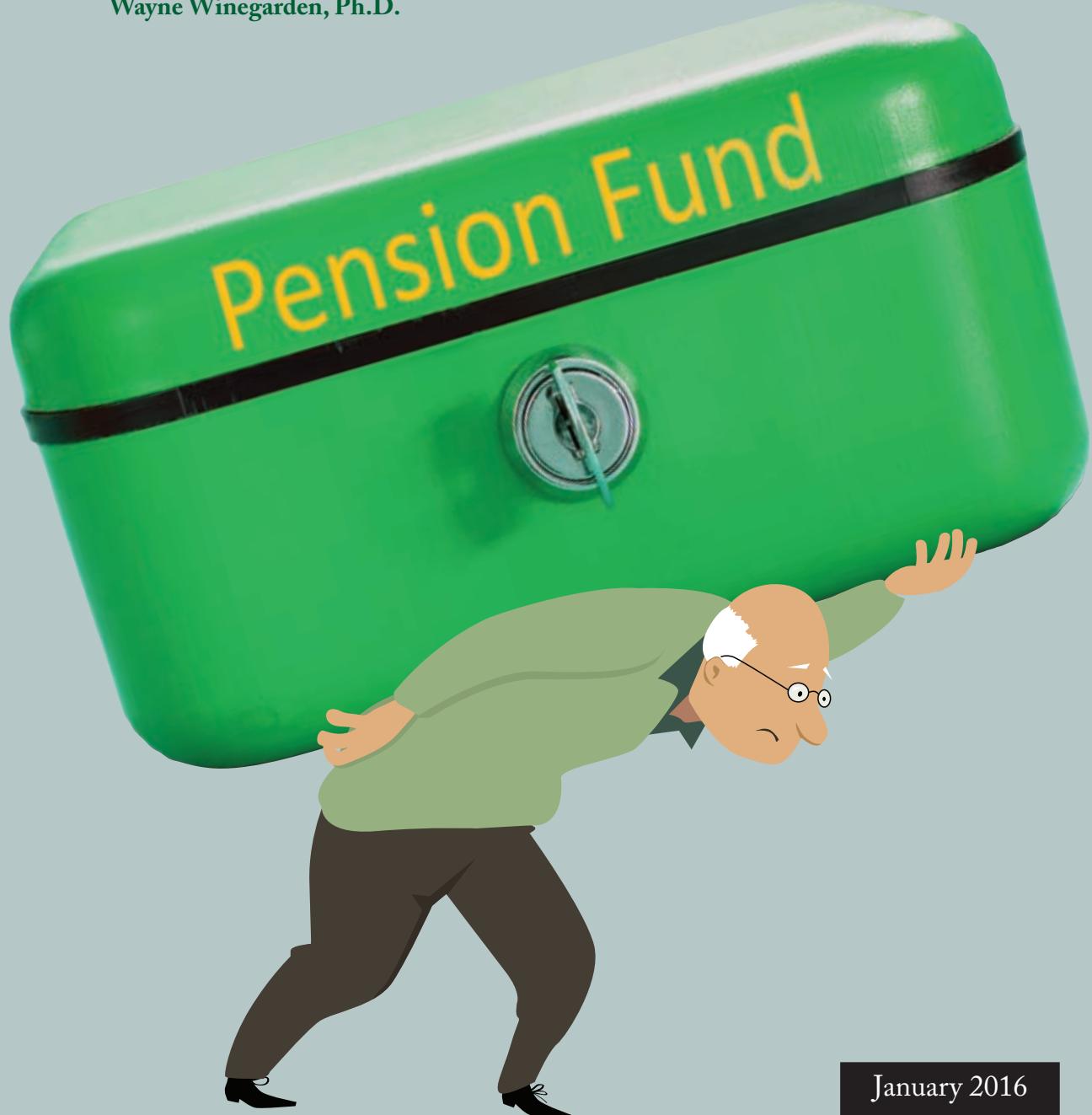


CALIFORNIA'S PENSION CROWD-OUT

California's defined benefit public pension plans are
unaffordable and over-burden current and future taxpayers

Wayne Winegarden, Ph.D.



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CONTENTS

Introduction	14
California's public pension crisis is already hurting taxpayers	15
...Leading to large unfunded liabilities	18
Accounting for Risk	20
Re-evaluating California's unfunded liabilities accounting for the risks	24
Adverse incentives worsen the unfunded defined benefit problem	29
A Tale of Two Teachers	33
The Consequences from California's Unfunded Pension Liabilities	36
Implementing Effective Pension Reform	41
California's Pension Crisis: Dividing Communities and Generations	43
Appendix: A Brief Review of the Economic Literature on Taxes.....	44
Endnotes.....	48
About the Author.....	54
About Pacific Research Institute.....	55

EXECUTIVE SUMMARY

Unlike most private sector employers, California's state and local governments continue to offer workers defined benefit pensions. Defined benefit pensions once were the dominant retirement plan of the private sector too. Then the federal Employee Retirement Income Security Act of 1974 (ERISA) was passed, and a new era was born.

ERISA imposed strict accounting standards and practices that ensured private defined benefit plans properly accounted for their future liabilities; and, made annual contributions that were sufficient to fully fund the plans. The purpose was "to protect against private sector mismanagement of employee benefit plans which placed individual participants' potential benefits at risk."¹

In light of these requirements, which were strengthened by future legislation, the private sector transitioned into defined contribution plans and away from defined benefit plans. The costs of running a defined benefit plan were simply too high, particularly relative to the costs of funding a defined contribution plan.

Although California state and local governments are not subject to ERISA regulations, *the same concerns* regarding the management of private sector defined benefit plans apply to public sector plans.

California has failed to make its required contributions...

For years California has not been setting aside enough money to fully fund its state-run defined benefit system. According to current government accounting practices, California's defined benefit programs are considered fully funded when annual contributions consistently meet a contribution level known as the actuarially required contribution (ARC). The ARC is an actuarially calculated estimate that is supposed to ensure that pension funds remain solvent if their key assumptions about investment returns, salary growth, and life expectancy are realized. The contributions are funded by state and local government revenues and contributions from public employees.

While the ARC payments may still be insufficient to fully fund the promised retirement benefits when risks are properly taken into account, California is not even meeting its ARC obligations. California contributed \$11.3 billion toward its state-run pension systems in 2013, \$4.9 billion below the ARC of \$16.2 billion – or 70.0 percent of the ARC level.² Making the situation worse, California, like the vast majority of states, has not been fully covering its ARC obligations for many years. According to the latest pension liability estimates from the Pew Charitable Trusts, California has not met its ARC obligations over the past 11 years.³

According to the latest pension liability estimates from the Pew Charitable Trusts, California has not met its ARC obligations over the past 11 years.

...and pension benefits are overly-generous...

The problem of insufficient contributions (based on the ARC) are compounded by the problem of promising overly-generous benefits. As Summers (2010) argued, California is “...one of the most generous states in the nation in terms of pension and retiree health care benefits.”⁴ For instance, based on the California Public Policy Center (CPPC) database www.TransparentCalifornia.com, Bucher (2014) found

...two government retirees collected over \$500,000 in pensions during 2012, and 443 retired government workers in California collected pensions that are over \$200,000.

