comptroller John C. Liu to protect the retirement security of public employees while ensuring the City's financial health.

About the Cover

The cover of this report was designed to convey the economic concept of "consumption smoothing." Within the context of pensions, consumption smoothing allows individuals to redistribute income from their younger to older self.

The images featured on the cover of this report represent the work of **Stephen Mancusi**, a New York City-based forensic artist since 1984, who utilized a technique known as age progression. All four images are of **Josiel Estrella**. The first image (far left) is a present-day headshot while the three images that follow are photographs that were digitally altered to represent aging of approximately 10, 25, and 40 years.

MANCUSI served the City of New York for almost 27 years in the New York City Police Department as Senior Forensic Artist and Detective, and is a member of the New York City Police Pension Fund. Mancusi conducted composite sketches with countless victims and witnesses for various crimes resulting in the identification of many suspects, including in such high-profile cases as the Stuyvesant Town Serial Rapist and the Central Park Assault Case. He is the author of *The Police Composite Sketch* published by Humana Press, and is the current Chair of the International Association for Identification's Forensic Art Certification Board. For more information about the artist, visit www.forartist.com.

ESTRELLA is a Press Officer in the New York City Comptroller's Office. She is also a member of the New York City Employees' Retirement System.



Overview

Perhaps the most important consideration in evaluating proposals to alter the pension benefits offered to City employees is the long-term sustainability of the financial obligation entailed. If realistic projections indicate that pensions will absorb a rapidly-rising and ever-greater share of City expenditures, the City may be compelled to dramatically reduce its pension commitments. If, on the other hand, financial projections indicate that currently high pension costs are likely to quickly subside, there may be no imperative to curtail benefits at all. This study was initiated by the New York City Comptroller's Office to inform the debate over municipal employee compensation with projections of the long-run trajectory of the City's pension obligations.

A previous study by the Comptroller's Office documented the rapid rise of the City's pension costs over the past ten years and quantified the major reasons for its growth (*The \$8 Billion Question: An Analysis of NYC Pension Costs Over the Past Decade*, Office of the New York City Comptroller, April 2011). From Fiscal Year (FY) 2001 through FY 2010, employer contributions to the New York City pension funds¹ increased from \$1.2 billion to \$7.7 billion. The Comptroller's analysis found that about 48 percent of the increase in contributions was caused by unexpectedly poor market performance, about 44 percent due to benefit enhancements (almost all of which were enacted in 2000), and about 3 percent due to unanticipated investment and administrative expenses. That study, however, did not address the impact of employee pensions on future City budgets.

This study provides projections of employer and City contributions² to the five employee pension funds through FY 2060 made by actuaries from the Hay Group. The Hay Group's long-term forecasts were based on the pension benefits provided under current law and on actuarial assumptions and methods that are consistent with those currently utilized by the New York City Office of the Actuary. The resulting pension contribution costs were put into an economic and budgetary context by the Comptroller's Bureau of Fiscal and Budget Studies.

Since the rate of investment return assumed (and ultimately realized) on pension fund assets is a major determinant of the employers' level of contributions, the

¹ The City's five pension funds are: The New York City Employees' Retirement System (NYCERS), the New York City Teachers' Retirement System-Qualified Pension Plan (TRS), the New York City Board of Education Retirement System-Qualified Pension Plan (BERS), the New York City Police Pension Fund (POLICE), and the New York City Fire Department Pension Fund (FIRE).

² City contributions are a subset of employer contributions because NYCERS, TRS, and BERS are cost-sharing, public employee retirement systems, i.e., employers other than the City of New York also contribute to these retirement systems.



Hay Group estimated four different pension cost scenarios.³ Three scenarios projected employer and City contribution costs using an 8.0 percent, 7.5 percent, and 7.0 percent rate of return, with modest growth in the active membership of the pension funds. There is also a fourth scenario that held active membership constant with an 8.0 percent rate of return. Unless otherwise specified, discussions in the report refer to projections based on an 8.0 percent rate of return with a 0.25 percent annual rate of growth in pension fund active membership. This is referred to as the “baseline” scenario in the report text. The NYC Office of the Actuary also currently utilizes an 8.0 percent rate of return to calculate employer contributions to the pension funds.

The reader should bear in mind that these projections are not intended to represent a most likely scenario or any other judgment concerning the city’s actual economic growth and fiscal status over the next 50 years. The next half century will most likely contain boom times and asset bubbles, recessions and market panics, just as past decades have. It will contain changes in elected administrations, reversals of governing philosophies, and fluctuations of the political climate. The actual course of economic and fiscal events will undoubtedly diverge from the smooth, straight-line projections presented here. Rather, this analysis intends to provide a baseline projection for understanding how pension obligations will affect the City’s budget, if all current laws relating to municipal pensions are left in place and if historical economic trends remain largely intact.

The analysis indicates that required City contributions to employee pension funds will peak in FY 2016, when they will reach approximately \$8.3 billion, or 11.4 percent of total City expenditures. They will then level off, and even decline somewhat, during the period from FY 2016 to FY 2027. Thereafter, contributions will decrease slowly in inflation-adjusted dollars, while falling both as a percentage of payroll⁴ and as a percentage of City expenditures, through FY 2060.

The major findings of the study are:

- City contributions to employee pension funds will increase through FY 2016, after which they will decline as a percentage of the City’s expenditures and revenues.
- Pension costs as a percent of the City’s budget will continue to run above typical historical levels until about 2022, at which point they will return to levels below those of the early 1980s.

³ Hay Group’s Scenario 1 assumes level workforce and 8 percent investment return, which they refer to as their “baseline” scenario because it projects no workforce growth; Scenario 2 assumes workforce increases of 0.25 percent per year from FY 2014 and 8 percent investment return; Scenario 3 assumes workforce increases of 0.25 percent per year from FY 2014 and 7.5 percent investment return from FY 2012; and Scenario 4 assumes workforce increases of 0.25 percent per year from FY 2014 and 7.0 percent investment return from FY 2012.

The body of this report only discusses Hay Group’s Scenarios 2, 3, and 4, with Hay Group’s Scenario 2 referred to as this report’s “baseline” scenario because it reflects the 8.0 percent investment return assumption which is currently used by the pension funds.

⁴ Payroll, in the context of this report, refers to “covered payroll,” i.e., the payroll of the active members of the pension funds on the specified date. In other words, salaries of City employees who are not members of the pension funds are not included.



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- By FY 2060, under the baseline scenario, City contributions to employee pension funds will represent about 3.3 percent of the City’s general fund expenditures, compared to 10.6 percent in FY 2010.
- By FY 2060, under the baseline scenario, City contributions to employee pension funds will represent about 4.5 percent of the City’s total tax revenues, compared to 17.9 percent in FY 2010.
- As a proportion of payroll, total employer contributions under the baseline scenario will fall from 32.4 percent in FY 2010 to 14.2 percent in 2060.
- Employer contributions to the Police and Fire pension funds are expected to decrease significantly over time. As a proportion of payroll under the baseline scenario, the Police fund’s rate is expected to fall from 65.1 percent in FY 2010 to 24.2 percent in FY 2060 and the Fire fund’s rate from 83.1 percent in FY 2010 to 25.4 percent in FY 2060.

Chart 1 and Table 1 show projected City contributions to the five municipal pension funds as a percentage of the City’s projected total expenditure budget through FY 2060 under the 8.0 percent, 7.5 percent, and 7.0 percent rate of return scenarios.

CHART 1

Pension Costs as Percent of City’s Budget Under Three Rate of Return Scenarios (FY 1981 – FY 2060)

