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Why City Pension Problems Have Not Improved, and a Roadmap Forward

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This paper studies the evolution of city-level pension liabilities over the period 2009-2013 for ten large U.S. municipalities: New York City, Los Angeles, Chicago, Houston, Philadelphia, Jacksonville, San Francisco, Baltimore, Boston, and Atlanta. Despite increases in public equity valuations of around 75 percent over this time period and public attention called to pension reform, the difference between liabilities under governmental accounting measures and the market value of assets fell by an average of less than 2%. Implementing a market value of liability (MVL) approach that values liabilities using bond yields rather than expected returns on assets, unfunded liabilities rose in all ten cities, and the total rose by 40%, from $277 billion to $359 billion. I provide a roadmap of policy options to address city-level pension imbalances in light of the fact that pension liabilities have continued to grow despite an environment of very robust returns on pension fund assets.

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In the aftermath of the 2009 financial crisis, large unfunded pension liabilities emerged in the reported accounts of U.S. state and local governments. Studies by the Pew Charitable Trust, among other sources, estimated that the unfunded liabilities were around $1 trillion at the state level and around $100 billion at the city level (Pew Charitable Trust (2010), Pew Charitable Trust (2013)). Using default-free discounting procedures consistent with the principles of financial economics, and relying on market values (as opposed to smoothed actuarial value) of assets, Novy-Marx and Rauh (2011a, 2011b) calculated considerably larger unfunded state pension liabilities of $2.5 trillion and unfunded city and county liabilities of $574 billion. Furthermore, while these mark-to-market gaps had widened during the financial crisis, they existed even before the 2008 downturn in equity markets (Novy-Marx and Rauh (2008)).

Since 2009, there have been dramatic recoveries in the valuations of the stock market and other risk asset classes such as private equity and real estate. Indeed, the S&P 500 rose in value by 75 percent over this period and most pension funds achieved annualized returns of well over their assumed rates of return, which were in the range of 7.5 to 8.5 percent per year. Some cities and states undertook reforms to their pension benefit structures and received considerable media attention for doing so, notably the state of Rhode Island, and the cities of San Diego, San Jose and Atlanta. Given these structural and market changes, one would assume the typical local government's unfunded liability would have seen substantial reductions.

This paper's first goal is to provide updated analysis of city-level pension liabilities for ten cities: New York City, Los Angeles, Chicago, Houston, Philadelphia, Jacksonville, San Francisco, Baltimore, Boston, and Atlanta. I compare the financial situation of these systems in 2009, directly after the financial crisis, with their situation in 2013 after several years of rapid recovery both in financial markets and in local government revenues.

Using liability measurements from the pension systems themselves, which are prepared under Governmental Accounting Standards Board (GASB) techniques, I find a growth in the absolute level of unfunded pension obligations for four out of the ten cities (New York City, Chicago, Jacksonville, and Philadelphia). For the remaining cities, improvements were modest, with the total unfunded liability using

GASB standards falling by an average of 16 percent.[1] This is remarkable as the assets of all the systems are heavily invested in risk assets which enjoyed a dramatic resurgence in value over the 2009 to 2013 period. The salutary effects of these strong investment returns were offset as liabilities continued to rise and benefit payments continued to outstrip contributions. This rise in liabilities is equally remarkable, given that public pension liabilities have been a central theme of public discourse in many cities for the past several years.

Furthermore, using an approximate market value of liability (MVL) approach, based on Novy-Marx and Rauh (2011a, 2011b), I estimate that unfunded accumulated pension obligations have grown in all ten of the cities. The MVL approach uses the yield on default-free assets to value pension obligations arising from past service as a non-defaultable government bond. The deterioration since 2009 has occurred as interest rates in the Treasury bond market have continued to decline. The MVL approach recognizes that the cost of providing guaranteed fixed benefits rises as interest rates on safe securities fall. In other words, if we treat the pension benefits as non-defaultable – hence not crediting cities for their option to default on pension obligations – the burden of paying public employee pensions has grown larger for every government in the study.

Unfunded liabilities using GASB standards fell by an average of only 1.7 percent, equally weighted across cities. Total unfunded liabilities for the ten cities under GASB standards rose from $125 billion to $131 billion. Under the MVL approach, unfunded obligations have increased by an average of 37 percent over this time period. Total unfunded liabilities under MVL standards rose from $277 billion to $359 billion, or by 40 percent.

If the liabilities of the rest of the state and local government universe rose by a similar percentage point count, total unfunded liabilities on an MVL basis would have grown from $3.1 trillion (Novy-Marx and Rauh (2011a, 2011b)) to well over $4 trillion during this time period.

In light of the fact that unfunded liabilities have grown even during an extremely robust period for equity markets, combined with a time where local governments were under pressure to reform their systems, the final section of this paper outlines some of the policy options available to cities. I divide the possibilities into three categories: changes to benefit structures that would comprise a long-term solution to unfunded public pension liabilities; parameter changes that would preserve the basic structure of local pensions and have long-term effects on state and local budgets but would not by themselves be sufficient to put local governments on a sustainable budgetary path; and changes that require employees to pay more into the pension system, which I argue will almost invariably be insufficient to address the growing unfunded liabilities.

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[1] Boston was excluded from this calculation as the data were only available through January 1, 2012.

If unfunded pension obligations continue to grow, the affected cities and states might ultimately attempt to call on the Federal government for assistance. In light of this possibility, I discuss several possible options available to the Federal government to address the problem of unfunded state and local government liabilities. One goal of such actions would be to protect the interests of taxpayers in localities that do not suffer from large unfunded pension obligations. Another goal would be provide incentives for local governments to reform pension systems. Such incentives may currently be lacking. Citizens may be unable to monitor and act collectively against poor government fiscal management, and city politicians may not internalize the fact that relying on the performance of risky assets to make good on pension promises carries large downsides for taxpayers. Federal measures consistent with these goals would increase transparency or provide incentives for good fiscal behavior.

Some observers have suggested the establishment of a new federal insurance agency, akin to the Pension Benefit Guaranty Corporation (PBGC) that backstops corporate defined-benefit (DB) pensions. I argue that if the PBGC experience is a guide, such a system might initially reduce unfunded liabilities but is likely to shift more long-term risks onto Federal taxpayers.

I conclude with the prediction that most systems will continue to hope for high equity returns and an increase in interest rates, while politicians will likely fight battles around the first-step reforms. If the bull market in equities resumes and continues, the financial status of the pension systems will be either stable or only slowly deteriorating, buying time for states and localities. Downturns or stagnation in equity markets will pressure systems, and cities may attempt to increase revenue to pension systems by raising taxes and cutting services. How robust state and local tax bases will be to these changes remains to be seen and is an important area for further research.

Data and Sample

Table 1 lists the ten systems analyzed in this paper. To select these systems, I began with the five most populous cities in the United States in 2013: New York City, Los Angeles, Chicago, Houston, and Philadelphia. I added to them five cities that in Novy-Marx and Rauh (2011b) were identified as distressed due to the high ratio of benefit payouts to assets: Atlanta, Baltimore, Boston, Jacksonville, and San Francisco.[2] Other possible candidate cities to be analyzed on the basis of distress in Novy-Marx and Rauh (2011b) that were excluded were Cincinnati (not enough data), Detroit (in bankruptcy), and the St. Paul Teachers Association Pension Fund (school district only).

For the cities in question, I collected data from Comprehensive Annual Financial Reports (CAFRs) for the years 2009 to 2013 for all the major pension systems for which the city government and closely-related entities are fiscally responsible. For some cities, such as Philadelphia and San Francisco,

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[2] Atlanta was not analyzed in Novy-Marx and Rauh (2011b) due to insufficient data at the time.

the pensions of municipal employees are consolidated into one system. In most of the cities, there is more than one system covering city employees. For example, for the city of Los Angeles I analyze the Los Angeles City Employees Retirement System (LACERS), the Los Angeles Fire and Police Pension Fund (LAFPP), and the City of Los Angeles Water and Power Employees' Retirement system. The study comprises a total of twenty-eight city pension systems.

Two important caveats arise that make comparability of the pension liabilities across cities challenging. The first regards schoolteachers' pensions. In New York City and Chicago, there are separate retirement funds for the teachers in the school districts covered by these cities, namely the Chicago Teachers Pension Fund and the Teachers' Retirement System of the City of New York. In the other cities, schoolteachers are covered by state-level plans. For example, teachers in the Los Angeles Unified School District are covered by the California State Teachers Retirement System (CalSTRS), teachers in Philadelphia public schools are covered by the Pennsylvania Public School Employee Retirement System, and teachers at Houston public schools are covered by the Teachers Retirement System of Texas. In the case of Boston, there is a pension system for Boston teachers, but the Commonwealth of Massachusetts is responsible for its unfunded liabilities (Bachman et al (2013)).