What about the \$100,000 pension club? In 2012, the CPPC’s database shows 30,744 retired government workers collected pensions and benefits worth over \$100,000.

the average recently retired CalPERS participant with thirty or more years of service receives \$63,977 per year...⁵

Then there are the incentive problems exemplified by the benefit expansions contained in SB 400. In the heyday of the Internet stock bubble of the late 1990s, California’s state-run defined benefit programs were flush with cash. CalPERS funded status, as an example, peaked at 137.9 percent in 1999.⁶ With the benefit of hindsight, it is clear that the extraordinary returns of the late 1990s were not sustainable, and a major correction in stock prices followed. Before the bubble revealed itself, however, the California legislature passed, and Governor Gray Davis signed, SB 400 in 1999.

SB 400 expanded retiree benefits based on the incorrect assumption that robust investment returns would be more than sufficient to cover the costs. When this turned out not to be the case, the burden of covering these costs was shifted onto the taxpayer. These new taxpayer obligations need to be met regardless of the economy’s health. California’s experience with SB 400 (i.e. promising unsustainable retirement benefits during prosperous times that impose a bill on taxpayers during weak economic times) is typical of a defined benefit program.

...leading to large unfunded liabilities

The combination of consistently under contributing to the pension fund, while over promising benefits during good times, has created California’s severe underfunding problem.

Making the problem worse, as California underfunds its current defined benefit programs, pension costs over the last decade grew twice as fast as tax revenues. The excessive growth in pension payments is exerting upward pressure on California’s tax burden—a burden that is already the 4th highest overall tax burden in the country, according to the Tax Foundation.⁷ The

The problem of insufficient contributions (based on the ARC) are compounded by the problem of promising overly-generous benefits.

excessive growth in pension payments is also crowding out spending on all other government priorities.

Without properly accounting for risk, the unfunded liabilities of California's defined benefit public pension plans are around \$170 billion or 125 percent of total state tax revenues, as of 2014. Alternatively, California's unfunded liabilities equal 7 percent of total state GDP, as of 2014. If these official estimates of California's unfunded pension liabilities covered everything, then this heavy debt burden would portend a major threat to California's future. But, the situation is even more dire.

Properly accounting for risk, California's unfunded liabilities are even larger

Whether an investor is an individual with a small portfolio, or an institutional investor with hundreds of billions of dollars under management, all investments are subject to risk. The payments made to retirees (e.g. the pensions) are not supposed to bear any risk – these payments are supposed to be a sure thing. Current government practices do not properly account for the discrepancy between the risks of the funds' assets compared to the funds' supposedly riskless liabilities (promised employee pensions). This failure imposes large potential costs on California taxpayers.

As an illustrative example, it is unwise to put next month's mortgage payment (a certain cost) into the stock market (a risky investment) in the hopes of earning returns that are higher than the interest offered at a local bank. Perhaps the market will go up and the lucky homeowner can pay his mortgage and earn some extra money. It is also possible that within the relevant timeframe, the market does not go up, it goes down. If this unlucky scenario were to happen, the homeowner may now be unable to make his mortgage payment at all.

While overly simplified, the example illustrates that risks and market returns are inseparable. Higher market returns can only be achieved by bearing higher market risks. However, the promises of the defined public pension are not supposed to bear any risk.

Risks are not reduced, however, by simple declaration. They have to be effectively managed. One way to reduce risks is to adjust the investment portfolio – instead of owning higher-risk assets, California's public pension funds could invest in low risk assets that match the risk profile of the liabilities. Average returns of the funds would be significantly lower, however.

Alternatively, the investment portfolio can invest in high-risk assets and simultaneously purchase a financial instrument called a put-option. By purchasing put-options, the public pension fund would have the right to receive the dollar value of the guaranteed pension liabilities from the seller of the put-option should the risky investments underperform. By purchasing the put-option, the public pension fund would explicitly pay a premium that covers the costs of the risk discrepancy between the funds' risky investment

Current government practices do not properly account for the discrepancy between the risks of the funds' assets compared to the funds' supposedly riskless liabilities (promised employee pensions).

portfolios and the funds' riskless public pension liabilities. However, purchasing the put-option would increase the costs of managing the defined benefit program significantly.

Unfortunately, California's public pension funds chose a third option. California's public pensions own risky assets that are inconsistent with their riskless liabilities, and simply transferred the risks from the public workers to the taxpayers without compensating taxpayers for bearing this risk – requiring taxpayers to provide government workers with a put-option while ignoring the potential costs.

The potential costs are hidden because California's liabilities that are not supposed to bear any risk are valued based on a risky asset portfolio that excludes the costs of the implicit put-option. Such an estimate significantly underestimates the amount of resources the public pension funds require and therefore overestimates the financial health of the pension fund. This is the mistake that accepted government accounting principles make.

It is possible that, should the government cover the \$170 billion official unfunded liabilities, the market will perform as expected and there will be sufficient assets to cover the promised benefits of public retirees. Under such a scenario, there would be no investment underperformance for taxpayers to cover. On the other hand, perhaps the market will underperform expectations and taxpayers will need to cover large investment shortfalls for the public pension funds. Which outcome will occur is unknown; but what is known is that it is inappropriate to ignore these potential risks for taxpayers.

If the riskless nature of the liabilities are properly taken into account, California's estimated unfunded pension liabilities increase significantly. Instead of California's public pension funds having an unfunded liability of \$170 billion, analyses that account for risk estimate that California's unfunded liabilities are between \$300 billion and \$600 billion. Such pension debt levels are the equivalent of between 13 percent and 28 percent of total California state GDP in 2014.

If unaddressed, the economic consequences will be severe

As detailed in the Appendix, there is a robust economics literature linking higher tax rates and higher tax burdens to slower overall economic growth.

Given the excessively large public pension debt burden, the current policy that public pension promises, once made, are inviolable will impose severe economic costs on Californians for years to come.

Covering the debt burden exclusively through tax increases would require the largest tax increase in California's history – an annual \$28.3 billion net tax increase over the next 30 years. Higher taxes are an impediment to working, saving, and investing. As detailed in the Appendix, there is a robust economics literature linking higher tax rates and higher tax burdens to slower overall economic growth. In the case of California's unfunded pensions, the necessary increase in the state and local tax burden to fully fund the state's

current pension system will cause California's economy to be 21 percent smaller over the next 30 years compared to its current economic growth path due to the adverse impacts on economic growth.

Alternatively, the state can maintain its current 4th highest tax burden in the country, but *cut total state and local spending by more than 8 percent* across the board. Such an expenditure reduction would, among many other significant spending cuts, entail: a \$5.4 billion cut to the school budget, a \$4.9 billion cut in spending on income support programs, a \$2.9 billion cut to the higher education budget, and a \$1.9 billion cut to California's hospital systems (all compared to the 2012 state and local expenditures as reported by the U.S. Census).

Under either scenario, the vitality of California will be significantly dimmed in order to maintain current pension promises. It simply makes no sense for California to continue a pension system that, despite the apparent gains in fiscal health recently, will drive the state into insolvency over time. It is way past the time to reform California's state and local defined benefit pension system.

Reforms to Address California's Public Pension Crisis

Fundamental reforms to current pensions are required. These fundamental reform efforts should recognize that the current pensions offered to public employees are unaffordable and overly generous.

The simplest reforms to implement are changes to the retirement benefits for employees that have not yet been hired. All new employees should be ineligible for the current defined benefit programs. Instead, new employees should be eligible for a defined contribution retirement system whose terms are described below.

With respect to current employees, reforms should start by repealing the so-called California Rule, which would likely require a constitutional amendment. The California Rule, an unusual requirement that is adopted by a minority of states, mandates that once employees have been hired, they are entitled to both the retirement benefits they have earned for their years already worked under the current retirement system, and the benefits they would earn under the current retirement system should they choose to continue working for the state (prospective benefits that may not be earned for many years).