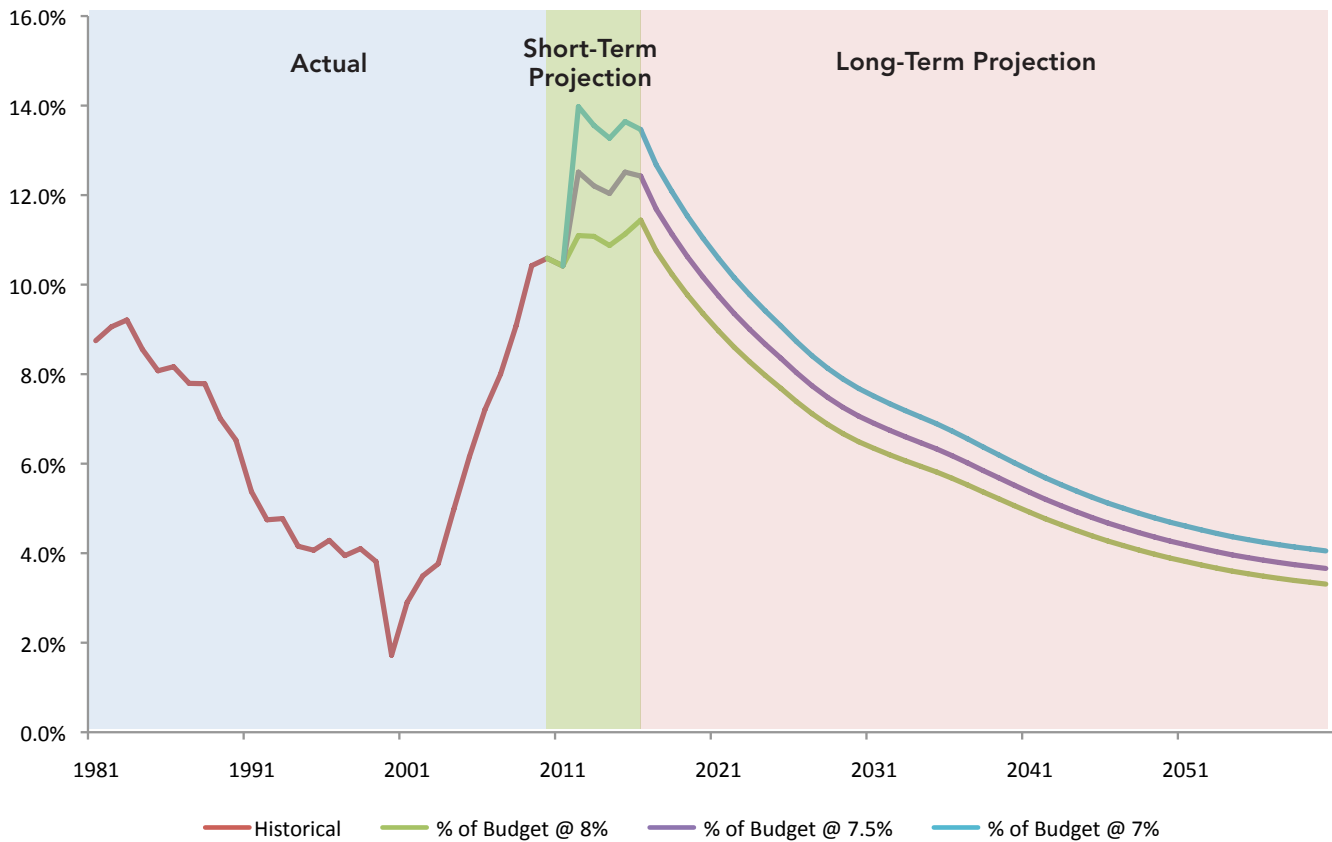


TABLE 1
Pension Costs as Percent of City’s Budget Under Three Rate of Return Scenarios

Fiscal Year	8%	7.5%	7%
2010	10.6%	N/A	N/A
2020	9.4%	10.2%	11.0%
2030	6.5%	7.1%	7.7%
2040	5.1%	5.5%	6.0%
2050	3.9%	4.3%	4.7%
2060	3.3%	3.7%	4.1%

Long-Term Projections of Pension Costs

The following long-term projections of City pension costs were developed by the Hay Group utilizing their computer models of the five actuarially-funded New York City retirement funds. The Hay Group programmed salary, population, and benefit projections into the model, taking into account the funds’ lag valuation methodology.⁵ Each of the five pension funds was modeled independently.

Whenever possible, the City’s figures were used to generate forecasts, particularly in the earliest years of the projections. For example, values for payroll, wage growth, and pension contributions used for the fiscal years 2011 through 2015 were consistent with those used in the City’s FY 2012 Executive Budget and Financial Plan, with long-term assumed values substituted thereafter. Furthermore, whenever possible the long-term assumed values were made consistent with the City’s actuarial assumptions. In particular, the long-term rate of municipal employee general wage growth was assumed to be 3.0 percent annually, of which 2.5 percentage points was assumed to be inflation and 0.5 percentage points real growth.

⁵ See page 8 of the Appendix to this report for an explanation of lag valuation methodology.



The projections include a 0.25 percent annual growth in the City's workforce starting in FY 2014, leading to an increase of "active" participants in the five pension plans to 411,168 by FY 2060, compared to 365,639 in FY 2010. The Comptroller's Office believes this slight growth in active membership increases the realism of the forecasting exercise by allowing the municipal "headcount" to increase with the projected increase in the City's resident population, while still allowing for anticipated increases in labor productivity. However, all categories of employees were assumed to increase in number at the same rate; consequently, the share of active members employed by the City directly and employed by other public agencies is held constant throughout the forecast period. Similarly, the distribution of City employees by function was held constant throughout the period. The constant employment mix assumption was made because it was deemed too speculative to project how future social conditions and technological innovations might alter the municipal government employment mix.

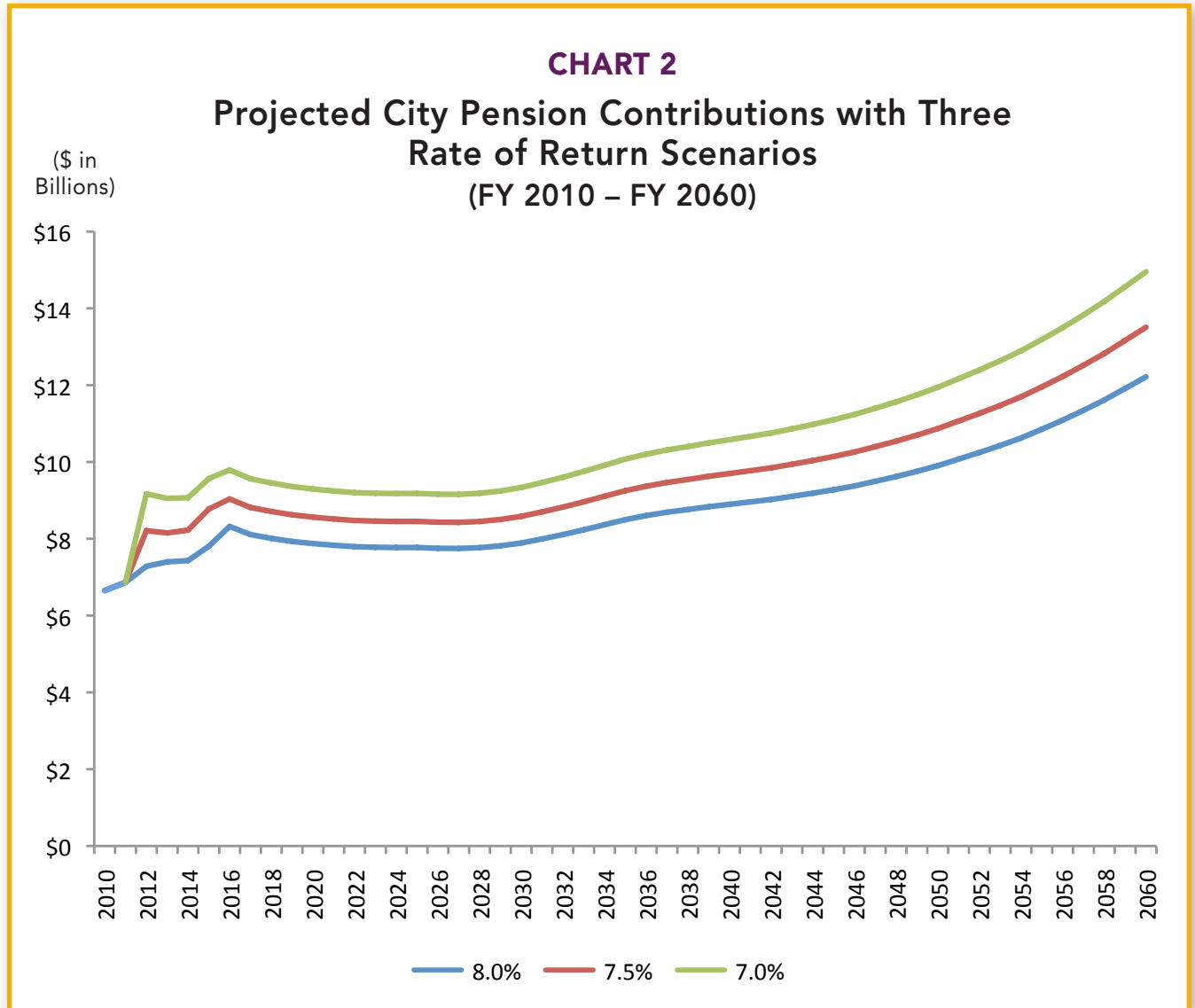
An important variable used in projecting the pension contribution costs to the City was the rate of return expected on pension fund assets. The baseline projections were calculated using an 8.0 percent annual rate of return, which is identical to that currently used by the City. The compounded annual average rate of return on the assets of the five pension funds combined was 9.37 percent for the 30-year period FY 1981 - FY 2010. However, the Hay Group also projected employer contributions under 7.5 percent and 7.0 percent rate of return assumptions for each of the funds. The different rate of return assumptions begin with the first forecasted period, i.e., FY 2012. In other words, no "catch-up" in fund asset values is assumed to offset the unusually poor investment returns experienced during the past decade.

According to the baseline projection using an 8.0 percent return on pension fund investments, the City net contributions to the five pension funds will continue to increase through FY 2016, although at a much slower rate than they have in recent years. They will then remain below the FY 2016 figure until FY 2034, after which they will again rise slowly in nominal (unadjusted for inflation) dollars. The projected annual rate of increase between FY 2034 and FY 2060 is 1.5 percent, well below the rate of inflation anticipated for that period.

The projected annual rate of increase between FY 2034 and FY 2060 in City net contributions to the five pension funds is 1.5 percent, well below the rate of inflation anticipated for that period.

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Chart 2 shows the City's projected contributions to the five pension funds, in nominal dollars, for each rate of return scenario for the period FY 2010 to FY 2060. It is a mathematical necessity that the pattern of growth is similar in each scenario, and that the 7.0 percent return scenario results in a higher level of City contributions. By 2060, the 7.0 percent return scenario results in City contributions that are \$2.7 billion, or 22.4 percent, higher than if the realized rate of return over that period is 8.0 percent.