In this study, I include systems that are legally supported by the taxpayers of the cities themselves. For complete comparability, the share of state teachers' pensions that city taxpayers ultimately have to fund would have to be imputed to the city. That is, because taxpayers in Los Angeles, Boston, and Houston represent a large share of the tax bases of their respective states, the taxpayers in these cities are also responsible for their pro rata share of state-level unfunded pension liabilities.

The second caveat regards county retirement systems. The cities of Atlanta, Baltimore, Chicago, and Los Angeles are all situated in counties whose governments also sponsor DB plans. However, these counties encompass a different group of taxpayers than the affiliated cities. For example, Cook County comprises Chicago but also a number of suburban areas with substantial tax bases. I do not aggregate the county pension liabilities with the city liabilities. Other relevant counties not included in the analysis in this report are the counties of DeKalb (overlapping with on part of Atlanta), Fulton (also overlapping with Atlanta), Baltimore County, and Los Angeles County.

The main pension variables used in this study are membership (active, separated/vested, and retired), actuarial accrued liabilities, the discount rate used to measure liabilities, the market value of plan assets, salaries and payroll, contributions (city, employee, and other), and the actuarially required contribution (ARC). In addition to these variables, which come from the pension system CAFRs, I also collected data from two additional sources. First, I collected city and county population for 2009 to 2013 from U.S. Census Bureau data, as well as the average number of people per household in each city as of the latest decennial census (2010). Second, I collected data on total revenue, total own revenue, and tax

revenue from the CAFRs of the cities themselves, as opposed to the pension systems. I define total own revenue as all general fund revenue excluding transfers from higher levels of government. Tax revenues consist of own revenue arising from taxes only, excluding fees for public services.

In order to get a harmonized view of the systems, some data items for 2013 for some plans were imputed based on their previous year's values and the average growth rates of these data items for the other plans in the sample.

Table 2 provides summary statistics on these items, specifically the mean, minimum, maximum, and total of the pension variables at the plan level. The plans analyzed cover 1,188,552 members[3], of which 619,604 (or 52 percent) are active and 543,815 (or 46 percent) are retired. The remaining members are no longer employed with the city but have left with a vested benefit that they have not yet begun to claim. The total actuarial liabilities of these plans were $357 billion as of 2013, backed by assets with a total market value of $226 billion, for a total unfunded liability using GASB standards of $131 billion. The mean discount rate used for actuarial discounting purposes was 7.7 percent with a range of 7.0 to 8.5 percent. The mean percentage of the employer ARC that plans contributed was 84.7 percent, with a range of 18.1 (Chicago Municipal) to 124.3 percent (Chicago Metropolitan Water District).

As of 2013, these plans were collectively 63.4 percent funded, with plans paying out 9.2 percent of assets as benefits per year and paying in 7.1 percent in contributions. However, there is some skewness to these statistics. The equally-weighted mean funding ratio across the 28 plans is 61.8 percent, and the equally-weighted mean ratio of benefits paid to assets is 10.2 percent, with 7.3 percent paid in as contributions.

Evolution of Assets and Liabilities (2009-2013)

Figure 1 shows the evolution of total liabilities under GASB standards, total market assets, and the difference (or funding status) for the twenty-eight plans in the sample. As the figure shows, these plans had $157 billion of assets in 2009 and $226 billion of assets in 2013, for a 5-year growth rate of 44 percent. Total liabilities grew from $281 billion to $357 billion, or a 5-year growth rate of 27 percent. Because the liabilities were starting from a much higher baseline level, the fact that assets grew more quickly did not erode the unfunded liability at all. In fact, the unfunded liability (or gap between assets and liabilities) grew from $125 billion in 2009 to $131 billion in 2013, an increase over the 5-year period of 5 percent.

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[3] For comparison, this is around half of the 2,042,253 members covered in the 77 cities and counties analyzed in Novy-Marx and Rauh (2011b).

This is an important principle of asset-liability management. If liabilities are larger than assets, then even if assets grow at a faster rate than liabilities, the gap between assets and liabilities might nonetheless increase.

One factor that contributed to the increase in liabilities was that some systems marginally lowered their discount rates. The sample liability-weighted average discount rate fell from 8.0 percent in 2009 to 7.4 percent in 2013. For example, the city of New York employed a discount rate of 8 percent through 2009 and lowered it to 7 percent for the years 2010 and afterwards, the lowest rate used by systems in this study.[4] Not all funds reduced the discount rate, however. The three pension funds from the city of Houston all still used an 8.5 percent discount rate in the 2013 actuarial reports. Without changes to discount rates, total liabilities would have been around $25 billion lower[5], but these totals would still have grown by 17 percent. Lower discount rates therefore accounted for approximately one-third of the increase in liabilities.

Figure 2 shows total per-capita unfunded liabilities for the ten cities in the sample, with the liabilities measured at GASB discount rates. The top graph shows the results for the five largest cities. At the top of the graph is Chicago, with unfunded liabilities according to the accounting methodologies used in the systems' own reports of $21,671 per household in 2009, rising to $28,472 per household in 2013. New York City had a very similar level of unfunded liabilities per capita to Chicago in 2009, at $21,264, rising slightly to $21,430 in 2013. Under governmental accounting, Philadelphia's unfunded liabilities remained steady at around $9,000 per household through this period. Houston ended fiscal 2013 with unfunded liabilities of $4,350 per household having improved by around $1,000 from fiscal 2009. Los Angeles showed the most improvement on the measures that use GASB discount rates, with unfunded liabilities declining from $9,200 per household to $7,000.

The bottom graph shows unfunded liabilities per household calculated under GASB standards for the five smaller cities in the sample. San Francisco showed the greatest improvement on these measures, with stated unfunded liabilities falling from around $13,000 per household to around $9,000 per household. Atlanta and Baltimore showed modest improvement as well, while Jacksonville and Boston deteriorated.

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[4] Nonetheless, the *New York Times* reported the following quote from Mayor Michael Bloomberg: "The actuary is supposedly going to lower the assumed reinvestment rate from an absolutely hysterical, laughable 8 percent to a totally indefensible 7 or 7.5 percent." http://www.nytimes.com/2012/05/28/nyregion/fragile-calculus-in-plans-to-fix-pension-systems.html?_r=3&hp&

[5] As explained in Section III, the exact change in liability for a change in discount rate can be approximated using the duration (or weighted average maturity) of the pension liabilities. For a 14-year duration, for example, the $356 billion in total liabilities in 2013 would under the lower discount rate be worth $(356.5)*(1.074)^{14}/(1.080)^{14} =$ $329.8, or $27 billion less. For a 12-year duration, replacing the 14-year exponentiation with 12-years, it would be $23 billion less. Due to convexity, the actual decrease in value for the higher rate is actually less than what is implied by the duration approximation.

Figure 3 shows how flows (benefit payments and contributions) have evolved for the ten cities in the sample. Total benefit payments have increased from $17.0 billion to $20.9 billion. Total contributions have increased from $12.0 billion to $16.0 billion. So both total benefit outflows and total contribution inflows to the funds have increased by around $4 billion per year. $3.5 billion of the $4 billion contribution increases have come from the city governments themselves, while the employee contributions increased by $0.5 billion. In total, increases in contributions have been consumed by increases in benefits.

Another way to examine whether these increased contributions reflect improved funding discipline is to examine how city contributions compare to those recommended in the actuarial valuations. Figure 4 shows city pension contributions as a share of actuarially required payments for a somewhat larger sample of eighteen cities during the period 2000 to 2012. During the time period 2000 to 2008, there is a downward trend in the percent of the ARC that the cities paid. From 2008 to 2012, the trend is mostly flat. On average over the eighteen cities, around 83 percent of the ARC was paid in 2012. Weighting by liabilities, the average was 78 percent of the ARC. So while contributions have increased, the percent of actuarially required contributions has not increased.

Three caveats apply to the analysis so far. First, the present value of unfunded liabilities is a measure of the debt a city effectively has on its balance sheet, but does not reflect how quickly the city will face strong liquidity demands from the pension fund. Second, different cities have different revenue bases, and so they may be differentially equipped to make payments and deal with unfunded liabilities. Third, the discount rates used in the liability measures incorporated above rely on GASB discount rates. To obtain an economically valid measure of liabilities, the liabilities must be discounted at rates that reflect the fact that they are guaranteed to be paid regardless of asset returns.

Market Valuation of Liabilities (2009-2013)

The market value of liabilities (MVL) reflects the true financial cost or value of the pension benefit as of the date of measurement. That is, it is a valuation that represents the cost of buying (deferred) annuities for employees to cover all pension benefits earned by the workforce up until today.

There are two steps to converting a typical city actuarial accrued liability (AAL) into an MVL that reflects the true financial value of the promise. First, the actuarial liability concept usually includes some benefits that employees have not yet earned through their years of service to date. Since the idea of the MVL is that it would pay only pensions earned to date, the AAL must be reduced by the amount of future-earned benefits reflected in the measure. Second, cities measure the AAL using a discount rate that is set at their "expected return" on plan assets, as opposed to a discount rate that reflect the relative safety of a secure benefit.