The California Rule is a bad policy that traps taxpayers in an unaffordable pension system and ensures unequal treatment across different types of long-term contracts.

Once the California Rule has been repealed, California should implement a hard freeze across all defined benefit programs. Under a hard freeze, no public employee would be able to accrue any more benefits in the defined benefit program. All vested public employees should then be offered a choice: either receive a lump sum payment equal to the present value of their actuarially

With respect to current employees, reforms should start by repealing the so-called California Rule, which would likely require a constitutional amendment.

determined benefit under the defined benefit plan, or remain in the defined benefit plan. It is important to note that in order to accommodate the cash-out option, transition issues need to be addressed, including: managing the current unfunded status of the funds, accounting for the value of the put-option that has been received by public employees, and accounting for the impact from the cash-out option on the program's funded states. Employees that choose the lump-sum payment would then transfer their share of the assets into an appropriate retirement account.

For those employees that choose to remain in the now frozen defined benefit plan, the plan would continue operating with the purpose of paying out current obligations. However, all employees who choose to remain in the plan should no longer receive the value of a put-option from the taxpayer without paying for the service. Therefore, either the costs of the put-option should be charged to the beneficiaries in the frozen defined benefit plans; or the plan's assets should be altered (as practicable) to reflect the riskiness of the pension payments (or lack thereof).

Going forward, all employees' retirement plans (new and current) should be a defined contribution plan that meets the average standards of a defined contribution plan for a large private company. According to a Towers Watson survey of private pension plan sponsors, these standards could include:⁸

- No minimum length of service requirement for eligibility in the defined contribution pension plan;
- Participation in the defined contribution plan permitted upon hire;
- Non-matching and matching contributions up to a set percentage of pay with immediate eligibility; and
- Average matching and non-matching contributions equal to around 8 percent of pay for a total of 12 percent of pay annual contribution, including an assumed 4 percent contribution from employees (slightly less than the average contributed by employees in the private sector).

The standards across the private sector surveyed by Towers Watson varied. As such, the standards discussed above are illustrative of the type of terms California should consider. The actual defined contribution standards adopted, especially the matching and non-matching contribution rates, should be determined following an actuarial analysis determining the estimated costs to the government for the terms provided and the needs of the government to attract the necessary employees.

Due to the combination of a very large unfunded liability problem, coupled with the high promised benefit levels compared to similarly paid private sector workers, pension reforms could consider reducing the benefits that have been earned in the defined benefit plan at the time of the plan's freeze in order to ensure taxpayers do not bear a disproportionate share of the unfunded pension liability costs.

The actual defined contribution standards adopted, especially the matching and non-matching contribution rates, should be determined following an actuarial analysis determining the estimated costs to the government for the terms provided and the needs of the government to attract the necessary employees.

Recent court rulings, such as Judge Klein's ruling in the Stockton, California bankruptcy case, support the right of municipalities to treat pension contracts similarly to all other contractual obligations in bankruptcy court. This ruling provides a sensible path for reforming California's pension system even at the state level.

But, while such a reform could reduce the overall economic costs from the unfunded pension problem, such a change would face legal impediments that would need to be overcome. If this path is taken, any reductions to the public employees' benefits should be bounded by the expected benefits available to comparable private sector workers to ensure that public employees do not bear an undue burden from the pension sectors underfunding.

There are pension reform efforts currently under consideration that would meaningfully start the pension reform process. For instance, there are proposals that would cap the contribution rates that California's government could make toward employees retirement at 11 percent of base compensation (13 percent for safety employees) for all new labor contracts. Further, unless voters approved, the government's share of total retirement costs could not be more than 50 percent. These cap levels are similar to the average pensions offered by the private sector. Reforms such as this will help the state regain control over government retirement costs and is, consequently, a significant improvement over the status quo.

Given the value of state pension assets, and the benefits from implementing a defined contribution system, California has the opportunity to significantly reduce the adverse economic and financial consequences from its current pension crisis.

Conclusion

California faces difficult choices today because the state continues to offer defined benefit pensions to employees without properly accounting for the costs and without fully funding its promises. Effective pension reform offers the best path forward.

Comprehensive pension reforms are possible that would help California avert many of the adverse economic consequences while providing public sector workers with a comfortable retirement that is aligned with their neighbors in the private sector. Given the value of state pension assets, and the benefits from implementing a defined contribution system, California has the opportunity to significantly reduce the adverse economic and financial consequences from its current pension crisis.

But, California will realize this opportunity only if the state acknowledges the size and scope of its current pension problem, and is willing to correct it.

INTRODUCTION

As is the norm among state and local governments, California offers qualified government workers defined benefit pensions, as well as promises to fund retirees' health care expenses. In total, state and local governments in California are operating 63 different defined benefit pension systems, with a total of 2.3 million active and inactive members.⁹ CalPERS (the California Public Employees' Retirement System), CalSTRS (the California State Teachers' Retirement System), and the University of California Retirement Plan (UCRP) are the three largest systems accounting for the majority of the public pension assets under management and liabilities owed to state and local employees and current retirees.

A defined benefit pension plan establishes a set benefit level for retirees and is funded by annual contributions to state and local pension funds by the state, localities, and employees; as well as any returns the plan's managers earn on the assets of the pension funds.

The California pension system can adequately fund the defined retirement obligations of the state, even overly-generous obligations, if the contributions to the retirement system, plus the returns state and local pension funds will earn on those contributions, exceed the payments that the state and local pension funds will make to retirees. This criterion has not been met.

First, state and local governments have failed to contribute enough money to either fund the retirement system or pay for promised health care benefits to retirees. Second, the market risks of the pension funds' assets are inconsistent with their liabilities (e.g. the promises to pay retirees a set benefit level regardless of the actual investment returns of the pension system). The result: California taxpayers now face a large funding deficit as the current expected payouts from the system exceed the current expected revenues flowing into the system; and on top of these costs, California's taxpayers may have to contribute billions more should the market returns fall short.

The financial viability of California's pension system will not be regained without changes. One path, maintains the "California Rule", which asserts that current public employees have a contract right to the pensions they have already accrued, and they are entitled to continue accruing benefits under that pension system (or one at least as generous) as long as they remain employed.

If California continues on this path, California's taxpayers will have to contribute billions more into the state-run public pension system. Taxpayers will, consequently, bear all of the funding risks and backstop the current public sector retirement benefits, regardless of the cost. This path places an unprecedented burden of meeting the current public employees' retirement promises on California's taxpayers either in the form of higher taxes, fewer public goods and services provided to citizens (i.e. crowding-out), or a combination of both. The economic consequences from maintaining the current path are dire. Californians -- especially the state's youth -- will bear large costs in terms of reduced quality of life, reduced public safety, less funding for education, higher taxes, and slower job growth. These large economic costs are particularly hard to justify in light of the overly generous public defined benefit pensions offered to public sector employees that are significantly more generous than the pensions of most private sector workers who will have to pay the costs. Therefore another path is needed.

This other path repeals the California Rule, which will likely require a constitutional amendment. Public pensions could then be reformed, leading to the creation of a pension system that is sustainable for the long-term and divides the burden between qualified public sector workers (whose pension benefits would now be worth less money) and taxpayers.