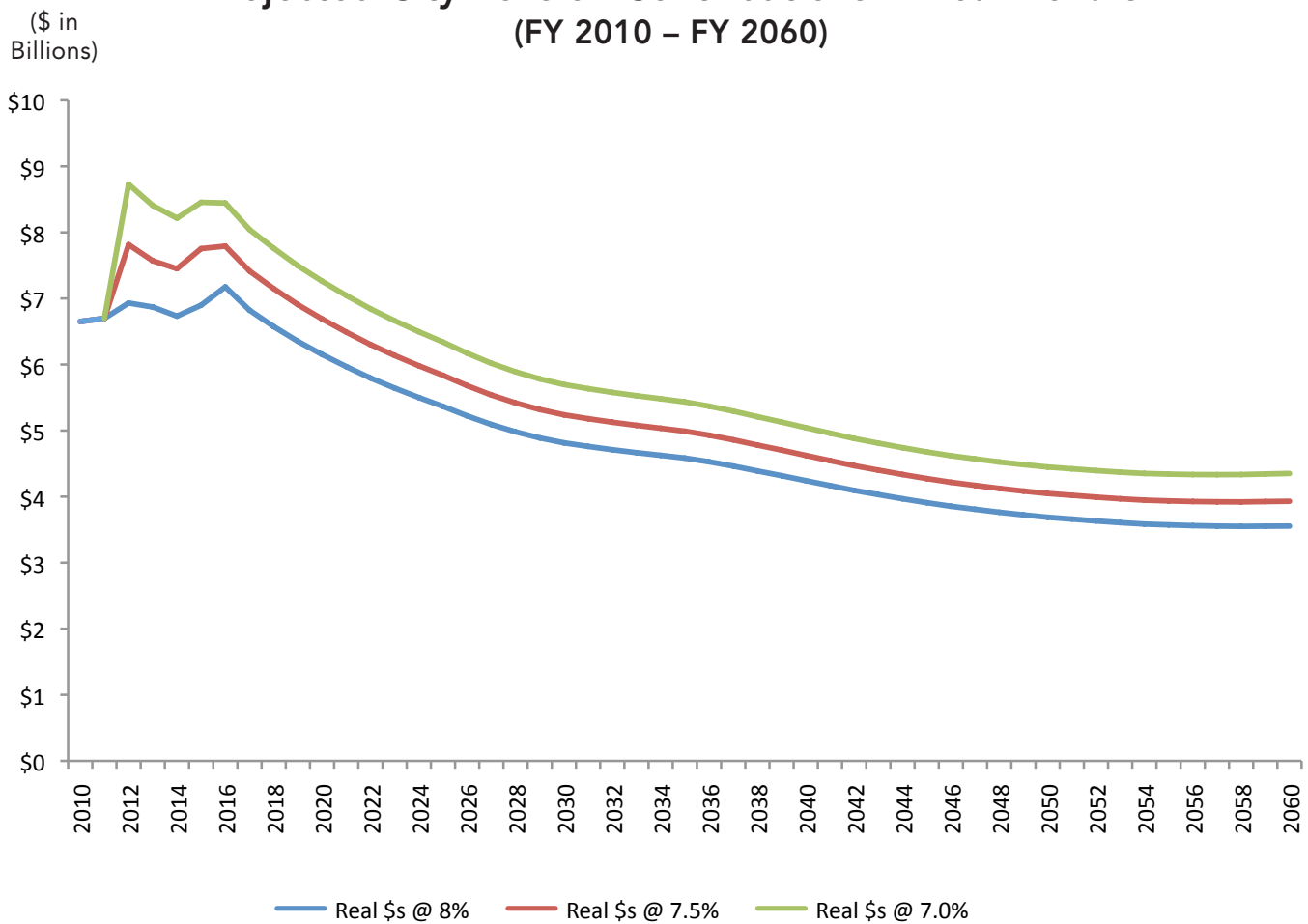
Although the costs plotted in Chart 2 appear to be growing continuously, in reality, beyond 2026 the curves essentially plot the rate of inflation. It is instructive to look at the projected pension costs in inflation-adjusted dollars. That is done in Chart 3.

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Chart 3 shows that the real, or inflation-adjusted, pension costs to the City are projected to rise under the baseline scenario until FY 2016, and then to decline through 2060. In the 7.5 percent and 7.0 percent rate of return scenarios, pension costs in real dollars peak in FY 2012. Under each rate of return scenario, City pension contributions will be roughly 50 percent lower in real terms in FY 2060 compared to the projected costs in FY 2016. Those declining real costs are projected to occur without any further changes to employee pension benefits and while allowing for a 0.25 percent annual increase in the City’s workforce. Moreover, if a 7.0 percent annual return were to be realized over the period FY 2012 through FY 2060, the least favorable scenario modeled, real pension costs to the City would still be 34.6 percent lower in FY 2060 than in FY 2010.

CHART 3

Projected City Pension Contributions in Real Dollars (FY 2010 – FY 2060)



The projected long-term decline in the City's inflation-adjusted pension costs is largely due to the phasing-in of new, less costly pension plans.

There are two reasons for the projected long-term decline in real contribution costs. First, pursuant to the funds' method of phasing in investment shortfalls over a six-year period, the adverse impact from the asset value declines of 2008-2009 will be fully realized in the actuarial asset values by FY 2016. However, the cost of funding those shortfalls will be felt throughout the time period studied, with the actual dollar amount declining each year until it eventually becomes financially insignificant. That effect will reduce the rate of contribution growth each year beyond FY 2016.

Far more important is the effect of the phasing in of new pension plans, which are generally less favorable for employees and less expensive for the City. Some of these plans have been in place for some time, such as the "Tier 4, 57/5 Plan" into which new civilian employees have been enrolled since June 29, 1995. This pension plan is less expensive to the City than earlier plans, primarily because of the higher rate of employee contribution required. Although participants in this plan are eligible to retire at age 57, compared to the earlier plan under which the retirement age was 62, participants in the current plan contribute an additional 1.85 percent of their salary to their pension fund for the first 30 years of service. The increased employee contribution makes the plan slightly less expensive to the City than the earlier "62/5" plan. Charts showing the major features of the current plans can be found as Exhibits D, E, and F in the Appendix to this report.

More financially significant changes have been implemented for the Police and Fire pension plans in recent years. Since July 1, 2009, new uniformed Police and Fire Department hires are required to join a "Tier 3" pension plan. Among the significant changes from the earlier Police and Fire pension plans, Tier 3 extends the years of service necessary to receive a 50 percent-of-salary pension benefit, changes the determination of final pensionable salary, and reduces disability benefits. Those changes make pension benefits significantly less expensive to the City, as is evident from Table 2.



Table 2 shows the entry age normal rates for civilian workers, police, firefighters, and teachers under the current and previous pension plans. Entry age normal is an actuarial cost method designed to estimate a member’s total plan benefit over the course of his or her career. It can be used to design an employer’s contribution rate that produces contributions equal to a fixed percentage of an employee’s salary throughout their job tenure. The percentages shown in Table 2 are the entry age normal rates for a 30-year-old male or female entering each type of City employment.

TABLE 2
Entry Age Normal Rates for City Pension Contributions
Under Current and Previous Pension Plans
Open to New Hires

Plan	Male	Female
NYCERS (Civilians)		
Former Plan: "Tier 4, 62/5"	5.71%	6.36%
Current Plan: "Tier 4, 57/5"	5.41%	6.17%
POLICE		
Former Plan: "Tier 2"	25.56%	26.25%
Current Plan: "Tier 3"	12.56%	13.07%
FIRE		
Former Plan: "Tier 2"	27.17%	27.47%
Current Plan: "Tier 3"	11.81%	11.98%
TRS		
Former Plan: "Tier 4, Teachers' 62/5"	8.61%	9.07%
Current Plan: "Tier 4, Teachers' 55/27"	6.39%	6.79%
BERS		
Former Plan: "Former Plan: "Tier 4, 62/5"	5.88%	6.63%
Current Plan: "Current Plan: "Tier 4, 55/27"	4.00%	4.63%

Source: Office of the NYC Actuary

For 30-year-old males and females



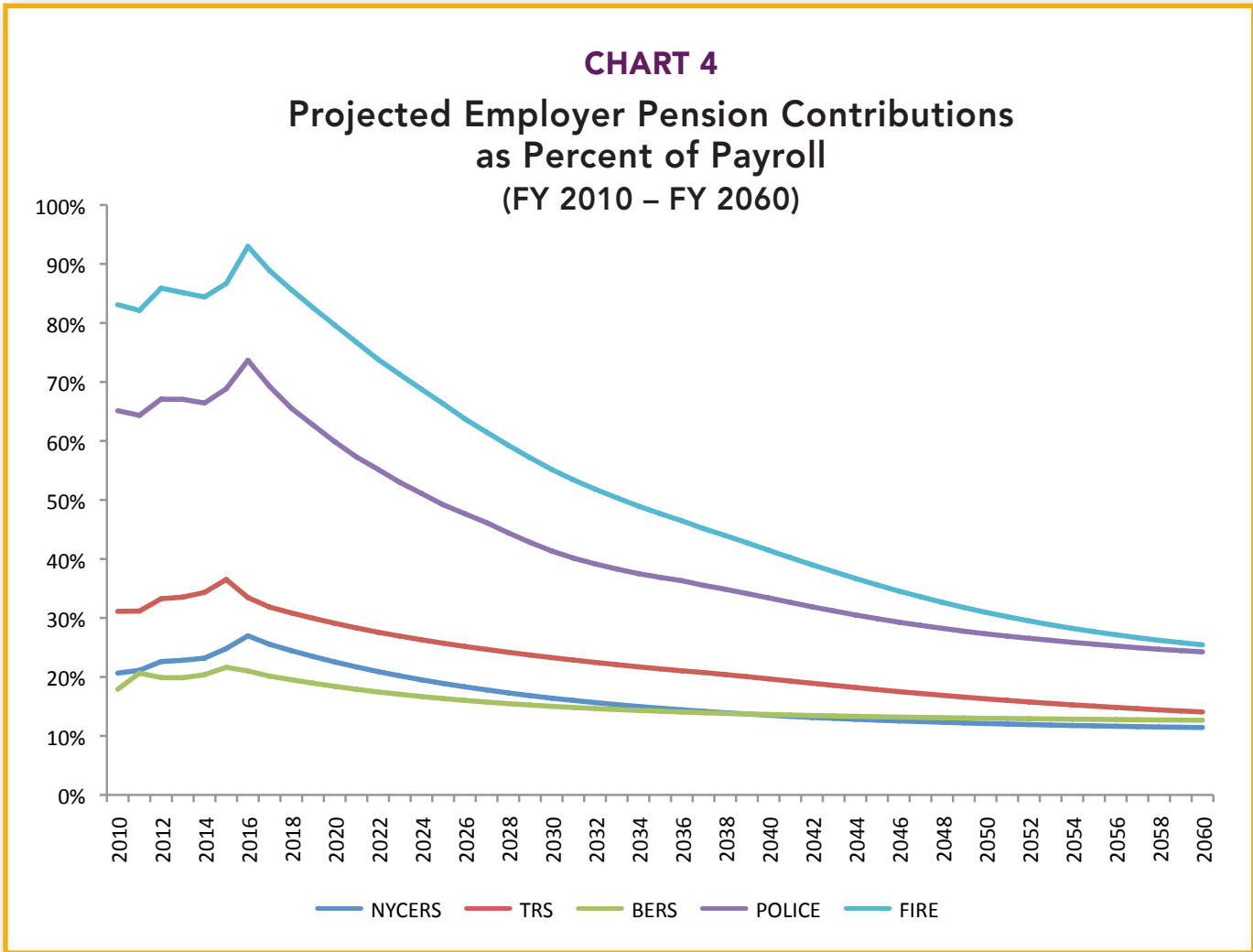
Changes have also been made to teachers' pension plans in recent years.⁶ Effective December 11, 2009, new teachers entering the Teachers' Retirement System are required to contribute 4.85 percent of salary until they have 27 years of credited service, and 1.85 percent thereafter. This lowers the City's costs, as 62/5 members were only required to contribute 3.0 percent of salary for the first ten years of service. The new teachers' plan also raised the vesting period from five to ten years of credited service.