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To adjust the actuarial standard, I begin by determining that the actuarial measure of accrued liabilities is in all but four cases provided under the Entry Age Normal (EAN) standard. In the remaining 4 instances (Chicago Teachers, Chicago Transit Authority Pension Fund, Baltimore City Fire and Police, and Houston Police) it is provided under the Projected Unit Credit (PUC) standard. As detailed in Novy-Marx and Rauh (2011a), the liability measurement standards differ in the extent of future pension accruals that they reflect in the accrued actuarial liability measure. The narrowest possible definition of liabilities is the Accumulated Benefit Obligation (ABO), which reflects only benefits earned based on employees' service and salary up to the date of measurement. Financial economists generally favor an ABO measure which they then compare to the assets on hand to determine a "termination" funding status. That is, comparing the assets set aside today to the present value of benefits that have been earned up until today.

To conduct a precise conversion from the stated measure (EAN or PUC) to ABO, one needs a full model of the cash flows arising from the benefit promise, as provided in Novy-Marx and Rauh (2011b). In Novy-Marx and Rauh (2011b), cash flows for each city fund are reverse engineered based on data available through 2009 regarding the fund's stated liabilities, discount rate, and actuarial assumptions.

In this paper, I rely on the plan-specific ratio of the stated measure to the ABO that was calculated for the sample plans in Novy-Marx and Rauh (2011b). That is, for plans that use the EAN measure and PUC measure, I respectively take the ratio of the ABO to the EAN or PUC in the data that underlie the Novy-Marx and Rauh (2011b) analysis. On average, the termination liability (ABO) is 12 percent lower than the stated liability, with a range of 5 to 18 percent.

In undertaking a market valuation, ABO liabilities must be valued using the principles of financial economics. Unless one wants to credit the local government for their option to default on pension benefits, such a valuation requires the use of a default-free rate. A precise re-discounting would use the entire stream of cash flows, as in Novy-Marx and Rauh (2011b) and use horizon-specific default-free discount rates for each cash flow. The calculations performed here are approximations based on the duration of the liability, which is estimated to be around 14 years (Novy-Marx and Rauh (2011a)).

Specifically, the calculation implemented to derive the liability at Treasury rates is

$$L_{Treasury} = L_{Expected\ Return} \left(\frac{1 + E[R]}{1 + r_{Treas,T}} \right)^T$$

where $L_{Treasury}$ is the liability recomputed using the Treasury rate, $L_{Expected\ Return}$ is the liability stated in the system's reports using the expected return, $E[R]$ is the expected return on assets used by the system, T is the duration of the pension liabilities, and $r_{Treas,T}$ is the point on the Treasury yield curve at horizon T.

Table 3 shows Treasury yields at the 10-year and 20-year horizon, from the Federal Reserve daily yield curve website, as of June 30th of each year. A 14-year yield is constructed as a weighted average of

the 20-year and 10-year yields, specifically 40 percent times the 20-year yield plus 60 percent times the 10-year yield.

The first two columns in Table 4 show unfunded liabilities under the GASB assumptions and unfunded liabilities using the MVL approach (called UMVL). Note that for cities where the stated liabilities are somewhat closer to stated assets, such as San Francisco and Los Angeles, the difference between the UAAL and the UMVL will be larger than cities where the stated liabilities are already quite far from stated assets (e.g. Chicago).

The right two columns show the UMVL as a share of 2013 total city own general fund revenue and 2013 total city general fund tax revenue. Chicago tops the list with the UMVL amounting to over 10 years of city revenue. Jacksonville, Houston, and Los Angeles[6] are all around 7 times revenue, followed by Atlanta, San Francisco, Philadelphia, and Baltimore in the 4 to 6 times range. New York City has the largest absolute UMVL in the sample of $182 billion, but this is less than 3 times the revenue base. Boston also has unfunded liabilities less than 3 times revenues, in large part because the financial responsibility for the unfunded Boston teachers pensions has been transferred to the Commonwealth of Massachusetts.

It is also useful to examine the flow of resources into and out of pension systems. The first two columns of Table 5 show contributions, in dollar terms and as a percent of own revenue. Jacksonville, Philadelphia and Los Angeles pay in 19 to 20 percent of the general fund budget excluding intergovernmental transfers.[7] San Francisco, New York City, and Atlanta are contributing around 15 percent of that budget. Notably, Chicago is only contributing 11 percent, which in part explains why its unfunded liabilities have grown so rapidly.

Table 5 also shows benefit payments by city, in dollar terms and scaled by total pension assets or percent of own revenue. The scaling by total pension assets illustrates which funds are paying out the largest percentage of fund assets per year, specifically Philadelphia at around 17 percent and Chicago at around 14 percent. The final column can be thought of as indicating what percent of general fund revenues would have to go toward paying pensions if the funds ran out of money – almost half in Chicago's case.

Figure 5 shows unfunded liabilities per household at Treasury rates. These graphs can be considered in parallel with those in Figure 2. The top graph shows the five largest cities in the sample. Both Chicago and New York City began the sample period with around $46,000 per household of

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[6] Note that this includes the Los Angeles Water and Power Department pension liabilities, with the operating cash flow of the department included in the denominator as revenues.

[7] Tatum (2013) finds 18% excluding the Los Angeles Power and Water Department Pension.

unfunded liabilities. In 2013, Chicago had risen to almost $66,900 per household and New York City to $55,600 per household. Other cities show similar patterns of increase.

The factor that makes these graphs different from Figure 2 is the discount rate, which is applied year-by-year. So the fact that rates were much lower in 2012 and 2013 than in 2009 affect these calculations. This highlights one of the features of the MVL calculation, namely that it reflects the fact that pension obligations are more expensive to meet as interest rates fall.

In sum, while total unfunded liabilities on an actuarially measured basis have remained about flat over the sample period of 2009 to 2013, total unfunded liabilities measured using the principles of financial economics have increased, as the decline in interest rates has made pension promises more expensive to deliver.

Roadmap Forward

In this section, I provide a roadmap of the possible actions that could conceivably be taken by city governments. Figure 6 provides an overview of this roadmap. There are three main categories I consider: structural changes, benefit parameter changes, and contribution increases. There are four possible groups of claimants that these changes could affect: retirees, current employees, new employees and taxpayers.

A.) Structural Changes

Structural changes are those that fundamentally alter the nature of the benefit contract for some group of workers for either past or future work. These include the introduction of different forms of providing retirement benefits.

i.) Individual Account Plans

The structural change that would be most familiar to private sector workers would be to move some or all workers onto an individual-account retirement plan, where workers are responsible for managing their own assets. It is worth pointing out that such individual account plans would not necessarily have to have all the same features as the typical 401(k) plans, which have resulted in some employees making suboptimal savings and investment decisions (Brown et al (2007), Choi et al (2011) and Tang et al (2010)) and some paying substantial fees for the mutual funds in these funds. Individual account plans can be established to encourage saving if contributions were mandatory (or at least the default) and employer matches are substantial. To avoid excessive fees, plans could offer only low-cost mutual funds. To avoid under-annuitization could offer the option to participants to convert their retirement wealth into an annuity upon retirement.

Recent attempts to introduce 401(k) plans for public workers have faced challenges when put to the political test. Perhaps the most well-known failed attempt was former Los Angeles mayor Richard

Riordan's Fall 2012 pension reform effort that would have moved all new employees onto 401(k) plans. Representatives of public safety workers found this provision particularly unpalatable and mounted severe opposition. As pointed out in a press article by Maddaus (2013), the experience of Riordan in Los Angeles contrasts with San Diego, where reform proponents gave ground and eliminated plans to have newly hired public safety officials on 401(k) plans. In exchange, they received support from public safety unions for their reform plans, which included introducing 401(k) plans for other types of workers. Of course, this leaves the fire and police funds with the DB benefit structure and likely continued growth in unfunded liabilities. The success of San Diego where Los Angeles failed may have also have had more to do with differences in funding, time-frame, and political support than with differences in the particular features of the reform plans.

An approach related to the introduction of 401(k)'s is to introduce a mixed or hybrid plan where new employees or some group of employees receive a more modest DB accrual combined with a 401(k) plan. This is the solution that the city of Atlanta arrived at in 2011. While the rate of growth of unfunded liabilities is slowed, it is not stopped completely unless contribution increases are sufficient to pay for the true cost of the DB portion (see section (iii) below).

An even softer reform is to offer new employees the option of choosing a 401(k) or a hybrid plan. For example, Philadelphia Mayor Michael Nutter reached a contract agreement in February 2014 with one of the main public employee unions (District Council 47) under which new employees could join a hybrid plan or remain in the traditional plan and pay 1 percent of pay more than current city employees, rising by another 1 percent of pay in 2016. This deal also shows how employees might be given incentives to opt into defined contribution plans instead of paying more into defined benefit plans, although it is not clear that the incentives in this instance are strong enough. The city has also entered into a similar agreement but with smaller contribution increases (0.5 percent in 2015 and another 0.5 percent in 2016) with one of its other public employee unions (District Council 33).