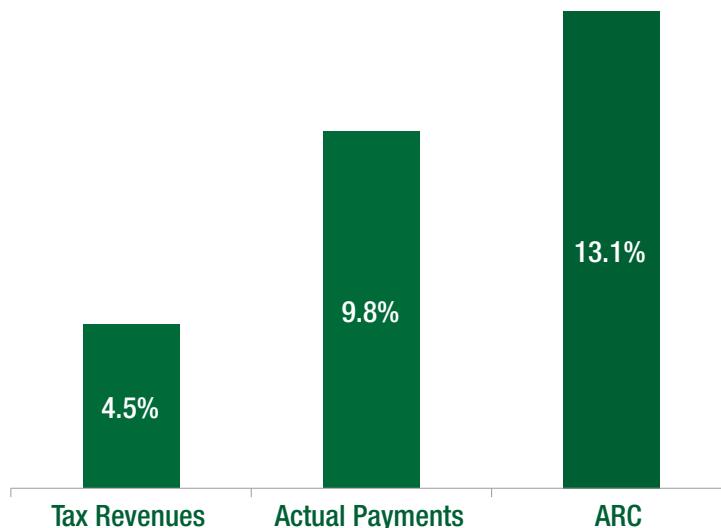
This report reviews the flaws with public pension systems that bias the system toward crises and excessive benefit levels; projects the implications in terms of crowding out other expenditure priorities and/or historically large tax increases; and discusses potential reforms that could lessen the impending adverse economic consequences.

CALIFORNIA'S PUBLIC PENSION CRISIS IS ALREADY HURTING TAXPAYERS

The adverse consequences from California's public pension crisis are no longer a theoretical problem for future budgets. The amount of money California's state and local governments are contributing toward public employee defined benefit plans is already growing at an unsustainable rate.

According to the Pew Charitable Trusts, total state run pension contributions in California in 2013 were \$11.3 billion.¹⁰ Between 2003 and 2013, these contributions grew 9.8 percent per year, which is more than double the growth in total state tax revenues over the same time period (4.5 percent), see Figure 1.¹¹ The result, by definition, is that the public pension system requires a growing share of total California tax revenues leaving less money available for all other priorities.

FIGURE 1
**California's Average Annual Growth Rate in Tax Revenues,
Actual Pension Contributions, and Recommended Pension Contributions
2003 – 2013**



Source: Pew Charitable Trusts and California Department of Finance

These large and growing contributions to public employee defined benefit plans are diverting revenues away from other priorities. In economic jargon, public pension expenditures are *crowding out* expenditures on public goods and services and creating pressure to raise taxes in order to fund government employees' retirement. For instance, as reported about San Jose, California in a 2014 *Washington Post* story,

...in the wealthy heart of Silicon Valley, the roads are pocked with potholes, the libraries are closed three days a week, and a slew of city recreation centers have been handed over to non-profit groups. Taxes have gone up even as city services are in decline, and Mayor Chuck Reed is worried.

The source of Reed's troubles: gold-plated pensions that guarantee retired city workers as much as 90 percent of their former salaries....

In San Jose and across the nation, state and local officials are increasingly confronting a vision of startling injustice: Poor and middle-class taxpayers – who often have no retirement savings – are paying higher taxes so public employees can retire in relative comfort.¹²

These large and growing contributions to public employee defined benefit plans are diverting revenues away from other priorities.

Vallejo also exemplifies how overly burdensome public pension costs are crowding out all other government priorities. Journalist George Will summarized Vallejo's problems succinctly in a 2008 editorial describing why the city went bankrupt:

Mayor Osby Davis, who has lived in this waterfront city across San Pablo Bay from San Francisco for 60 of his 62 years, says: "If you have a can that's leaking two ounces a minute and you put an ounce a minute in it, it's going to get empty." He is describing his city's coffers.

Joseph Tanner, who became city manager after this municipality of 120,000 souls was mismanaged to the brink of bankruptcy, stands at a whiteboard to explain the simple arithmetic that has pushed Vallejo over the brink. Its crisis -- a cash flow insufficient to cover contractual obligations -- came about because (to use fiscal 2007 figures) each of the 100 firefighters paid \$230 a month in union dues and each of the 140 police officers paid \$254 a month, giving their unions enormous sums to purchase a compliant city council.

So a police captain receives \$306,000 a year in pay and benefits, a lieutenant receives \$247,644, and the average for firefighters -- 21 of them earn more than \$200,000, including overtime -- is \$171,000. Police and firefighters can store up unused vacation and leave time over their careers and walk

away, as one of the more than 20 who recently retired did, with a \$370,000 check. Last year, 292 city employees made more than \$100,000. And after just five years, all police and firefighters are guaranteed lifetime health benefits.¹³

These salaries were so excessive that “police and firefighter salaries, pensions, and overtime accounted for 74 percent of Vallejo’s \$80-million general budget, significantly higher than the state average of 60 percent.”¹⁴

In bankruptcy, “the city slashed costs, including police and firefighter numbers, retiree health benefits, payments to bondholders and other city services.”¹⁵ According to Greenhut (2010)

Vallejo...slashed spending where it could, mostly by cutting personnel and services. As a recent *San Francisco Chronicle* editorial pointed out, the city cut its police force to about 100 officers from nearly 160 and warned residents to use the 911 system judiciously, even while it experienced crime rates higher than other comparable cities in California. The city has also cut funding for a senior center, youth groups, and arts organizations and has done little to restore an increasingly decrepit downtown, develop waterfront properties, or attract new businesses.

To permanently bring its spending in line with its tax base, however, at some point Vallejo will have to do something about its pensions.¹⁶

San Jose and Vallejo foreshadow California’s future. On its current path the payments necessary to maintain large and generous defined benefit pensions for state and local public employees in California will impede the governments’ ability to provide citizens with basic public services.

Yet, California’s current overly-burdensome annual payments are still insufficient...

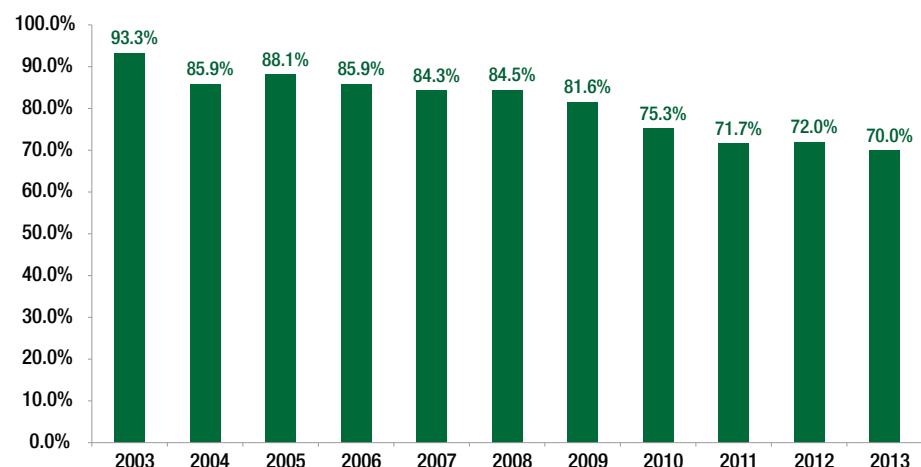
Figure 1 also illustrates that, while the current contribution levels are substantial, these contributions are also insufficient – while contributions grew 9.8 percent per year, these contributions should have grown 13.1 percent per year according to the actuaries.

Based on current government accounting practices, California’s defined benefit programs are considered fully funded when annual contributions consistently meet a contribution level known as the actuarially required contribution (ARC). The ARC is an actuarially calculated estimate that supposedly ensures that the pension systems maintain sufficient assets such that all currently accrued liabilities can be paid. The contributions are funded by state and local government revenues and contributions from public employees.