As more senior employees enrolled in earlier pension plans retire and are replaced with employees enrolled in the newer plans, the real cost of pensions to the City will decline.

As more senior employees enrolled in earlier pension plans retire and are replaced with employees enrolled in the newer plans, the real cost of pensions to the City will decline. Because the changes made to the pension plans offered to various classes of municipal employees differ, the trajectory of the City's future pension costs for each of the respective funds will also differ. Chart 4 shows projected employer contribution costs as a percent of payroll for each of the five funds. If no further adjustments to pension benefits are made, other assumptions are accurate, and investment returns are equal to the assumed rate (in Chart 4, 8.0 percent), the gap between contributions⁷ as a percentage of salary and the entry-age normal rate will narrow.

⁶ These changes were made in two steps, from the 62/5 Plan to the 55/27 Plan by Chapter 19 of the Laws of 2008, effective Feb. 28, 2008, followed by a modification of the 55/27 Plan by Chapter 504 of the Laws of 2009, effective Dec. 11, 2009.

⁷ Employer contributions shown in Chart 4, and elsewhere in the body of this study, include costs for administration of four of the pension funds (excluding FIRE), investments, Variable Supplements Funds (VSFs), and the impact of the One-Year Lag methodology used by the City.



In Chart 4 it can be seen that employer pension contributions as a percentage of payroll is presently much higher for the Fire and Police funds than it is for TRS, BERS, or NYCERS. In FY 2010, the ratio was 83.1 percent for the Fire fund and 65.1 percent for the Police fund, compared to 20.6 percent for NYCERS. However, primarily because the newly-implemented Tier 3 plans for Police and Firefighters represent larger benefit reductions compared to earlier plans, the projected ratios for POLICE and FIRE drop more dramatically than for the other three funds. By FY 2060, it is projected that the contributions/salary ratios for the Fire and Police funds will be 25.4 and 24.2 percent, respectively, while for TRS, BERS and NYCERS it will be 14.1, 12.7, and 11.4 percent, respectively.



Pension Costs Relative to City Resources

When evaluating long-term public budget projections, it is useful to relate them to the productive capacity of the economy or to some other measure of potential resources. When projected far out into the future, dollar values (especially when distorted by inflation) can be misleading as the future values are made larger by long-term compounding. For example, to get a clear picture of the long-term budget implications of various policies, the federal government often expresses budget items as a share of the projected total federal budget or as a percentage of Gross Domestic Product (GDP). In this section we provide a similar approach to the City’s future pension contributions as projected by the Hay Group.

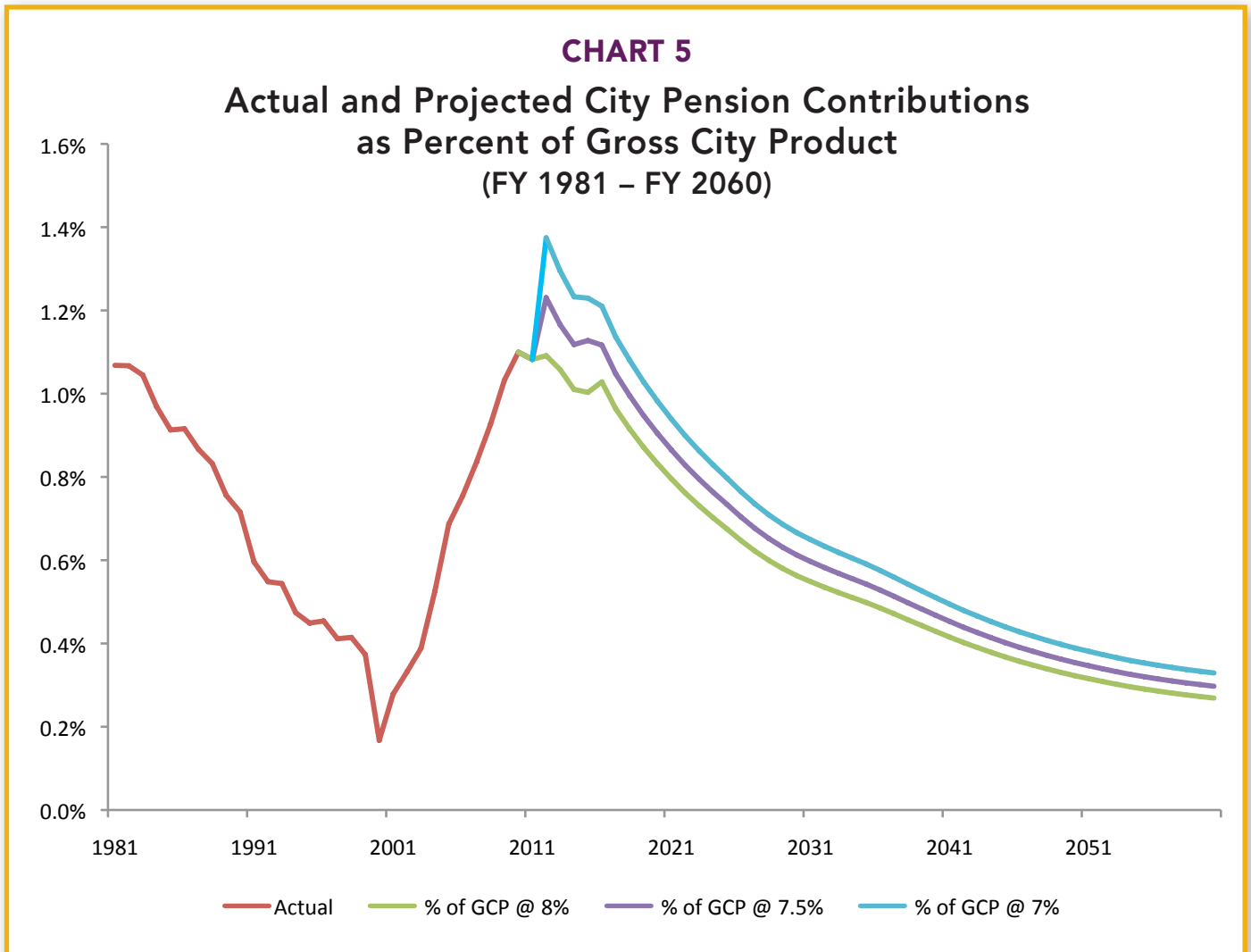


Chart 5 plots historical City pension contributions through FY 2010 as a percentage of Gross City Product (GCP), and projected contributions for each of the three rate of return scenarios, for the period FY 2011 to FY 2060. GCP is a measure of the total economic output of the city, analogous to the national GDP figure. There is no federal data series for GCP for New York City or any other cities, except Washington, D.C. The historical figures are estimated by the Comptroller's Office from: figures on national output; Gross State Product; Gross Regional Product (metropolitan areas) and Local Area Personal Income from the Bureau of Economic Analysis (BEA); employment figures and wage data from the Bureau of Labor Statistics (BLS); and various other local area economic indicators. The Comptroller's historical GCP estimates, adjusted to fiscal years, correspond closely to similar estimates constructed by the City's Office of Management and Budget in terms of dollar magnitude and long-term growth rate.

In order to build into our analysis conservative estimates of the city's economic growth, we have assumed that real GCP will grow at a rate two-thirds as fast as real GDP, or by approximately 1.5 percent annually, during the period FY 2016 to FY 2060.

According to the Comptroller's estimates of GCP, the city's real economic output increased at a rate slightly faster than the rate of national GDP during the period FY 1981 to FY 2010 (3.1 percent versus 2.8 percent). For purposes of its own long-term budget analysis, the Federal Office of Management and Budget (OMB) projects real GDP to increase at approximately a 2.2 percent rate over the period 2010 through 2060. In order to build into our analysis conservative estimates of the city's economic growth, we have assumed that real GCP will grow at a rate two-thirds as fast as real GDP,

or by approximately 1.5 percent annually, during the period FY 2016 to FY 2060. For the years through FY 2015, we have used the same short-term GCP forecasts utilized in other of the Comptroller's budget reports and tax revenue forecasts.