In sum, no major city government has succeeded in implementing mandated 401(k) type plans for all new hires. Either the 401(k) has been optional, or limited to certain groups of new hires, or it accompanies a DB benefit.

ii.) Pooled DC Plans and Cash Balance Plans

A common misperception in the United States is that all plans that do not involve government guaranteed benefits must necessarily involve individual accounts and the associated drawbacks in terms of fees and costs to individual participants. In fact, pooled defined contribution plans exist in a number of other countries including the Netherlands and Denmark. There are several variants of these plans. A simple example is a plan whereby contributions from individuals and employees are made to the pooled

fund and employees receive an annuity upon retirement that is a function of the investment returns in the plans. Novy-Marx and Rauh (2014a) discuss these plans in further detail.

Cash balance plans, which are relatively common among U.S. corporate DB plans and have been introduced in some state plans, particularly in Texas, are in essence a collective DC plan with a minimum return guarantee. These plans also have the potential to generate unfunded liabilities, but if the guarantee is modest and the investment strategy relatively safe, they offer an alternative to traditional DB plans.

iii.) Deferred Annuity Plans

Another type of structural change would be to introduce deferred annuity plans, in which contributions are used to contract with insurance companies to buy deferred life annuities for the employees, as proposed in the Secure Annuities for Employee (SAFE) Retirement Act of 2013. A deferred annuity is a life annuity whose payments begin at some future date. In fact, when an employee earns rights to a DB benefit in a traditional DB plan, she is essentially being granted the promise of a deferred annuity from the employer. There is a relatively thin market for deferred annuities in the U.S. today, but it could be expanded through demand from public employee pension systems.

The advantage of deferred annuity plans is that they offer a structural change alternative that might be considered by public unions who reject individual accounts and DC plans on principle, as the payouts in a deferred annuity plan are guaranteed and do not vary with the valuations of risky assets. Furthermore, in a deferred annuity plan, the city assumes no unfunded liability, as the responsibility to pay the pension becomes that of the insurer.

Such plans expand the role of insurance companies in the provision of retirement benefits to public employees. As explained in Section E below, the U.S. tax code may need to be amended before such plans would receive the same tax treatment as traditional DB plans.

iv.) Challenges

A unifying feature of these structural changes is that they would all eliminate the accrual of any new unfunded liabilities. Private sector pension law governed by ERISA is particularly concerned with preservation of the benefits employees have earned up to the date of any pension plan changes. Under this principal, accrued unfunded liabilities must be met and cannot be renegotiated or impaired, while the right to earn future benefits under the same formula going forward could be changed. However, because political employee groups and some state courts have viewed even the right to earn future pension benefits as protected, structural changes might be difficult to implement in a number of states, even if they affected future benefit accruals only. New employees would be the group that could potentially be introduced on completely new benefit structures.

Related to direct political and legal opposition, another challenge facing such structural reforms is that some contributions which would otherwise go toward the traditional DB plans are devoted to the new

plan. This creates transition costs, and may in part explain the opposition of public safety unions even to the introduction of 401(k) plans for new hires. If the contributions devoted to the DB plan are likely to be insufficient to cover the benefit promises made, then such a change amounts to the termination of the younger workers' subsidy for the older workers' benefits.

Furthermore, an often-cited cost of closing DB plans to new employees is the claim that the plan's existing unfunded liability will have to be paid down more quickly. As detailed in Costrell (2012), GASB accounting standards require a change in the ARC calculation method if the plan is closed to new members, and that change generally results in an accelerated amortization schedule. The acceleration occurs because the ARC for the unfunded liability in a closed plan must, under GASB rules, be measured assuming a "level dollar" method as opposed to a "level percent of pay" method.

The ARC does not determine mandatory funding policy, which is set by state statutory authorities. Pension systems that determine their own funding policy could therefore close plans to new workers and choose to pay down the unfunded liability under the same schedule as they otherwise would have. However, cities may face real constraints in switching to DC plans if legislatures or state authorities mandate that all systems in the state must make the ARC. Then the GASB accounting requirements could in fact require cities to accelerate the paying down of unfunded liabilities when they close plans to new workers, as the ARC under GASB rules would increase.

B.) Benefit Parameter Changes

A second set of options maintains the structure of defined benefits but implements changes to benefit parameters such as retirement ages or benefit factors for some group of employees. The weakest of these changes is typically to impose less generous benefit parameters on newly hired employees. Assuming that contribution rates for those employees remain unchanged (an untested assumption) this would then amount to the employees and taxpayers paying the same amount for less generous benefits for the new hires, with the remaining savings being directed toward the legacy liabilities. For example, in 2012, the Los Angeles City Council raised the retirement age from 55 to 65 and reduced benefits for newly hired Los Angeles city employees not in public safety.

Benefit parameter changes also include attempting to reduce cost of living adjustments (COLAs). This preserves the fundamental structure of the DB system but changes the extent to which benefits rise after employees retire. COLAs can have a very large impact on the cost of providing benefits and can account for up to half of the unfunded liability (Novy-Marx and Rauh (2011c)). Ex-post COLA reductions expose retirees to inflation risk and involve what under private sector law would be a reduction in earned benefits, although this approach has nonetheless been applied in several states and cities for their pension systems. In June 2014, for example, Governor Pat Quinn of Illinois signed a law that

reduced COLAs for participants in the Chicago municipal and laborers fund, including three years where no COLAs will be granted.

Another approach to COLAs is to introduce risk sharing by linking benefits to asset performance to some extent (see Novy-Marx and Rauh (2014a)). An ex-ante COLA change, by linking benefits to asset performance would have a similar effect on the cost of pension promises, but would more clearly spell out legal rights and avoid the costly disputes that arise if cities attempt to reduce COLAs later. Linking COLAs entirely to asset performance leaves employees bearing inflation risk, although this could be in part mitigated if city pension funds invested some of the assets in inflation-linked bonds.

C.) Increasing Contributions

Many pension reform attempts in recent years at both the state and local level have aimed at requiring some or all workers to pay more into the system to keep existing benefits, or at introducing less-generous pension tiers for new workers while requiring them to pay in just as much as longer-tenured workers. For example, the law mentioned above that affects Chicago municipal and laborers not only reduces COLAs, but also increases employee contributions for participants in the Chicago municipal and laborers fund from 8.5 percent of their pay to 11 percent of their pay.

These types of changes are generally more politically viable than the fundamental reforms, as the interests of the younger or newer members of the system are not as well represented at the bargaining table. However, in most cases the pension underfunding is severe enough that feasible increase in contributions from new workers will not have a major impact on unfunded liabilities. Novy-Marx and Rauh (2014b) calculate that for U.S. public funds taken as a whole, contributions would have to rise by 2.5 times to achieve fully funded pension promises over a 30-year period, assuming investment returns of around inflation plus two percent per year. Furthermore, distributional consequences and possibly labor market effects of these types of reforms need to be carefully considered.

Contribution increases, while generally seen as more politically feasible than structural reform and benefit cuts, have nonetheless been met with legal challenges in some municipalities that have attempted them. Notably, a group of Atlanta city workers is currently suing the mayor's office and the city council to undo contribution increases that have so far amounted to five percent of their wages and that could increase further. With the passage of time, the workforce consists increasingly of people who will be paying at the increased contribution rate for a longer number of years, which has led public employees to demand that the contribution increases be revisited. The Atlanta suit is also related to the prospect of future employee contribution increases, which is linked to the cap that the reform imposed on city contributions. Such caps can be thought of as imposing contingent contribution increases on the employees.

D.) Dealing with the Unfunded Liability

The measures in the previous section would all move systems toward a closer balance between the accrual of new liabilities and the level of contributions going into the pension system. Short of attempts to renege on promised benefits, however, they do not address the unfunded legacy liability that exists due to the service that public employees have already performed. A possible exception to that statement is COLA reductions, which under the logic behind the law of private sector pensions actually do reduce the present value of a benefit already earned. Given the emphasis in pension law on preserving earned benefits, even if cities are able to implement new forward-looking benefit structures, they will still be left with substantial unfunded legacy liabilities. Without COLA adjustments or other changes that affect accumulated benefits, that unfunded obligation is $359 billion for the ten cities studied in this paper alone. Such an obligation is financially equivalent to debt owed to creditors.

There are five possibilities for existing legacy liabilities.

First, the city could gradually pay down the unfunded obligations. If a city wants to pay down its existing pension debt that will almost universally imply substantial increases to contributions over today's levels. Essentially no city with a DB plan has a level of contributions today that will both pay the costs of new service accruals and pay down debt (Novy-Marx and Rauh (2014b)).