On its current path the payments necessary to maintain large and generous defined benefit pensions for state and local public employees in California will impede the governments’ ability to provide citizens with basic public services.

While in reality the ARC payments may still be insufficient (see below) California is not even meeting its ARC obligations. The \$11.3 billion contribution made in 2013 was \$4.9 billion below the ARC of \$16.2 billion – or 70.0 percent of the ARC level.¹⁷ Making the situation worse, California has not been fully covering its ARC for many years. According to the latest pension liability estimates from the Pew Charitable Trusts, California has not met its ARC obligations over the past 11 years, see Figure 2.¹⁸

FIGURE 2
California's Actual Contributions to Defined Benefit Plans as a Percentage of the Recommended Payment that Fully Funds the State Defined Benefit Pension Plans
2003 – 2013



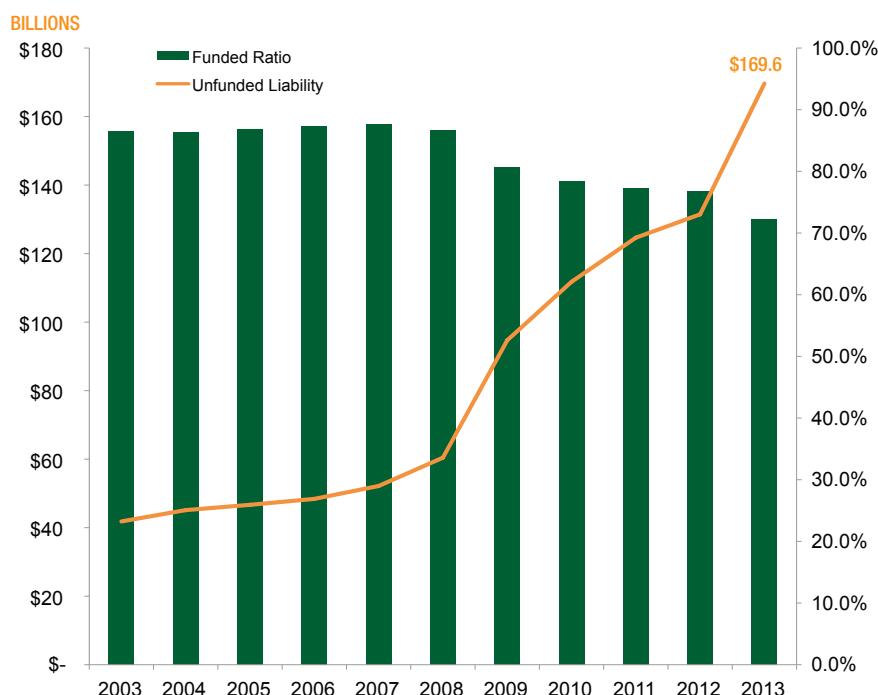
Source: Pew Charitable Trusts

...LEADING TO LARGE UNFUNDED LIABILITIES

The inadequate annual contributions have helped create California's large unfunded pension liability problem. Official estimates are substantial, despite (as discussed in detail below) the fact that the official estimates underestimate the total liabilities. Estimates from various organizations indicate that, based on the government's current accounting practices, the unfunded liabilities of California's state-run public pensions are around \$170 billion.

The Pew Charitable Trusts (2015) annually reviews the financial reports of state-run public pension systems across the country, 238 in all.¹⁹ According to the latest Pew report, the estimated unfunded pension liabilities of California's state-run pension systems were \$169.6 billion as of 2013, see Figure 3.²⁰

FIGURE 3
California's Public Pension Unfunded Liability Estimated by the Pew Charitable Trusts
Unadjusted for the Riskless Nature of Public Pension Benefits



Source: Pew Charitable Trusts

In a 2013 report, *Morningstar* estimated that as of 2012, California's unfunded liabilities were \$131.4 billion (consistent with the Pew Center's 2012 estimate), and California's funded ratio at that time (the percentage of liabilities funded with assets) was 76 percent.²¹

In a 2014 report, the *Legislative Analyst's Office* (LAO) estimated that out of \$340 billion in total unfunded liabilities, there were \$167.9 billion in pension and retiree health care obligations that are unaddressed.²² The LAO did not include the estimated \$50 billion unfunded liabilities problem of CalPERS in these estimates because the LAO deemed the actions taken by the CalPERS board, such as the expected increase in employer funding (e.g. funding from the state and local governments), was sufficient to close this funding gap.

Estimates for the unfunded liabilities of CalSTRS and CalPERS are consistent with these findings. The *LAO* and *CalSTRS* estimated that CalSTRS' unfunded liability as of June 2011 was \$70 billion.²³ According to its Comprehensive Annual Financial Report, *CalPERS* had a \$57.2 billion unfunded liability in 2011, which has grown to \$93.1 billion as of 2013 based on the

The total unfunded liabilities recognized by the government accounting practices in 2013 were around 34 percent larger than the total annual state tax revenues in 2013.

actuarial value of its assets (the actuarial value that averages yearly losses and gains over several years).²⁴ Compared to the market value of its assets, *CalPERS* had an \$86.8 billion unfunded liability in 2011, which grew to \$113.4 billion in 2013.²⁵

In addition to these unfunded costs, California also faces unfunded costs related to other retirement benefits, the majority of which are promised retiree health care costs. As of 2013, these costs, also referred to as the unfunded OPEB liability, were an additional \$64.6 billion.²⁶

Putting these unfunded costs in perspective, total state tax revenues in FY 2013 were \$126.8 billion, which grew to \$141.2 billion in FY 2015.²⁷ *The total unfunded liabilities recognized by the government accounting practices in 2013 were around 34 percent larger than the total annual state tax revenues in 2013.*

Making matters worse, the official government accounting methods significantly underestimate the actual unfunded liabilities California has amassed. The reason: the official estimates do not account for the fact that the pension benefits are guaranteed – these payments are not supposed to bear any market risk. Appropriately accounting for risk significantly changes the outlook – for the worse.

ACCOUNTING FOR RISK

California's public pension systems are transferring risks from public employees to taxpayers without formally accounting for the terms and financial implications created by this risk transfer.

Life is full of risks. Whether it is the risk of traffic accidents when driving a car or the unexpected fluctuations in exchange rates when investing in another country, many people want to reduce or transfer the financial consequences they would have to bear should the unwanted happen.

Take automobile insurance. There is a risk of being in an accident while driving a car; albeit, for most drivers, a relatively low risk. However, while the risk of being in an accident is low, the financial consequences from an accident, should it occur, could be very large. Automobile insurance offers drivers a means to transfer the financial risk of accidents from drivers to an insurance company. In exchange for bearing the financial risks, the insurance company receives regular payments from the drivers the company insures – the payments being high enough such that over the large population of drivers the company insures, the income the insurance company earns exceeds the money the company pays to cover the costs of the accidents that do occur.

Automobile insurance exemplifies the broader principles involved. Entities or people that bear other people's (or entities) financial risks provide a valuable market service. Outside of public pensions, the entities or people that bear others' risks receive compensation for these services. California's public sector employees, on the other hand, receive a risk transferring service from taxpayers without having to pay for it.