The principal reason we project the city's rate of real economic growth to be lower than the national rate is the difference in projected population growth rates. From 1980 to 2010, the city's population grew at less than half the rate of the nation's (0.5 compared to 1.1 percent). If that growth differential persists until 2060, and there is no widening of the difference in per capita output in New York City and per capita

output in the rest of the United States, the difference in real economic growth should be about 0.6 percent.

The OMB anticipates a rate of inflation over the 50-year period of 2.5 percent, which is the same as that utilized by the Hay Group in its analysis of City pension contributions. Consequently, we also use an inflation assumption of 2.5 percent in our projections of long-term nominal GCP growth. Combining these assumptions (1.5 percent real GCP and 2.5 percent inflation), we anticipate an average annual growth rate of 4.0 percent for nominal GCP during the forecast period.

Chart 5 shows that the City's actual pension contributions of \$6.7 billion in FY 2010 represented a sum equal to 1.10 percent of GCP for that year. That is slightly above the previous high level of 1.07 percent in FY 1981, and dramatically above the low point of 0.17 percent reached in FY 2000. Based on our short- and long-term projections of GCP growth, the FY 2010 percentage is expected to be the peak share if the current 8.0 percent rate of return assumption is maintained. If City contributions were to be determined using a 7.5 percent or 7.0 percent rate of return assumption (effective FY 2012, but retaining current lag methodologies), the contributions/GCP ratio would begin to trend downward after FY 2012.

If the pension funds realize an 8.0 percent rate of return on investments during the 50-year forecasting period, the analysis indicates that City pension contributions as a share of GCP will fall to 0.27 percent by 2060. That is approximately the percentage experienced in FY 2001. Over the entire forecast period FY 2011 - FY 2060, the ratio would average 0.56 percent, substantially lower than the historical 0.68 percent average experienced from FY 1981 to FY 2010. Under the less-favorable rate of return scenario of 7.0 percent, the ratio would drop to 0.33 percent by FY 2060, and average 0.66 percent over the forecast period.

Based on our short- and long-term projections of GCP growth, the FY 2010 percentage is expected to be the peak share if the current 8.0 percent rate of return assumption is maintained.

It is also instructive to look at City pension contributions relative to tax revenues and as a share of total revenues or expenditures.⁸ This is done for the 8.0 percent rate of return scenario in Chart 6. In forecasting tax revenues and expenditures additional assumptions are needed. The City's current tax revenue figures were used for the period FY 2011 through FY 2015; thereafter, they were assumed to grow at the same rate as GCP. Due to the City's graduated income tax rate and its reliance on other economically-sensitive taxes, tax revenues as a percent of GCP tend to increase during economic expansions and fall during recessions. Overall, however, there has been no clear trend in the recent historical data, with tax revenues having averaged 6.22 percent of GCP during the period FY 1981 to FY 2010, quite close to the 6.15 percent figure in FY 2010.

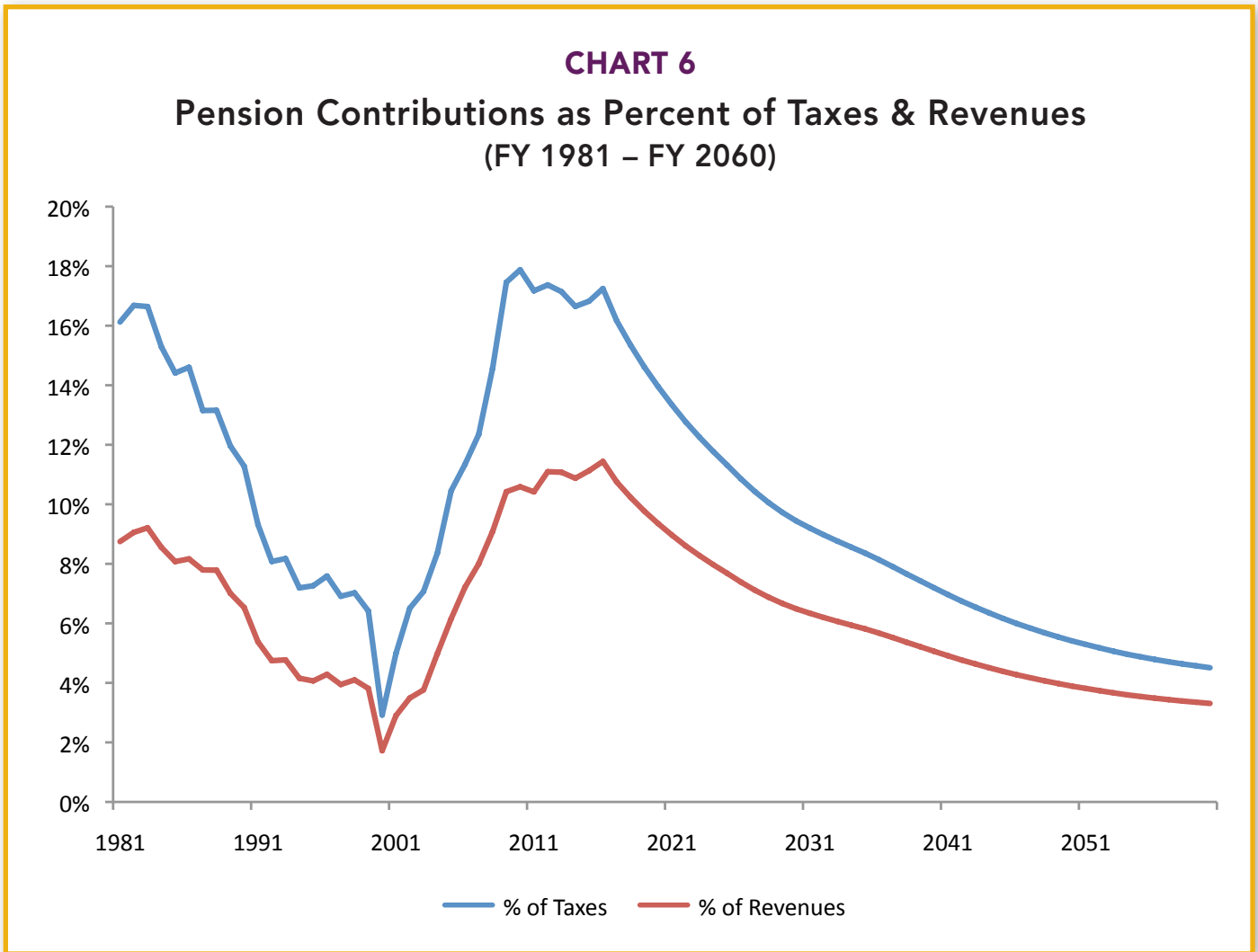
Federal categorical grants, State categorical grants, and City fines, fees for service, and other revenues have all fallen as a share of the City's revenue base. Given the long-term budgetary problems of the federal and state governments, and the anticipated political climate for managing those budgetary problems, we anticipate that those trends will continue.

Over the same period total City revenue (and expenditures) has trended downward, from 12.21 percent of GCP in FY 1981 to 10.39 percent in FY 2010. The differing trend between tax revenue and total expenditures was a result of a greater reliance on own-tax revenue to fund City operations during the past few decades. Federal categorical grants, State categorical grants, City fines, fees for service, and other revenues have all fallen as a share of the City's revenue base. Given the long-term budgetary problems of the federal and state governments, and the anticipated political climate for managing those budgetary problems, we anticipate that those trends will continue. Consequently,

in the forecast years after FY 2015, we assume that federal and state categorical grants to the City will grow at the same real rate they have grown during the FY 1981 to FY 2010 period (0.4 percent and 1.0 percent, respectively), and other City revenues will grow at the same ratio to tax revenues as they have historically. Price inflation in all dollar variables is assumed to be 2.5 percent annually.

⁸ The City is required by law to run a balanced budget, so total revenues and total expenditures are equal. In practice, the City usually records a \$5 million surplus on its final budget accounts.

Chart 6 shows the same declining trend as most other measures of City pension obligations. Pension contributions peak at 17.9 percent of tax revenues in FY 2010 and 11.44 percent of total revenues in FY 2016 and both decline every year after FY 2016. By FY 2060, City pension contributions are projected to be 4.51 percent and 3.31 percent of tax revenues and total revenues, respectively.



Conclusion

This report presents long-term projections of all employer and City contributions to the five pension funds constituting the New York City Retirement System. The projections were made by the Hay Group, based on the firm's actuarial software, and on actuarial assumptions currently used by the City's retirement systems. For analytical perspective, the Hay Group's projections were combined with the New York City Comptroller's projections of the city's economy and tax and other revenues.

The analysis shows that the City's pension contributions will, if no changes are made to existing pension benefits promised to employees, reach a peak dollar amount in FY 2016, will decline for several years, and then will grow slowly through FY 2060. From FY 2016 through 2060, pension contributions will grow at a slower rate than the city's economy, the City's tax revenues, and its total revenues. By FY 2060, pension contributions as a share of Gross City Product, as a share of tax revenues, and as a share of total revenues or expenditures will be at levels below those of the mid-1990s. The primary reason for the declining burden of pension contributions is the phasing-in of new employees who are only eligible, under current law, for pension benefits less costly to the City than those offered to earlier cohorts of municipal workers.

This report makes no judgment about whether the overall level of City pension obligations are too high, whether the decline relative to other variables will be fast enough to accommodate other fiscal objectives, or whether the balance between the current wages of City employees and their deferred wages, in the form of pensions, is appropriate. Also, it does not make a judgment as to what the appropriate rate of return assumption for calculating City contributions to the pension funds should be. Its purpose is to inform discussion of City pension policy with reasonable long-term projections of the cost of existing pension benefits under alternative rate of return assumptions.