Second, the city could attempt to renegotiate the pension debt with its "creditors," i.e. the beneficiaries. The public sector has not yet experimented with lump-sum buyouts of pension rights, but there is substantial precedent for lump sum buyouts in the private sector. A key parameter for any buyout would of course be the discount rate. Some participants in the pension system may view themselves as over-annuitized, or face liquidity needs, or be concerned about the solvency of the pension system, or simply have a strong personal preference for receiving their retirement assets all at once. A study by Fitzgerald (2015) found that many teachers in Illinois were not interested in buying additional pension benefits even at fair prices; the natural question is whether this implies they would be willing to sell some of their existing pension benefits. Offering buyouts could therefore allow cities to remove unfunded obligations from their books on terms that would be favorable to both the cities and employees. Such buyouts would need to be financed, and they would also need to be structured in such a way as to avoid adverse selection -- the possibility those employees with private information about personal ill-health would be the ones to take the lump sums, leaving the most long-lived retirees in the pension system.

Third, the legacy debt could be restructured or in part reduced as part of an insolvency process, i.e. Chapter 9 bankruptcy. However, such a bankruptcy proceeding by a city is only specifically authorized in fifteen states (Spiotto (2012)). Relevant for this study, California, New York, and Texas all specifically authorize municipal bankruptcies of city and local entities within the state. Nine states,

including Florida, authorize municipal bankruptcies of city and local entities conditional on a further act of the state government. Three states, including Illinois, have some limited form of authorization. The remaining states are unclear in that they have no specific authorization (Spiotto (2012)). In many states, therefore, the rules of Chapter 9 bankruptcy can be changed at will by state legislatures, making it a politically hazardous process.

A further problem with the use of municipal bankruptcies to restructure pension obligations is that it has found limited success in achieving that goal. In the bankruptcy of Stockton, California, the city obtained the legal right to restructure all obligations including pensions, but the final plan to exit bankruptcy did not include pension cuts. This is perhaps understandable when one considers that the city still had to re-contract with some of the same municipal employees and representatives on an ongoing basis. In Detroit, city workers received 4.5 percent cuts to their base pensions plus COLA suspensions. While the COLA reflects a non-trivial portion of the value of the benefit, it is still very clear that Chapter 9 is not simply a way out of a city's unfunded pension obligations. Finally, Chapter 9 is also expensive and difficult to justify for cities on the verge of fiscal insolvency.

Fourth, the city could bond-off the debt by issuing bonds and putting the proceeds into the pension system. This could potentially be useful in collateralizing the promised benefits. For cities that have very underfunded systems, such collateral might be useful as a bargaining tool in persuading employee groups to acquiesce to structural pension reforms. In essence, such an action reduces the city's ability to abrogate the funded portion of the pension liability. However, pension obligation bonds are often issued under the false logic that a city can create an arbitrage by issuing debt at a relatively low rate and then investing in risky assets to earn a rate of return higher than that rate. Such a transaction in effect uses risk to attempt to improve pension funding. If cities want to bond-off debts by issuing bonds and putting the proceeds into the pension system, it would be important for all parties to consider the implications of the investment strategy of the new proceeds on likely future outcomes.

Fifth, the debt could be passed on to another government entity, such as the state or the federal government through a bailout. States and cities already have complex financial arrangements through which resources are transferred, and since cities are corporate entities of the state, they can be taken over, as exemplified by Commonwealth of Pennsylvania appointing a receiver to take over Harrisburg's finances in 2011. There is no precedent Federal government bailout of a city, but it remains a possibility.

E.) Federal Action

In this section I discuss the role of the Federal government in possibly helping to address the public pension crisis. The first question is of course what interest the Federal government should have in what is fundamentally a state and local problem. Federal taxpayers could find themselves liable for city

and state problems if the Federal government decides to bail out a city. While some consider the possibility of a Federal bailout of cities remote, bailouts of any kind typically happen in unusual times of crisis. There is no mechanism that permits the Federal government to commit *ex ante* not to bail out a city or a state. There are three types of approaches that I examine here.

i.) Carrot-and-Stick Approaches

Cities are either offered a (figurative) carrot, or hit with a (figurative) stick, or both, if they do not implement a specified reform or set of reforms. One bill that has been proposed along these lines is the Public Employee Pension Transparency Act (2013). Under this act, cities and states would have to provide accounts of pension obligations using default-free discount rates. The stick that is used in the bill to induce compliance is the argument that municipal borrowing enjoys federal tax advantages, which could be conditioned on compliance with the law's provisions. Such a bill would reveal the financial costs of deferred compensation and would improve transparency in a system where these costs are currently hidden by GASB accounting.

Other carrot-and-stick approaches could involve granting tax benefits to local governments in exchange for actual reforms of the pension system. One version of this is Novy-Marx and Rauh (2010) in which municipalities would be able to issue tax-exempt pension funding bonds if and only if new workers were on defined contribution plans plus Social Security.

ii.) Changes in Tax Code to Promote Deferred Annuity Plans

As discussed in Section A.iii above, deferred annuity plans guarantee pre-specified benefits to public employees but create no liability for the sponsoring city. Employer and employee contributions are paid to insurance companies who then provide deferred annuity contracts. In order for these plans to receive the same preferential tax treatment as traditional DB plans, the U.S. tax code may need to be amended (Walsh (2013)). A plan put forward by Utah Senator Orrin Hatch in the Secure Annuities for Employee (SAFE) Retirement Act of 2013, and endorsed by the Urban Institute in Washington DC, would change the federal tax code accordingly.

iii.) A PBGC for the Public Sector?

Riordan and Ruttan (2013) have called on the federal government to guarantee debt that cities issue to pay into pension systems, in exchange for reforms such as the use of a lower pension discount rate. The U.S. has experience with the introduction of pension guarantees and the creation of a new federal pension insurance entity through the ERISA law of 1974 and the creation of the Pension Benefit Guaranty Corporation (PBGC). A PBGC for the public sector might reduce the magnitude of unfunded obligations if localities were forced to remediate unfunded obligations through mandatory funding requirements. But the PBGC experience also suggests that it would also generate a new set of agency problems if local governments believed that they were backstopped if their investments performed poorly.

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Van Binsbergen, Novy-Marx, and Rauh (2014) estimate using MVL approaches that the PBGC's insurance of unfunded corporate liabilities has grown to equal a net debt of $358 billion.

Conclusion

        In this paper, I show that the unfunded liabilities of a sample of ten large U.S. cities have on average not declined despite stock market increases. On an MVL basis, the liabilities have substantially increased. I have also discussed a range of possible actions that city governments and the federal government could potentially undertake.

        Looking forward, the reform process itself needs attention. City officials that wish to reform pensions must walk a tightrope between forcing reforms and attempting to gain consensus for reforms. Forcing reforms can lead to lawsuits that challenge the validity of the new policies, as has happened with the state-wide Illinois pension reform of 2013. But consensus-oriented reforms may not go far enough to address the issue. It may be that city employees only notice their skin in the game when pension funds run low, in which case there will be tradeoffs of funding increases in exchange for pension reform. Cities that are committed to paying actuarially required contributions are likely to see citizens more eager for pension reform as they feel the pain of making the contributions, but ironically these are the cities where employees will be least concerned.

        In sum, the pressure to deal with the pension crisis has to date simply not been strong enough from interested parties. The groups most likely to exert that pressure are citizens who feel their services squeezed, taxpayers who rebel against tax increases without improvements in services, bondholders who are concerned that their debts will be impaired to pay pensions, and pension recipients who become concerned that they will not receive their full benefits. Until now, each of these groups has either not had the collective will to act, or have assumed that the other groups will bear the brunt of the cuts. Until discipline comes strongly from these groups, politicians will likely fight battles around the first-step reforms, rather than badly-needed structural changes.

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Figure 1: Total Assets and Liabilities of 28 Systems from 10 Cities