Government defined benefit pension plans provide retirees guaranteed income based on the workers' job type, years of experience, age at retirement, and salary. These benefits are purportedly a *sure thing*, creating an illusion that the growth in the public pension plans' assets are a sure thing as well. As Biggs (2010) noted "current pension accounting methods report plans' funding shortfalls assuming that pension investments in stocks, bonds, hedge funds, and private equity will produce forecasted rates of return with certainty."²⁸

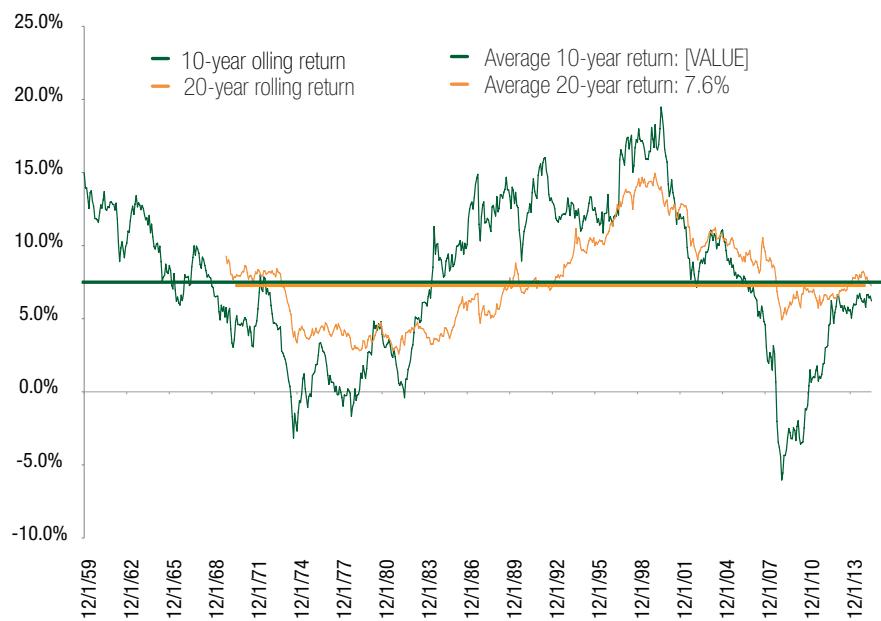
Investing is not a sure thing: returns in the financial market always come with risk. For instance, between January 1950 and January 2015, the S&P 500 increased 7.7 percent per year, on average (including the impacts from inflation). The average returns over sub-periods of this timeframe can vary substantially from this average.

For instance, a 25 year old employee in 1950 who retired at 67 years of age would earn 7.6 percent per year if he or she held his or her entire pension assets in the S&P 500 (around the average performance over the entire period). However, a 25 year old employee in 1966 who retired at 67 years of age would earn 5.9 percent per year if he or she held his or her entire pension assets in the S&P 500 (17.0 percent below the average performance over the entire period).

Such performance discrepancies are expected. It exemplifies why workers nearing retirement are advised to reduce their exposure to higher risk investments – when investors have short-time horizons, long-term investment averages are less relevant. Figure 4 presents the rolling 10-year average annual return and 20-year average annual return for the S&P 500. The average 10-year (7.8 percent) and 20-year (7.6 percent) returns are similar to the average returns in the market over the entire period (7.7 percent). But, as Figure 4 illustrates there are prolonged periods of time when the market significantly underperforms these averages. Risks arise if a prolonged period of underperformance (that is natural to the stock market) occurs at the wrong time leaving the pension fund short of the required assets it needs to meet the pension requirements of employees.

California's public pension systems are transferring risks from public employees to taxpayers without formally accounting for the terms and financial implications created by this risk transfer.

FIGURE 4
Average Annual Return for the S&P 500 (10-year and 20-year Rolling Periods)
1959 - 2015



Source: Yahoo! Finance, Adjusted Close

From the employees' perspective, the actual market returns do not matter – their promised pension income does not change when the returns of the pension fund change. This promise creates a belief that pension payments paid to public employees should not bear any market risk.

This is not the case for most private sector workers. When private sector workers save for retirement, they bear all of the market risks from their investments. Should they invest in a high-risk company that ultimately succeeds, then the investors will have a very comfortable retirement. However, should the high-risk company go bust, the workers' pensions will bear the consequences from having taken these risks.

The connection between risks and returns do not only apply to people's retirement – it applies universally to all savings and investing, and people saving for life events must consistently manage the trade-offs between risks and returns. For instance, it would be unwise for a family preparing to pay their child's college tuition next autumn to invest all of that money in a high-risk stock. Perhaps the stock will soar and the family will be able to both pay the tuition and send their child to school in a shiny new car. But, perhaps not. It is also possible that the high-risk stock will plummet in value risking the family's ability to pay their child's school costs and require the child to take out loans to attend college. The potential returns the family can earn cannot be separated from their ability to manage the potential losses that often occur in high-risk investments.

By intent of the defined benefit public pension programs, public employees are told they are insulated from the market risks that are borne on their behalf. Although the pension payments paid to public sector employees are not supposed to bear any market risk, the assets that actually fund the pensions bear market risks. And, herein lies the problem.

The fundamental connection between risk and return applies to the managers of California's pension system. California's pension systems are, generally, committed to earning an annual average return between 7.0 percent and 7.5 percent – a return consistent with average stock market risks. If, as is evident in the historic returns of the S&P 500, the possibility that the pension system fails to earn its targeted rate of return over a prolonged period of time occurs, then there will be insufficient assets to pay the accrued liabilities (i.e. the defined pensions offered to the public sector workers).

Instead of the pensioners suffering the consequences of the risks undertaken on their behalf, however, the current system asks taxpayers to cover the investment underperformance of the pension funds by appropriating more money to the pension funds from the state and local budgets. When greater allocations to the pension funds must be made, the state or local government must either raise tax revenues or divert a larger share of the budget away from services provided to current taxpayers. Under either scenario, the taxpayers, particularly future taxpayers, are bearing the pension funds' risk on behalf of pensioners.

The fundamental connection between risk and return applies to the managers of California's pension system.

As discussed in the beginning of this section, such a risk transfer is a valuable market service akin to a put option in finance – in this case, the pension recipients have the option to *cash-in* the pension fund at the defined benefit level and the taxpayer has the obligation to fund the difference between the pension funds' actual market value relative to the value of the defined benefit levels (e.g. the unfunded liability).

The result is that pensioners are receiving a valuable service without having to pay for it, and taxpayers face potentially large costs.

Like any put option, should the value of the pension exceed the defined benefit level, the option would not be exercised (the taxpayer is not asked to cover any of the potentially large costs). Regardless of whether the option is used, public employees are enjoying an important benefit from taxpayers without having to pay the costs of that benefit – the transfer of underperformance risk from the current public employees to future California taxpayers. Returning to the automobile insurance example, a driver who was never in an accident (and therefore never received any insurance payments) still benefited from the risk transfer services provided by the insurance company.

The value public employees receive from transferring the financial risk to taxpayers is large, and failing to account for the value of these benefits is consequential. Biggs (2010) explains the implications from ignoring the value of this transfer:

Actuarial-accounting methods do not disclose the price of this taxpayer-provided option and therefore omit a significant contingent liability the public faces. Using the Black-Scholes options-pricing formula, however, we can calculate the cost of this risk and show the true funding status of public-sector pensions. Pension shortfalls calculated using this market-valuation method represent the amount taxpayers would be willing to pay today to eliminate the chance of much larger payments in the future. Given market volatility, the chance of extremely large future deficits is significant.²⁹

Biggs (2010)³⁰ and Rauh and Novy-Marx (2009 and 2011),³¹ also illustrate that ignoring the value of the put-option is a core reason why the current valuation methods of California's pension liabilities underestimate the true costs. The defined benefit pension system offered to public employees of California promises returns that require risk, but asks others to bear that risk without compensation. Such a situation will likely impose large costs on taxpayers. As Novy-Marx and Rauh (2009) summarize the problem, “under current pension fund investment policy, there is a wide distribution of possible future funding outcomes. The outcomes are skewed in such a way that *there is a small probability of an extremely good outcome and a large probability of poor outcomes.*”³²

These consequences result, in part, from the principal-agent problem discussed later. Correcting this uncompensated risk transfer is an important reform.