The primary reason for the declining burden of pension contributions is the phasing-in of new employees who are only eligible, under current law, for pension benefits less costly to the City than those offered to earlier cohorts of municipal workers.

Appendix





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May 27, 2011

Mr. Ari Hoffnung
Assistant Comptroller for Budget
Chief Policy Officer
The City of New York
Municipal Building
One Centre Street
New York, NY 10007

Dear Ari:

Hay Group is providing certain retirement program consulting services to the Office of the Comptroller (OC) of the City of New York (CONY). A key deliverable of this engagement is to project future annual contributions to the New York City Retirement Systems (NYCRS) under four scenarios, and to provide computations of the Systems' projected funding ratios in future years.

Data

The projections are based on census data for the NYCRS as of June 30, 2008, supplemented with additional data provided to us by the OC. We believe that these data are appropriate for use in these projections.

Methods and Assumptions

The calculation of the statutory employer contribution is substantially similar for each of the NYCRS. Thus, in the discussion that follows, the description of Hay Group's methodology applies to all the Systems. Unless otherwise specified, the methodologies and assumptions used to produce the projections are the same as those used by CONY's Office of the Actuary (OA) to calculate the fiscal year 2010 employer contributions to the NYCRS. The current funding method (Frozen Initial Liability), actuarial asset valuation method (graded six-year smoothing), and actuarial assumptions (with the exceptions of the variations in discount rate, and the addition of future new hires in the census projection) were used for each Scenario listed below, throughout the projection period. These are respectively described in detail in Exhibits A, B, and C.

The projections were performed under the following scenarios:

Scenario 1: "Baseline case": level workforce assumption, current discount rate of 8.0%. In this scenario, we used the City's actual contributions for FY 2010, and followed the City's FY 2012

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Executive Budget Financial Plan for employer contributions from FY 2011 to FY 2015. Contributions calculated for FY 2016 and beyond are based solely on Hay Group projections.

Scenario 2: Increasing workforce assumption – by $\frac{1}{4}\%$ per year from FY 2014, and 8.0% discount rate. In this scenario, contributions match the baseline case projection for FYs 2010 through FY 2015.

Scenario 3: Increasing workforce assumption – by $\frac{1}{4}\%$ per year from FY 2014, and 7.5% discount rate. In this scenario, the FY 2010 and FY 2011 employer contributions match the baseline projection because the earliest any change to the actuarial interest rate can occur is in FY 2012.

Scenario 4: Increasing workforce assumption – by $\frac{1}{4}\%$ per year from FY 2014, and 7.0% discount rate. In this scenario, the FY 2010 and FY 2011 employer contributions match the baseline projection because the earliest any change to the actuarial interest rate can occur is in FY 2012.

The “baseline case” and subsequent scenarios produced sets of estimated projected future contributions for the fiscal years through 2060. The current plan provisions for each of the NYCERS which apply to new entrants were assumed for all future new entrants; these plan provisions are summarized in Exhibits D, E and F. Members in the census as of June 30, 2008 were assumed to continue in their current benefit tier.

Census projections

As the workforce is projected into the future (even under the level workforce assumption), members are assumed to leave the workforce by reason of termination (either vested or non-vested), disability (either accidental or ordinary), service retirement, or death (either accidental or ordinary). As noted in the list of scenarios above, Hay Group was requested to either project the censuses such that the active workforce was either to remain level (Scenario 1) or increase by $\frac{1}{4}\%$ each year beginning at June 30, 2014, so that the first impact of the increasing workforce would occur with respect to contributions calculated for FY 2016 (Scenarios 2, 3, and 4). This means that we needed to add new hires to replace (or more than replace, if the workforce is increasing) those members who exited the workforce. Thus, at each projection year, we created new members (based on the demographics in the assumptions listed below in Exhibit C), and projected each cohort of new entrants into future years, subject to the same probabilities of exiting the workforce as those members in the original census.





Asset projections

Each System's assets were projected into the future assuming that statutory contributions for the fiscal year are paid on January 1st, i.e., the middle of the fiscal year; that employee contributions computed by the valuation program ("expected employee contributions") are deposited on average, at mid-year; that benefit payments computed by the valuation program ("expected benefit payments") are paid to members; and, that no actuarial gains or losses of any kind will occur throughout the projection period. The net impact of this method is that after phasing into the actuarial asset value all the actual asset gains and losses through June 30, 2010, the actuarial asset value will equal the fair market value of plan assets.

Present value of benefits, future salaries and employee contributions

As an initial step, we tested our valuation programs for reasonability. We produced projected benefit payments, annual salaries and employee contributions for each year in the future for only those members who were included in the June 30, 2008 census. These amounts, when discounted back to the valuation date at an 8% assumed interest rate, equaled the present values we produced when we audited¹ the OA's results for each System, thus validating the data and software that forms the basis of this 50-year projection.

The next step was to add the impact of the assumed new entrants in each projection year into the results. Each year's group of new entrants generated its own set of projected benefit payments, salaries and employee contributions, which then were discounted back to the projected valuation date. Adding these results to those based on the original population provided the information needed to project statutory contributions over the 50-year period.

Present value of accumulated benefits

The present value of accumulated benefits ("PVAB") is initially valued in a manner similar to the present value of future benefits ("PVFB"). The PVFB is the discounted value of all future projected benefit payments that are expected to be made to every active member. PVAB discounts all future payments in a similar manner, except that instead of using a projected benefit, the benefit accrued as of June 30, 2008 is used. Future PVAB calculations are performed by indexing from the accrued benefit to the future projected benefit for all members.

¹ Hay Group is currently completing our second biennial engagement to serve as Independent Actuary under Section 96 of the New York City Charter. A key deliverable in that engagement is to audit the Office of the Actuary's calculations of the employer contributions to the NYCERS for FYE 2010. Such an audit involves materially replicating the Office of the Actuary's employer contribution calculations.





Observations

Based on the projections of assets and liabilities under each scenario, for each System, we observed that the funded status (assets divided by liabilities) improves gradually over time.

PVFB

The present value of future benefits, as a measure of plan obligations, may not be entirely appropriate to determine funded status, because it includes the discounted value of benefits not yet earned. The PVFB is the highest measure of plan obligations, and thus would be the most difficult measure against which to achieve a high funded status. If a plan's assets equal or exceed the PVFB under the methodology used to determine the employer contributions to the NYCERS, the contribution (exclusive of expense loads and any amortizations of unfunded actuarial accrued liabilities) would be zero.

PVAB

The present value of accumulated benefits provides a clearer picture of a System's funded status based on benefits earned to date. The projected funded status for each System based on PVAB shows that each System is projected to attain a strong (90+%), but not excessive, funded status in the future.

Other measures of actuarial liabilities

Other measures of actuarial liabilities, such as Entry Age Normal or Projected Unit Credit accrued liabilities, would fall between the PVFB and PVAB. Thus, the projected future funded statuses under these methods would be greater than those using PVFB, and less than those using PVAB.

The detailed results of the projections are shown in Exhibits G thru J. Furthermore, as a reasonableness check of the results, we reconciled the year 50 normal cost rates to sample Entry Age Normal normal cost rates for new entrants calculated by the OA. This reconciliation is shown in Exhibit K.

In Conclusion

The results shown herein depict the funded status of the NYCERS under given plan provisions, methods and assumptions. In general, over the projection period, employer contributions as a percentage of covered salary is projected to decline and the funded status for each of the Systems is projected to improve.

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There are several reasons why the decline in employer contributions as a percent of salary takes place. A key reason for this pattern is the fact that projected new entrants being added into future valuations (as replacements for those members leaving active service) are all assumed to be subject to the most recent (and hence “less expensive”) tier of benefit plan provisions in each System. A second reason for this pattern relates to actuarial losses incurred prior to fiscal year 2011. The funding methodology in use for determining employer contributions to the NYCRS provides a mechanism for amortizing actuarial losses over time. There are historical actuarial losses that are currently affecting the normal contribution rate. However, as these losses are amortized during the projection period, they have less of a pronounced effect on the employer contribution rate.

If you have any questions, or would like to discuss any issue in this report, please contact us. We thank you for allowing us to partner with you on this project.

Sincerely,

Adam Meyers, FSA, EA, MAAA
Vice President

Craig R. Graby, EA, MAAA
Senior Consultant

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Senior Principal

cc: Amitabha Basu
Vadim Shulman, ASA, MAAA





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Exhibit A: Funding Method

The OA, as required by applicable statutes, uses the Frozen Initial Liability (“FIL”) actuarial funding method for determining the annual employer contributions to the Systems. In the general application of the FIL method, employer contributions are the sum of the Normal Cost and amortizations of unfunded actuarial accrued liabilities (“UAAL”) determined under the Entry Age Normal (“EAN”) actuarial funding method. In determining employer contributions to the Systems, the OA adds administrative and investment expenses to the contributions.

The Normal Cost is determined by (i) subtracting the Actuarial Asset Value, the present value of future member contributions, and the unamortized portion of the UAAL from the total present value of benefits¹, and (ii) dividing the difference by a factor that will approximate the average future working lifetime of the active employee population. For pension plans (such as NYCERS) in which benefits are determined by a formula applied to members’ salaries, it is common and appropriate to determine the factor by dividing the present value of future salaries for the current active employee population by that population’s current salaries. This is the procedure being used by the OA in applying the FIL method.