This figure shows total assets and liabilities for the 28 pension systems of the 10 cities analyzed in this paper: New York City, Los Angeles, Chicago, Houston, Philadelphia, Jacksonville, San Francisco, Baltimore, Boston, and Atlanta.
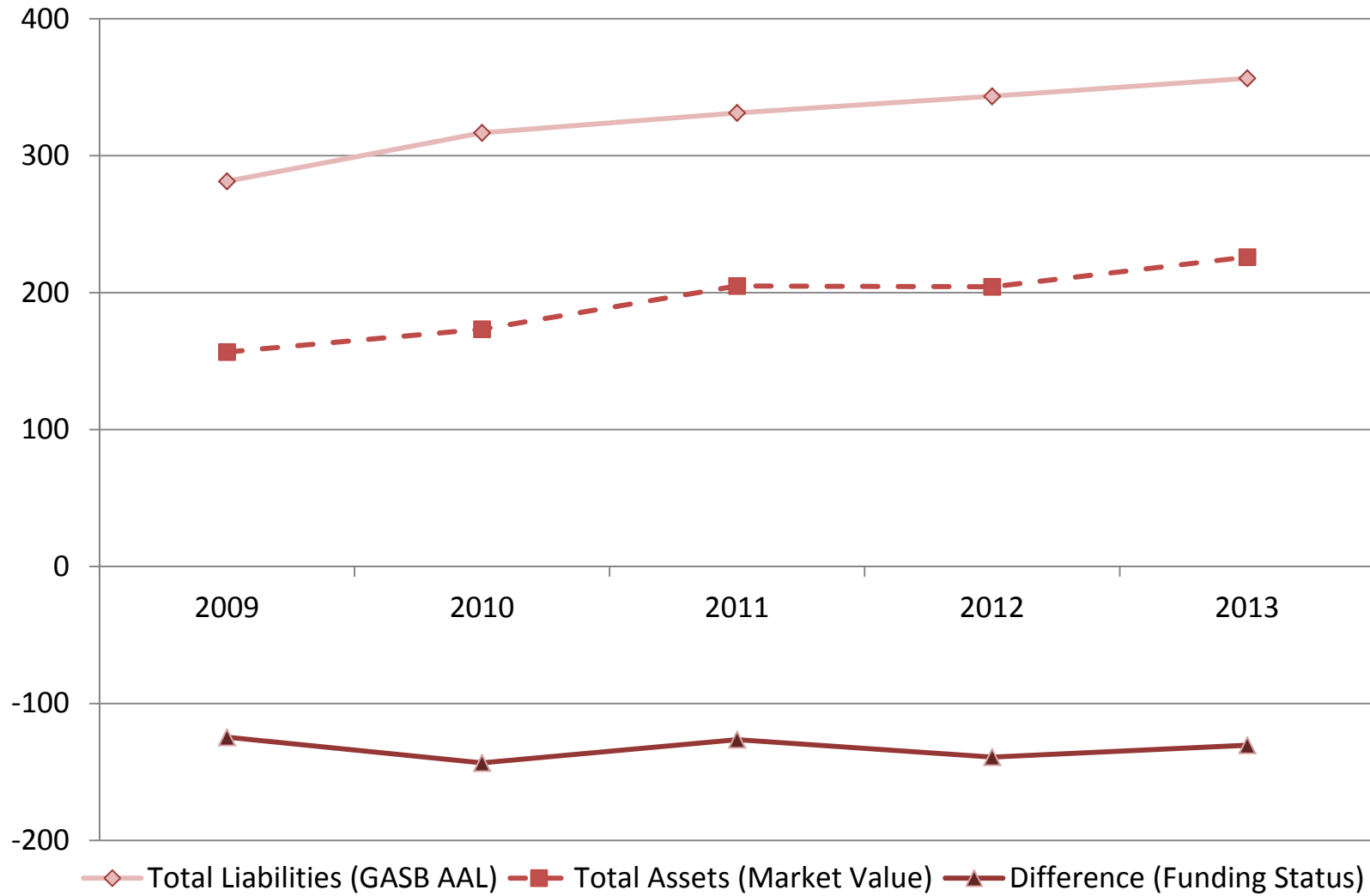
Figure 2: Actuarial Unfunded Liability in Thousands of Dollars Per Household

$ thousands per household

New York City — Chicago — Los Angeles City — Houston — Philadelphia

$ thousands per household

San Francisco City and County — Jacksonville — Baltimore — Boston — Atlanta
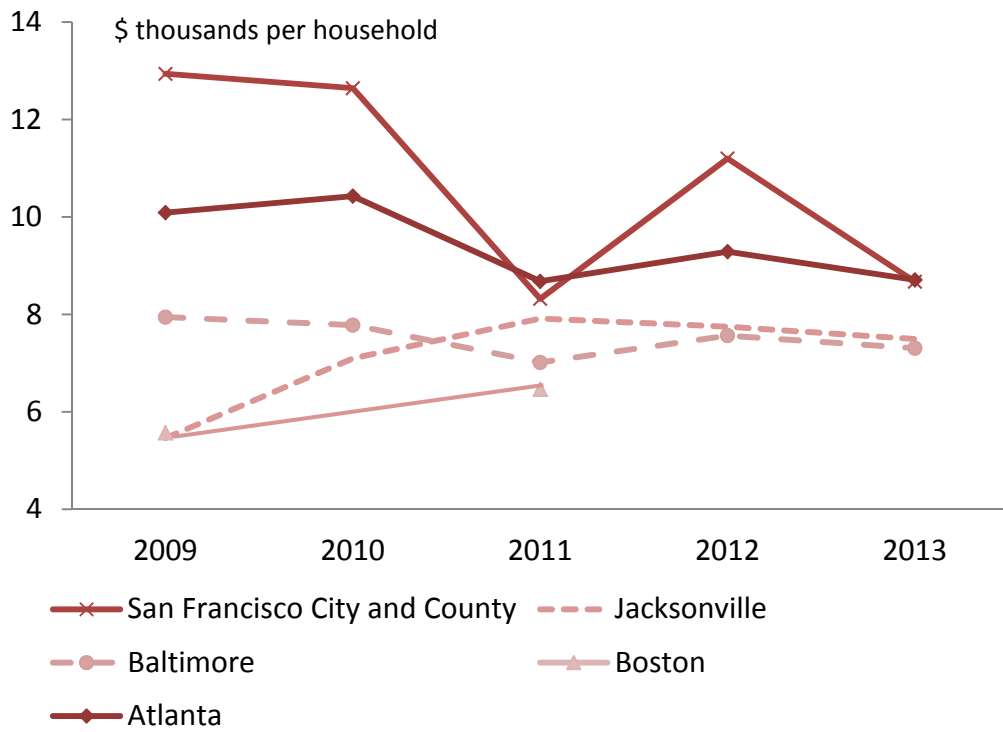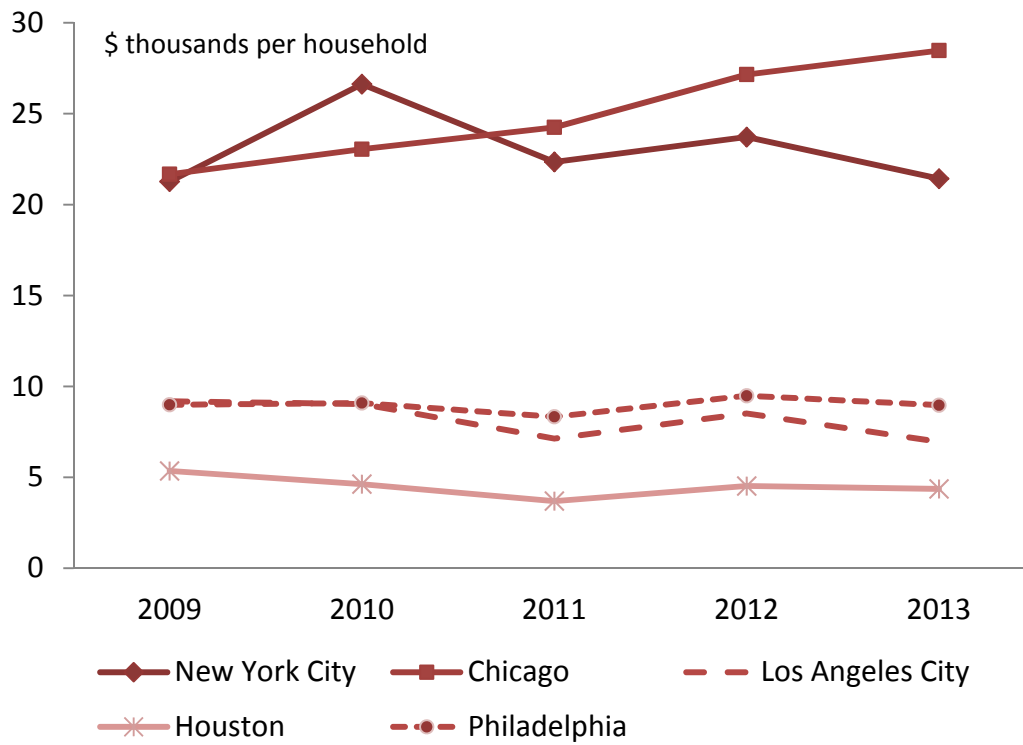
Figure 3: Contributions and Benefit Payouts for 10 Cities
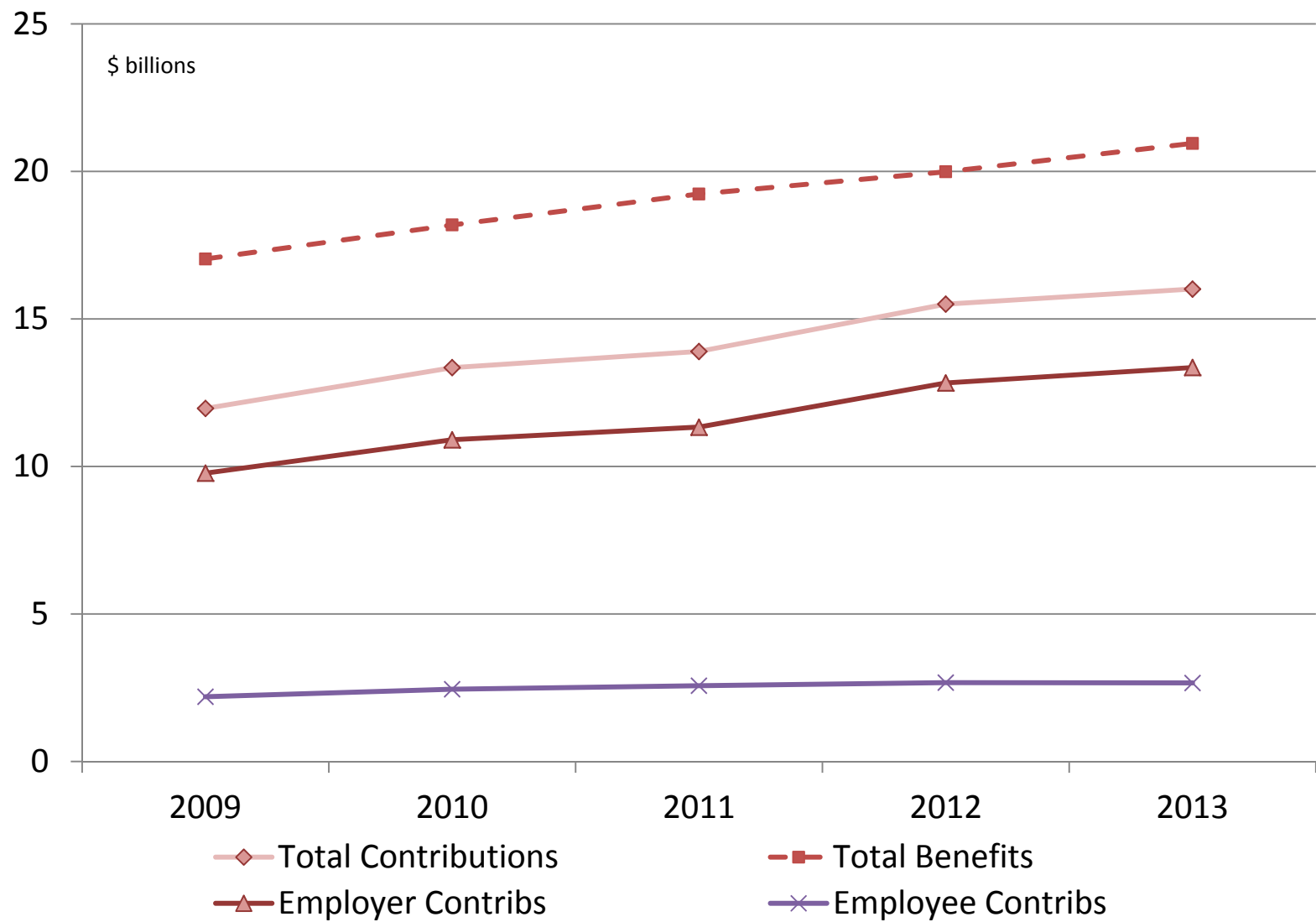
Figure 4: Ratio of Actual Employer Contributions to the Actuarially Required Contribution for 18 Cities