The outcomes are skewed in such a way that there is a small probability of an extremely good outcome and a large probability of poor outcomes.

RE-EVALUATING CALIFORNIA'S UNFUNDED LIABILITIES ACCOUNTING FOR THE RISKS

A key assumption when estimating the necessary contributions for the defined benefit public pension system is the assumed discount rate used to estimate the value of future pension liabilities. California's pension systems obscure the costs of the defined benefit plans by assuming rates of return that are inconsistent with their obligations – the rates of returns require the plans to assume market risks while their obligations are supposed to be riskless.

By assuming rates of return that are inappropriately high, California's public pensions are understating the amount of money that is needed to fund the future retiree benefits. The consequence is the illusion that public sector defined benefit plans are in better shape than they are. In fact, as demonstrated by the transformation of the private sector, defined benefit plans are unaffordable when their actual costs are fully recognized.

Determining the correct discount rate is important because California's pension systems do not need \$10 million today in order to pay \$10.0 million to pensioners next year. Instead, if the pension system can earn 10.0 percent on its holdings, then the pension system only needs \$9.09 million today – in this case the assumed discount rate is 10.0 percent. The pension could then invest the \$9.09 million and earn 10.0 percent (or \$909,000) this year. By next year, the pension system would have the \$10.0 million that it owes to pensioners and, based on current accounting standards, with a 10.0 percent return assumption a pension system with \$9.09 million today but owes \$10.0 million next year would be considered fully funded – the unfunded liabilities would equal zero.

What if the pension system cannot earn 10.0 percent on its holdings? If the pension system can only earn 5.0 percent, then instead of needing \$9.09 million to pay pensioners \$10.0 million next year the pension system would need \$9.52 million. And, this is why choosing the appropriate discount rate is such an important assumption. If the pension system only had \$9.09 million, but the appropriate discount rate is 5.0 percent not 10.0 percent, then the pension system would have a \$455,000 unfunded liability instead of being considered fully funded.

The discount rate used by most California pension systems ranges between 7 percent and 8 percent, and, much like the simplified example above, is based on the plan's projected rate of return. The problem arises because of risk. It is not the average potential return (and therefore the amount of risk) that the public pension systems can earn on its assets that is relevant – instead, it is the risk (or certainty) of the liabilities that matters. As Biggs (2010) explains:

Discounting liabilities at the plan's projected rate of return has intuitive appeal, but financial economists and the practice of financial markets object to using an interest rate derived from risky investments to discount the value of a riskless liability. As University of Illinois finance professor Jeffrey R. Brown and Federal Reserve economist David W. Wilcox write, "Finance theory is unambiguous in that the discount rate used to value future pension obligations should reflect the riskiness of the liabilities."^{*}

The following example illustrates the problems with discounting liabilities using the expected interest rate on a risky portfolio: imagine a pension that owes a lump-sum liability of \$10 million to be paid fifteen years from now. If we discount that liability by the 8 percent return typically projected for pension assets, it has a present value of \$3.15 million. A public pension would consider that liability fully funded if it held at least \$3.15 million in assets. The practical problem is

that those assets are risky while the liability is certain. A simple simulation of market returns shows that, even if we assume that the average long-term return is accurately predicted at 8 percent, volatility from year to year means that \$3.15 million in assets today would have only around a 40 percent chance of reaching the goal of \$10 million in fifteen years. The remaining 60 percent of the time the plan's investments would fall short.

Alternatively, if the plan discounted the \$10 million liability at a safe interest rate—say, at 3.6 percent, equivalent to the yield on U.S. Treasury bonds with a maturity of fifteen years—the plan could be virtually certain of being able to pay its debt. However, the upfront cost would be larger: to be fully funded, the plan would presently need to have \$5.88 million in assets instead of \$3.15 million.³³

If the plan's liabilities (i.e. the defined pension benefits promised government workers) bore market risk, then it would be appropriate for the plan's assets to bear market risk. By definition of the promised benefits, this is not the case. Therefore, the official estimates that discount the future liabilities by a rate between 7 percent and 8 percent based on their assumed return on assets are likely understating the actual unfunded liabilities. For this reason, several analyses examining California's unfunded pension liabilities will use a discount rate that is lower than the officially used rates that is closer to a riskless discount rate.

The different discount rate assumptions lead to a wide range of estimated unfunded pension liabilities. The many answers to the question “how large are California's unfunded public pension liabilities?” are an argument against the defined benefits program by itself. The expenditure uncertainty makes it more difficult for the state and local budgets to establish an effective and sustainable fiscal program.

Importantly, even those estimates presented above that do not correct the discount rate assumptions to reflect the risks of the liabilities (not assets) find that California's public pension systems do not have adequate resources to pay for the benefits that have been promised to current and future retirees – California's public pension system has a large dollar value of unfunded liabilities. The only question is: How much money will taxpayers need to contribute?

The following overview reviews various estimates of California's unfunded pension liabilities relying on different discount rate assumptions, with different levels of comprehensiveness (i.e. some estimated unfunded pension liabilities account for the major state plans only, while other estimated unfunded pension liabilities account for all state and local pension plans). In addition to the unfunded pension liabilities, California also promises to pay

The different discount rate assumptions lead to a wide range of estimated unfunded pension liabilities. The many answers to the question “how large are California's unfunded public pension liabilities?” are an argument against the defined benefits program by itself.

the health care costs of state and local government retirees. These health care costs are generally unfunded, adding to the total unfunded liabilities' problem.

Nation (2011) of the Stanford Institute for Economic Policy Research estimated the public pension deficits for California's three largest pension funds (CalPERS, CalSTRS, and UCRP) under different return assumptions. According to Nation (2011) "the combined unfunded liability for CalPERS, CalSTRS, and UCRP under the 6.2 percent discount rate is \$290.6 billion, equal to more than three state General Fund budgets. That figure represents an unfunded amount per household of nearly \$24,000. Using a low-risk, or risk-free, discount rate, the combined unfunded liability for these three systems reaches \$497.9 billion."³⁴

Storms and Nation (2012) expanded the analysis to examine the 24 largest independent pension systems. In aggregate, these 24 systems were only 53.6 percent funded based on a 5.0 percent discount rate, or a \$135.7 billion unfunded liability.³⁵

Biggs (2010) estimated California's state-only public pension shortfall, including the value of the taxpayer provided put-option, to be \$454 billion.³⁶

Novy-Marx and Rauh (2011) estimated that, based on the yield on Treasury bonds to reflect the risks associated with the pension liabilities, California's unfunded pension liability for the three major state pension funds as of June 2009 was \$370.1 billion.³⁷

Eucalitto (2013) of *State Budget Solutions* estimated California's pension liabilities using the yield of a 15-year Treasury bond as the discount rate,³⁸ finding that California's unfunded liability as of 2012 was \$640.6 billion.

These various estimates of California's unfunded pension liabilities, along with the previous estimates based on official government accounting, are summarized in Table 1. As evident from reviewing Table 1, the official unfunded pension liability estimates, while significantly smaller than the risk-adjusted estimates, are still quite large. Due to the unwillingness of the California state and local governments to annually contribute sufficient resources into the pension funds, California is not currently on a path to close these unfunded liabilities.