UAALs may be established upon certain events: plan inception, changing the funding method to FIL, and when plan amendments are enacted by New York State law². The “frozen initial” UAAL is calculated as the difference between the EAN actuarial accrued liability and the Actuarial Asset Value as of the date of plan inception, the change in method to FIL, or the reestablishment of the UAAL. When a plan amendment occurs, the UAAL associated with it is the difference in EAN actuarial accrued liabilities before and after the plan amendment. Once the UAAL has been calculated, the length of time over which it is amortized must be established, as must the pattern of amortization. In public sector pension funding, there are no specific guidelines that pertain to the length of the amortization period, but most employers use a period of 30 years or less.³ The pattern of amortization can either be level dollar (much like a fixed-rate mortgage), or can increase annually at some pre-determined percentage.⁴

¹ Though not part of the general application of FIL, the OA also subtracts the discounted value of the previous year’s contribution (due to the one-year lag methodology).

² In the general application of FIL, plan amendments give rise to a UAAL. However, in NYCERS case, the method of amortizing the effect of benefit changes is sometimes specified in the law establishing the benefit change.

³ Before the advent of the Pension Protection Act of 2006, private sector pension plans subject to ERISA funding requirements were required to use a 30-year amortization (level dollar) for changes in UAAL attributable to plan inception, plan changes, and funding method changes. GASB 27, paragraph 10(f)(1) and GASB 25, paragraph 36 (f) (1) state that the maximum amortization period is 40 years, during the first 10 years following the effective date of GASB 25 (which was for periods beginning after June 15, 1996), and then 30 years.

⁴ The percentage increase is usually a rough approximation of estimated future salary increases.





Chapter 85 of the Laws of 2000 reestablished the UAAL as of June 30, 1999, and provided for an amortization period of 11 years beginning with fiscal year 2000, where each annual payment would be 103% of the preceding year's payment. As of June 30, 1999 only FIRE had an unfunded liability, so it was the only System for which a UAAL amortization was established. In the FIRE valuation for fiscal year 2010, the final amortization payment is made.

Chapter 69 of the Laws of 2002 established a UAAL (and the method for amortizing it) as of June 30, 2003 due to the offer of an early retirement incentive to NYCERS, TRS and BERS members. The UAAL was amortized over a 5-year period on a level-dollar basis, beginning in fiscal year 2004, in the valuations for those three Systems. Thus, as of fiscal year 2009, these amounts are fully amortized.

One-Year Lag Methodology

The OA applies a "one-year lag" methodology to calculate the contributions which fund the benefits payable from each System. Under this methodology, the Employer Contribution for FY 20xx is determined based on census and asset data as of June 30, 20xx - 2. Thus, the cost for benefits accruing (the "normal cost") during FY 2009 for new entrants to a System who first appear on the valuation census as of June 30, 2008 is spread, as a level percent of pay, over the remaining expected working lifetime of these new entrants. In effect, since the first contribution (for FY 2009) is skipped for new entrants, higher subsequent contributions are made - during the remaining expected working lifetime of these members - to fully fund the expected cost of future benefits. If all actuarial assumptions are met, the entire cost of an individual's benefit will be fully funded during his or her working lifetime.





Exhibit B: Asset Valuation Method

Effective with the June 30, 2004 (one-year lag) valuation, which was used to determine the fiscal year 2006 employer contributions, the Systems fresh-started the AAVM at June 30, 1999 using the market value of assets. For each fiscal year following June 30, 1999, market values of assets are reconciled from beginning to end of fiscal year. Using the actuarial interest rate as the expected rate of return on System assets, and applying it to the beginning of fiscal year AAV, and the fiscal year’s net cash flow, an expected investment return is computed. The difference between the expected and actual investment returns for the fiscal year is called the “unexpected investment return.” The unexpected investment returns for fiscal years 2000 and later are phased into the AAV over a six-year period, as follows:

Fiscal Year	Cumulative Phase-in Percentage
X (most recent)	15%
X – 1	30%
X – 2	45%
X – 3	60%
X – 4	80%
X – 5	100%





Exhibit C: Actuarial Assumptions

In Scenarios 1 and 2, in each valuation in the projection, the same economic and demographic assumptions used by the OA to perform the FY 2010 valuation were used. In Scenarios 3 and 4, the only assumption that varied from the actuarial assumptions used by the OA was the discount rate, which was varied to 7.5% and 7.0%, respectively.

In projecting the census to future years, we assumed that new employees would enter the workforce for each System. The number of new entrants entering a System for a given year was based on how many active employees exited from active employment based on the demographic assumptions used by the OA in the FY 2010 valuation. We assumed that these future new employees would be:

- Based on actual new entrant demographics for the fiscal year ending June 30, 2008. Summary average demographics are as follows:

	NYCERS	TRS	BERS	POLICE	FIRE
Average Age	37.6	33.1	42.2	26.3	28.2
% Male	57%	23%	28%	83%	99%
Average Salary	\$44,544	\$47,888	\$34,193	\$42,318	\$42,392

- Valued based on the “most recent” tier of benefits (i.e., the tier of benefits current new hires in each System would enter) for their respective System

We did not assume any changes to the plan provisions in the future.

Each System’s assets were projected based on an investment rate of return equal to the discount rate being used in that scenario.

We assumed that each System’s administrative expenses increased by 3% per year. We further assumed that investment expenses would remain level as a percentage of the beginning of year market value of assets.

The “net City contributions” were calculated based on percentages, provided by the OC, applied to each year’s total contribution including administrative and investment expenses.

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Exhibit D: New Entrant Plan Provision Summary - Civilian

Defined Benefit Pension Plan	
Normal Retirement Eligibility	• Age 57 and 5 years of service
Service Retirement Benefits	If < 20 years service: 1-2/3% x FAS-3 x service. If ≥ 20 years service: 2% x FAS-3 x service up to 30 years, plus 1.5% x FAS-3 x service > 30 years.
Early Retirement	Age 55 and 5 years of service
Early retirement reduction	6% per year for ages 60-62, and 3% per year for ages 55-60.
Member Contributions	4.85% of compensation for first 10 years, 1.85% of compensation for 10-29 years, 0% of compensation at 30 and future years
Ordinary Disability Eligibility	10 years credited service.
Ordinary Disability Benefit	Greater of 1/3 x FAS or 1-2/3% x FAS-3 x credited service or Service Retirement Benefits, if eligible for it.
Accidental Disability Eligibility	Job-related accident - immediate EMT Presumptive for HIV, TB, etal5.
Accidental Disability Benefits	Same as ordinary disability above.
Ordinary Death Eligibility	Members who elected Death Benefit 1 receive greater of Death Benefit 1 or Death Benefit 2. Vested with 10 years of service for death benefit after termination before retirement benefit commences

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Defined Benefit Pension Plan	
Ordinary Death Benefits	Death in Active Service: Death Benefit Plan 2: 1-2 years of service = 1 year salary lump sum; 2-3 years of service = 2 years salary lump sum; 3 or more years of service = 3 years salary lump sum. Plus return of accumulated Basic Member Contributions with interest. Plus refund of 1/2 of accumulated Additional Member Contributions.
Accidental Death Eligibility	Immediate
Accidental Death Benefits	50% x last year's earnings or annual wage rate if less than one year. Pension only payable to certain relatives (spouse, children under 25, dependent parents).
Vesting Eligibility	5 years of credited service.
Automatic COLA Eligibility	Service and disability pensioners, and their surviving spouses. COLA applies to (1) pensioners who are at least age 62 and have been retired for at least 5 years; (2) pensioners who are at least age 55 and have been retired for at least 10 years; (3) disabled pensioners who have been retired for at least 5 years; and (4) beneficiaries receiving accidental death benefits who have been receiving them for at least 5 years.
Automatic COLA Benefit	COLA is 50% of the increase in the CPI-U based on the year ending March 31, rounded to the next higher .1%, not less than 1% nor greater than 3%, of the first \$18,000 of maximum retirement allowance. Surviving spouses of retirees who elected a joint-and survivor option receive one-half of the COLA.

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Exhibit E: New Entrant Plan Provision Summary - Teachers

Defined Benefit Pension Plan	
Normal Retirement Eligibility	<ul style="list-style-type: none"> • Age 55 and 27 years of service • or Age 62 and 10 years of service
Service Retirement Benefits	If < 20 years service: $1-2/3\% \times \text{FAS-3} \times \text{service}$. If ≥ 20 years credited service: $2\% \times \text{FAS-3} \times \text{service}$ up to 30 years, plus $1.5\% \times \text{FAS-3} \times \text{service} > 30$ years.
Early Retirement	Age 55 and 10 years of service
Early retirement reduction	6% per year for ages 60-62, and 3% per year for ages 55-60.
Member Contributions	4.85% of compensation for first 27 years, 1.85% of compensation after 27 years
Ordinary Disability Eligibility	10 years credited service.
Ordinary Disability Benefit	Greater of $1/3 \times \text{FAS-3}$ or $1-2/3\% \times \text{FAS-3} \times \text{credited service}$. If eligible for service retirement, choice of either disability benefit or service retirement benefit.
Accidental Disability Eligibility	Job-related accident - immediate
Accidental Disability Benefits	$2/3 \times \text{FAS-3}$.
Ordinary Death Eligibility	Members who elected Death Benefit 1 receive greater of Death Benefit 1 or Death Benefit 2. Vested with 10 years of service for death benefit after termination before retirement benefit commences.