The cities included in this sample and their percent ARCs for the latest available year are: Memphis (23%), Chicago (42%), San Antonio (50%), Houston (68%), Philadelphia (77%), San Jose (78%), Dallas (85%), Jacksonville (87%), Indianapolis (93%), Detroit (100%), Los Angeles (100%), New York City (100%), San Diego (100%), San Francisco (100%), Austin (103%), Phoenix (105%), Fort Worth (115%).
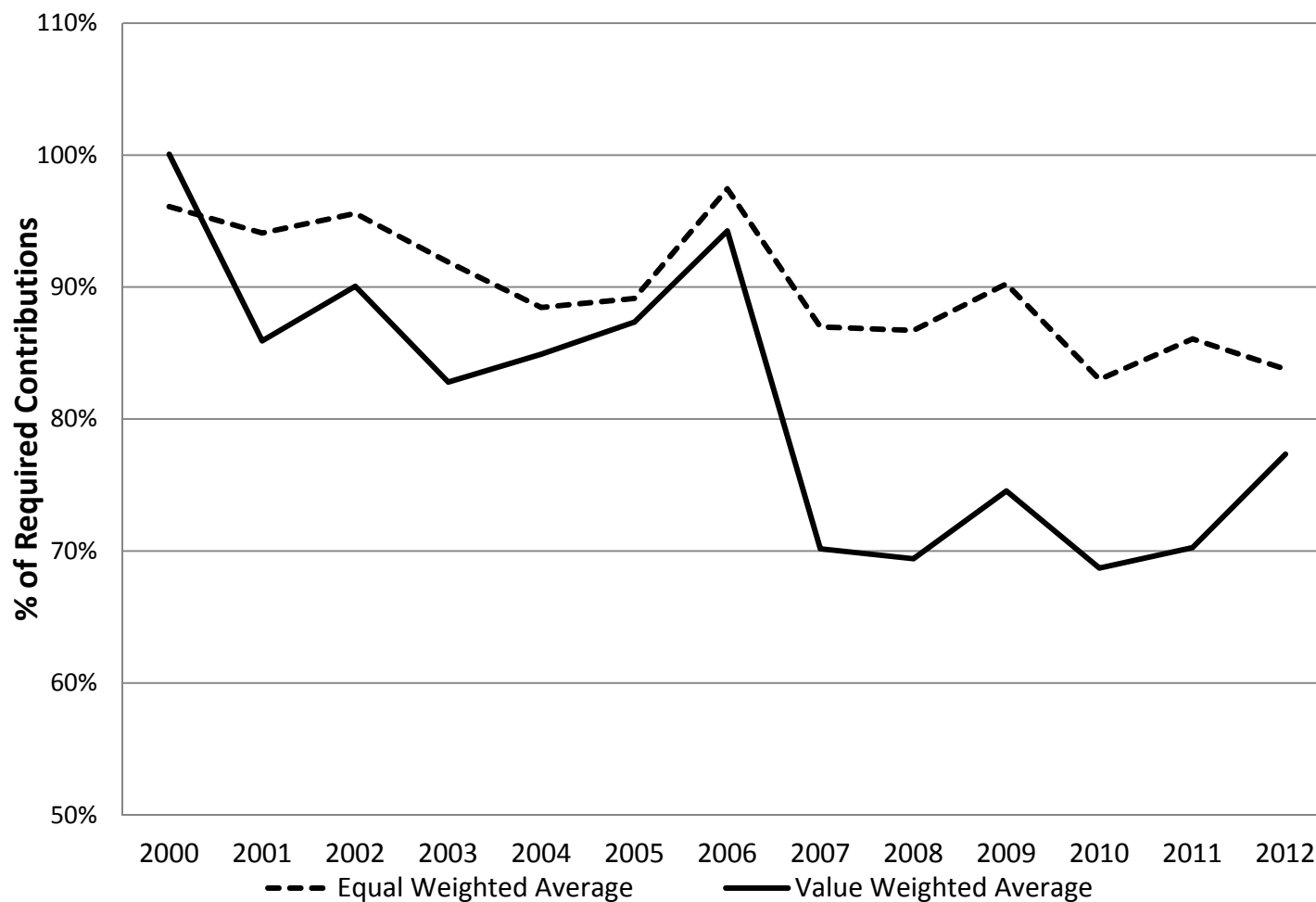
Figure 5: Market Value Unfunded Liability, Thousands of Dollars Per Household