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Defined Benefit Pension Plan	
Ordinary Death Benefits	<p>Monthly salary x years service (not > 36) plus balance in Annuity Savings Fund. If eligible for unreduced retirement: Greater of above or reserve for service retirement which would have been payable if retired on the day before death.</p> <p>Death Benefit 2 - 1 x salary for each year of completed service up to three years, plus balance in Annuity Savings Fund. Reduced by 5% per year after age 60.</p>
Accidental Death Eligibility	<p>Immediate.</p> <p>Benefits given to survivors of employees killed in military service if member had been on payroll within 12 months.</p>
Accidental Death Benefits	<p>Benefits</p> <p>Pension = 50% x last year's earned wages. Pension only payable to certain relatives (spouse for life or until remarriage, minor children under age 25, dependent parents for life, any other dependent until age 21).</p>
Vesting Eligibility	10 years of credited service
Automatic COLA Eligibility	<p>Service and disability pensioners, and their surviving spouses. COLA applies to (1) pensioners who are at least age 62 and have been retired for at least 5 years; (2) pensioners who are at least age 55 and have been retired for at least 10 years; (3) disabled pensioners who have been retired for at least 5 years; and (4) beneficiaries receiving accidental death benefits who have been receiving them for at least 5 years.</p>

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Defined Benefit Pension Plan	
Automatic COLA Benefit	COLA is 50% of the increase in the CPI-U based on the year ending March 31, rounded to the next higher .1%, not less than 1% nor greater than 3%, of the first \$18,000 of maximum retirement allowance. Surviving spouses of retirees who elected a joint-and survivor option receive one-half of the COLA.

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Exhibit F: New Entrant Plan Provision Summary - Uniformed

Defined Benefit Pension Plan	
Normal Retirement Eligibility	22 years of service
Service Retirement Benefits	50% x FAS-3 At age 62, benefit is reduced by 50% of Primary Social Security Benefit attributable to all City Service. The dollar amount of reduction stays frozen for future years.
Early Retirement	20 years of Police or Fire allowable service or attainment of age 62
Early retirement reduction	4% per year for service less than 22 years (i.e - 50% of FAS-3 becomes 46% at 21 years of service and 42% at 20 years of service
Member Contributions	3.0% of compensation for 25 years
Ordinary Disability Eligibility	5 years of City service and be eligible for Social Security Disability.
Ordinary Disability Benefit	33-1/3% of FAS-3 or 2% of FAS-3 times years of police or fire service (not more than 22 years), less 50% of the Primary Social Security Disability benefit (based on City service) and less 100% of Workers Compensation benefits.
Accidental Disability Eligibility	In the line-of-duty - immediate. Presumptive eligibility for diseases of the heart, lung, HIV, TB and various cancers.
Accidental Disability Benefits	2% of FAS-3 times years of police or fire service projected at full Escalation date (not in excess of 22 years), less 50% of the Social Security Disability Benefit attributable to City service less 100% Workers' Compensation benefits.

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Defined Benefit Pension Plan	
Ordinary Death Eligibility	<p>90 days service for death in active service (gets return of accumulated contributions, if dies earlier).</p> <p>Vested with 10 years of service for death benefit after termination before retirement benefit commences.</p>
Ordinary Death Benefits	<p>Death in active service equal to 3 x final year salary, raised to next highest multiple of \$1,000, plus return of member accumulated contributions.</p> <p>If death occurs after age 61, death benefit reduced to 90% of such and 10% reduction/yr thereafter (minimum death benefit is 10% of above amount).</p>
Accidental Death Eligibility	<p>(1) In the line-of-duty - immediate</p> <p>(2) Dies on active military duty for other than training purposes.</p>
Accidental Death Benefits	<p>NY State benefit – Pension to surviving widow(life) or children(until 18 or 23 if students) = 100% x final yr's salary offset by NYC accidental death benefit, Social Security and Workers' Compensation death benefits. Subject to annual 3% COLA (applied to 100% of final salary before offset). May not be payable if NYC benefit paid is the Death Gamble for Ordinary death.</p> <p>POLICE (City benefit): Pension equal to 50% x FAS3. Pension only payable to certain relatives (spouse, minor children, dependent parents).</p>
Vesting Eligibility	5 years of qualifying service
Automatic COLA Eligibility	<p>Service and disability pensioners, and their surviving spouses. COLA applies to (1) pensioners who are at least age 62 and have been retired for at least 5 years; (2) pensioners who are at least age 55 and have been retired for at least 10 years; (3) disabled pensioners who have been retired for at least 5 years; and (4) beneficiaries receiving accidental death benefits who have been receiving them for at least 5 years.</p>

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Defined Benefit Pension Plan	
Automatic COLA Benefit	COLA is 50% of the increase in the CPI-U based on the year ending March 31, rounded to the next higher .1%, not less than 1% nor greater than 3%, of the first \$18,000 of maximum retirement allowance. Surviving spouses of retirees who elected a joint-and survivor option receive one-half of the COLA. Members receive the greater of the applicable increase from COLA or Escalation.
Annual Escalation	Annual Escalation on "maximum" retirement allowance (1) in full, if retired for service after completing 25 or more years of police or fire service (or elected to defer commencement of benefit to that 25-year date) or on a reduced basis, by 1/36 for each month that their retirement precedes 25 years or (2) in full, of they have retired for disability or (3) in full, to their beneficiary for accidental death benefits. Escalation begins after retirement on "maximum" pension then on reduced amount after 50% SS offset and is compounded. Escalation is paid in April and is determined from the change in the CPI-U based on the prior year ending December 31, not greater than 3% and nor less than -3% in the event of a decrease. Members receive the greater of the applicable increase from COLA or Escalation.

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Exhibit G: Projection Results - Scenario 1

“Baseline case”: level workforce assumption, current discount rate of 8.0%

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Exhibit H: Projection Results - Scenario 2

Increasing workforce assumption – by ¼% per year from FY 2014, and 8.0% discount rate

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SUSTAINABLE OR NOT? NYC PENSION COST PROJECTIONS THROUGH 2060

Projection Using 8.00% Interest and 0.25% Increasing Employee Population
 FIRE Pension Fund Projections
 (\$ in millions)

Fiscal Year	Statutory Employer Normal Contribution	Administrative Expense Contribution	Investment Expense Contribution	Total FIRE Pension Fund Contribution	Total Contribution as Percent of Salary	Net City Contribution to FIRE	Employee Contributions as of June 30	Market Value of Assets as of June 30	Actuarial Value of Assets	Present Value of Future Benefits	AVA P/B	Present Value of Accumulated Benefits	AVA P/B	Active Count	Closed Group Active	New Active	Service Retirement	Ordinary Disability	Accidental Disability	Inact & Term Vested
2010	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2011	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2012	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2013	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2014	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2015	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2016	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2017	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2018	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2019	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2020	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2021	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2022	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2023	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2024	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2025	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2026	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2027	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2028	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2029	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2030	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2031	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2032	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2033	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2034	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2035	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2036	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2037	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2038	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2039	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2040	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2041	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2042	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2043	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2044	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2045	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2046	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2047	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2048	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2049	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2050	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2051	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2052	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2053	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2054	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2055	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2056	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2057	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2058	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2059	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	
2060	\$825.7	\$0.0	\$24.9	\$850.6	83.1%	\$825.7	\$6,813.0	\$6,813.0	\$5,193.8	46.7%	\$12,002.2	54.8%	11,574	11,574	0	7,966	1,284	814.9	85	

Assumptions:
 - Projections are based on June 30, 2008 data and assumptions.
 - Projections have been adjusted to reflect known asset, liability, and population adjustments through June 30, 2011.
 - Population is assumed to grow 1.0% of 1.5% per year.
 - New plans have been reflected for expected new entrants (Fire 3 FIRE).
 - New entrant populations are assumed to have the same characteristics as the population that entered the plan during FY 2008.
 - Investment returns are assumed to be 8% per year in the future, producing no future gains or losses in the smoothing method.
 - Administrative expenses are expected to increase 3% over prior year (does not apply to FIRE).
 - Investment expenses are assumed to be a fixed percent of assets ranging from 0.4% to 0.6% depending on the System.
 - The Net City Contribution is assumed to be 100% of the Total Pension Fund Contributor.





Exhibit I: Projection Results - Scenario 3

Increasing workforce assumption – by ¼% per year from FY 2014, and 7.5% discount rate

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Exhibit J: Projection Results - Scenario 4

Increasing workforce assumption – by ¼% per year from FY 2014, and 7.0% discount rate

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Exhibit K: Reconciliation of Projection Results to EAN Rates

**Analysis of Baseline 50-year Projection (8% and Static Employee Population)
Reconciliation of Projected Normal Cost Rates to Entry Age Normal Rates**

	NYCERS	TRS	BERS	POLICE	FIRE
2060 Total Contribution as a Percent of Salary	11.54%	14.58%	12.94%	24.82%	26.04%
Entry Age Normal Rate (35 year old Female)*	7.45%	7.53%	7.95%	N.A.	N.A.
Entry Age Normal Rate (25 year old Male)*	N.A.	N.A.	N.A.	13.33%	11.67%
Differences	4.09%	7.05%	4.99%	11.49%	14.37%

Differences Explained by:

Administrative and Investment Expenses	3.21%	3.27%	3.17%	5.09%	3.65%
Residual of 2011 Unfunded	0.00%	4.60%	1.00%	3.90%	5.10%
Lag Valuation Method	0.90%	1.01%	1.04%	1.86%	2.03%
Actual Differs from EAN Rate Age/Gender	0.30%	-0.40%	1.46%	-0.10%	0.35%
VSF	0.20%	N.A.	N.A.	1.75%	1.50%
Transit, Sanitation, & Corrections	0.53%	N.A.	N.A.	N.A.	N.A.
Total Explained	5.14%	8.48%	6.67%	12.50%	12.63%
Other	-1.05%	-1.43%	-1.68%	-1.01%	1.74%
Differences	4.09%	7.05%	4.99%	11.49%	14.37%

Average Age	37.6	33.1	42.2	26.3	28.2
% Male	57%	23%	28%	83%	99%

Notes:

For "Actual Differs from EAN Rate Age/Gender" BERS and NYCERS are extrapolated since the average age was greater than 35

* Source of Entry Age Normal rates was letter from the Office of the Actuary to Mr. Andrew G. Dowling dated February 4, 2011, page 16



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