$ thousands per household

New York City — Chicago — Los Angeles City — Houston — Philadelphia

$ thousands per household

San Francisco City and County — Jacksonville — Baltimore — Boston
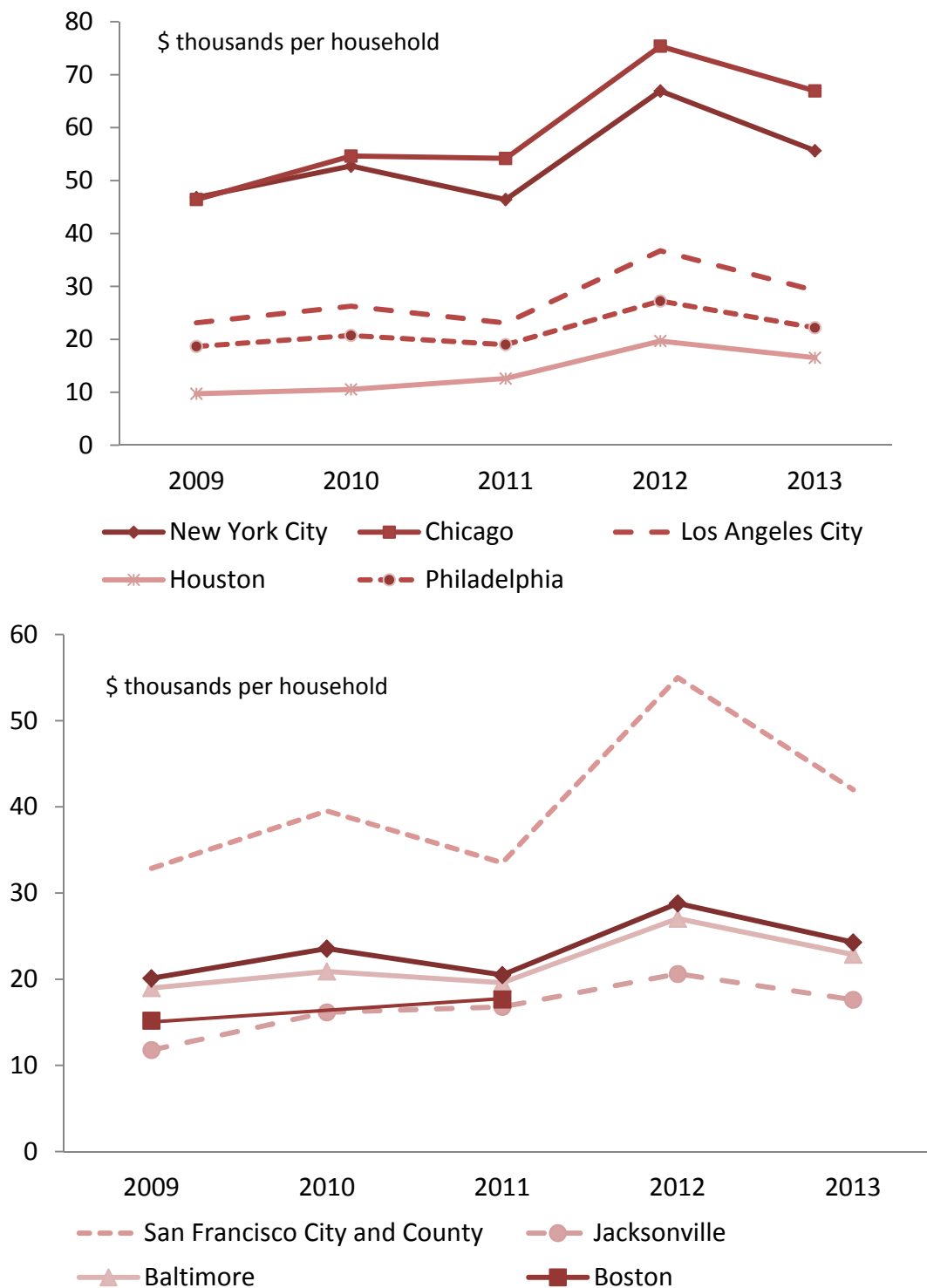
Figure 6: Roadmap for Municipal Pension Reform

Roadmap

Politically Difficult

Greatest Long-Term Effects

Structural Changes
Retirees | Current Employees | New Employees | Taxpayers

- Deferred Annuity Plans
- Pooled DC
- Individual Accounts

Benefit Parameter Changes
Retirees | Current Employees | New Employees | Taxpayers

- COLAs
- Retirement Ages
- Early Retirement Factors

Contribution Increases
Retirees | Current Employees | New Employees | Taxpayers

- Employees must pay to keep benefits (most do)
- Increases in government contributions

Smallest Long-Term Effects

Politically Easier

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Table 1: City Pension Systems in Sample

City	City Pension Systems Analyzed
Atlanta	City of Atlanta General Employees Pension Plan
	City of Atlanta Police Officers' Pension Plan
	City of Atlanta Firefighters' Pension Plan
Baltimore	Baltimore City Employees' Retirement System (BCERS)
	Baltimore City Fire and Police Employees' Retirement System (BCFPERS)
Boston	State-Boston Retirement System (SBRS) Excluding Teachers
Chicago	Chicago Teachers Pension Fund (CTPF)
	Policemen's Annuity and Benefit Fund (PABF) of Chicago
	Firemen's Annuity and Benefit Fund (FABF) of Chicago
	Municipal Employees Annuity and Benefit Fund (MEABF) of Chicago
	Laborers' & Retirement Board Employees' Annuity and Benefit Fund (LABF)
	Metropolitan Water Reclamation District Retirement Fund
	Retirement Plan for Chicago Transit Authority (CTA) Employees
Houston	Municipal Employees Pension System (HMEPS)
	Houston Police Officer Pension System (HPOPS)
	Houston Firefighters' Relief and Retirement Funds (HFRRF)
Jacksonville	Jacksonville General Employees Pension Plan
	Jacksonville Police and Fire Pension Fund
Los Angeles	Los Angeles City Employees Retirement System (LACERS)
	City of Los Angeles Water and Power Employees' Retirement
	Los Angeles Fire and Police Pensions (LAFPP)
New York City	New York Board of Education Retirement System (BERS)
	New York City Employee Retirement System (NYCERS)
	New York City Fire Pension Fund
	New York City Police Pension Fund
	Teachers' Retirement System of the City of New York (TRSNYC)
Philadelphia	City of Philadelphia Municipal Retirement System
San Francisco	San Francisco Employees' Retirement System (SFERS)

Table 2: Summary Statistics

This table shows summary statistics for the 28 plans analyzed in this paper. The 28 plans are listed in Table 1.

Variable	Count	Mean	Min	Max	Total
Members	28	42,448	1,841	328,579	1,188,552
Active Members	28	22,129	849	179,615	619,604
Retired Members	28	19,422	992	141,589	543,815
Actuarial Liability ($M)	28	$ 12,734	$ 754	$ 69,799	$ 356,544
Market Value (MV) of Assets ($M)	28	$ 8,072	$ 561	$ 47,195	$ 226,021
Unfunded Actuarial Liability	28	$ 4,662	$ 192	$ 24,004	$ 130,523
Payroll ($M)	28	$ 1,556	$ 40	$ 12,265	$ 43,557
Benefits Paid ($M)	28	$ 746	$ 39	$ 4,667	$ 20,878
Contributions ($M)	28	$ 572	$ 23	$ 3,485	$ 16,012
Employer Contributions ($M)	28	$ 477	$ 14	$ 3,047	$ 13,353
Discount Rate	28	7.7%	7.0%	8.5%	
ARC	27	$564	$17	$3,047	
Average Salary	23	$ 73,572	$ 37,310	$ 109,830	
Percent of ARC Contributed	21	84.7%	18.1%	124.3%	
% Active	28	48.7%	34.6%	71.3%	52.1%
Funding Ratio (MV Assets / AAL)	28	61.8%	27.0%	88.3%	63.4%
Benefits / MV Assets	28	10.2%	5.1%	22.1%	9.2%
Contributions / MV Assets	28	7.3%	2.1%	23.6%	7.1%
Employee / Total Contributions	28	26.3%	0.0%	71.7%	16.6%

Table 3: Treasury Rates

Source of the actual yields is the Federal Reserve Daily Yield Curve website.

	Actual 10-year Treasury Yield	Actual 20-year Treasury Yield	Interpolated 14-year Yield
6/30/2009	3.53%	4.30%	3.84%
6/30/2010	2.97%	3.74%	3.28%
6/30/2011	3.18%	4.09%	3.54%
6/30/2012	1.67%	2.38%	1.95%
6/30/2013	2.52%	3.22%	2.80%

Table 4: Unfunded Actuarial Liabilities and Unfunded Market Value Liabilities

This table shows the unfunded actuarial liability (UAAL) and the unfunded market value liability (UMVL) for 10 cities as calculated using the method described in Section III. The systems are listed in descending order of the 2013 UMVL share of own revenue.

	UAAL ($ bn)	UMVL ($ bn)	UMVL 2013 Share of Own Rev	UMVL 2013 Share of Tax Rev
Chicago	30.7	72.2	1015%	1353%
Jacksonville	2.5	6.0	730%	976%
Houston	3.6	13.7	710%	788%
Los Angeles	9.1	38.1	670%	1110%
Atlanta	1.8	5.2	590%	660%
San Francisco	3.2	15.6	584%	683%
Philadelphia	5.7	14.1	496%	549%
Baltimore	1.9	6.0	391%	456%
New York City	70.1	182.0	296%	398%
Boston	1.8	6.1	292%	331%

Table 5: Contributions and Benefits

This table shows contributions and revenues for the 10 systems in the sample, listed in descending order of contributions as a share of own revenue.

	Contributions		Benefits		
	$ billions	% of Own Revenue	$ billions	% of Pension Assets	% of Own Revenue
Jacksonville	0.161	19.6%	0.309	10.5%	37.7%
Philadelphia	0.552	19.5%	0.746	16.8%	26.3%
Los Angeles	1.090	19.2%	1.976	5.9%	34.8%
San Francisco	0.443	16.6%	1.033	6.1%	38.7%
New York City	9.543	15.5%	11.953	9.6%	19.5%
Atlanta	0.126	14.4%	0.252	10.0%	28.8%
Houston	0.267	13.8%	0.590	6.3%	30.5%
Baltimore	0.196	12.8%	0.337	9.4%	22.1%
Chicago	0.774	10.9%	3.449	14.3%	48.5%
Boston	0.201	9.6%	0.301	8.3%	14.3%