TABLE 1
Estimates of California's Unfunded Pension Liabilities

Study Author	Year of Estimate	Coverage	Discount Rate Assumption	Estimated Unfunded Liability (billions)
Government Accounting Assumptions				
Pew Charitable Trusts	2013	State-run pension systems	State assumed ROA	\$169.6
Morningstar	2012	State-run pension systems	State assumed ROA	\$131.4
Legislative Analyst's Office	2014	State-run pension systems & OPEB*	State assumed ROA	\$217.9
Risk-Adjusted Accounting Assumptions				
Nation (Stanford Institute for Economic Policy Research)	2011	CalPERS, CalSTRS, UCRP	7.75%**	\$142.6
			6.20%	\$290.6
			4.50%	\$497.9
Storms & Nation (Stanford Institute for Economic Policy Research)	2011	24 largest independent pension systems	7.75%**	\$36.0
			5.00%	\$135.7
Biggs, American Enterprise Institute	2008	California state pensions	3.60%	\$454.0
Novy-Marx and Rauh (2011)	2009	CalPERS, CalSTRS, UCRP	3.53%	\$370.1
Eucalitto (2013)	2012	State level DB plans	3.225%	\$640.6

* Includes the estimated \$50 billion CalPERS unfunded liability.

** The 7.75 percent discount rates used by Nation and Storms & Nation are consistent with the government accounting assumptions.

To put these various estimates of California's unfunded pension liabilities into perspective, Table 2 compares the estimated unfunded liabilities to total tax revenues (\$135 billion) and state GDP (\$2.3 trillion) as of 2014.

TABLE 2
Estimates of California's Unfunded Pension Liabilities As a Percentage of 2014 Tax Revenues and 2014 State GDP

Study Author	Estimated Unfunded Liability (billions)	Estimated Unfunded Liability as a % of 2014 Tax Revenues	Estimated Unfunded Liability as a % of 2014 State GDP
Government Accounting Assumptions			
Pew Charitable Trusts	\$169.6	125.4%	7.3%
Morningstar	\$131.4	97.1%	5.7%
Legislative Analyst's Office	\$217.9	161.1%	9.4%
Risk-Adjusted Accounting Assumptions			
Nation, Stanford Institute for Economic Policy Research	\$142.6 \$290.6 \$497.9	105.4% 214.8% 368.0%	6.2% 12.6% 21.5%
Storms & Nation, Stanford Institute for Economic Policy Research	\$36.0 \$135.7	26.6% 100.3%	1.6% 5.9%
Biggs, American Enterprise Institute	\$454.0	335.6%	19.6%
Novy-Marx and Rauh (2011)	\$370.1	273.6%	16.0%
Eucalitto (2013)	\$640.6	473.5%	27.7%

* Includes the estimated \$50 billion CalPERS unfunded liability.

Before discussing the economic consequences from the unaffordable pension plans, and reforms that can help reduce these burdens, it is important to review the incentives that are creating overly-generous pension benefits.

Table 2 illustrates that even without properly accounting for risk, California's current unfunded liabilities are equal to an entire year's worth of tax revenues, and between 6 percent and 9 percent of total state economic activity. Properly accounting for risk, and the burden from these liabilities increase significantly – with some estimates showing the liabilities equal to over 400 percent of the entire tax revenues in one year, or one-fourth of the total value of California's economic output.

It is neither necessary nor desirable to close California's unfunded liabilities in one year. However, these benchmarks illustrate how unaffordable California's defined benefit public pension systems have become. Before discussing the economic consequences from the unaffordable pension plans, and reforms that can help reduce these burdens, it is important to review the incentives that are creating overly-generous pension benefits. Understanding how these overly generous benefits have been offered begins with an understanding of what economists call a principal-agent problem.

ADVERSE INCENTIVES WORSEN THE UNFUNDED DEFINED BENEFIT PROBLEM

A principal-agent problem arises when agents (in this case politicians), who are supposed to work on behalf of the principals (in this case taxpayers), have interests that conflict with the principals. Due to the principal-agent problem, politicians (the agents) have offered pensions and retirement health benefits to public sector workers that are overly generous and do not reflect the interests of the taxpayers (the principals) and failed to properly accumulate the necessary resources to fund these benefits. Summers (2010) summarized the principal-agent problem as it relates to California's public pension system:

At the heart of the pension crisis is a set of incentives that encourages policymakers to make decisions for which they do not have to bear the consequences. Since, under a defined-benefit retirement system, lawmakers, pension board members and union officials do not bear the costs of the benefit increases they preside over, there is no incentive for them to show fiscal restraint. Policy leaders get to reap the political rewards of creating lucrative new benefits for employees or underfunding a system and freeing those monies for other purposes in the short term, and in the long term the bills for increased costs they impose on the system will not come due until they are long gone from their positions of power. The predictable result is promises to pay extravagant benefits that the state cannot afford. Even the governor, the state treasurer, and the chief actuary of CalPERS now admit that California's pension benefits are unsustainable.³⁹

The problems of contributing insufficient revenues (based on the ARC), particularly during periods of tight state and local budgets, are compounded by the problem of increasing promised benefits during periods of strong state and local revenue growth. SB 400 exemplifies this problem.

In the heyday of the Internet bubble of the late 1990s, California's defined benefit programs were flush with cash. For instance, CalPERS funded status peaked at 137.9 percent in 1999.⁴⁰ With the benefit of hindsight, it is clear that the extraordinary returns of the late 1990s were not sustainable, and a major correction in stock prices followed. Before the bubble revealed itself, however, California legislators passed SB 400 in 1999. SB 400 expanded retiree benefits based on the incorrect assumption that robust investment returns would be more than sufficient to cover the costs. When this turned out not to be the case, the burden of covering these costs was shifted onto the taxpayer. Making matters worse, these new taxpayer obligations needed to be met regardless of the economy's health.

According to the Pew Charitable Trusts, California's contribution to its retirement system has been below the ARC level for the past 11 years indicating that the unfunded pension liabilities are growing over time.

However, California has failed to meet its obligations. Since SB 400 was passed, California has not met the contribution amounts that the actuaries have determined are required to fund accruing liabilities and the amortized cost from current unfunded pension liabilities. As presented earlier, according to the Pew Charitable Trusts, California's contribution to its retirement system has been below the ARC level for the past 11 years indicating that the unfunded pension liabilities are growing over time.⁴¹

California's experience with SB 400 (i.e. promising unaffordable benefits during prosperous times that impose a bill on taxpayers during weak economic times) is typical of the defined benefit programs. Summers (2010) summarizes this problem:

The defined-benefit structure of the vast majority of government worker retirement plans forces governments (that is, taxpayers) to pay more during recessions to make up for shortfalls in pension fund investments. Not only is the defined-benefit pension system unsustainable, it is unfair to taxpayers in the private sector, who are forced to pay more to recession-proof government workers' pensions even as they are struggling to save for their own retiree health care costs and seeing their own retirement benefits reduced during rough economic times.⁴²

The adverse incentives are allowed to fester because the public defined benefit pension plans are held to a different accounting standard than private defined benefit pension plans. When coupled with the political incentives to over-promise pension benefits in the future while under-contributing to the investment funds in the present, the true costs of the public defined pension plans are being obscured from taxpayers. Taxpayers are, consequently, paying compensation to public workers without a complete and accurate understanding of the total costs of those compensation packages. The result is California's unaffordable public pension system that is significantly more generous than the pensions of most private sector workers.

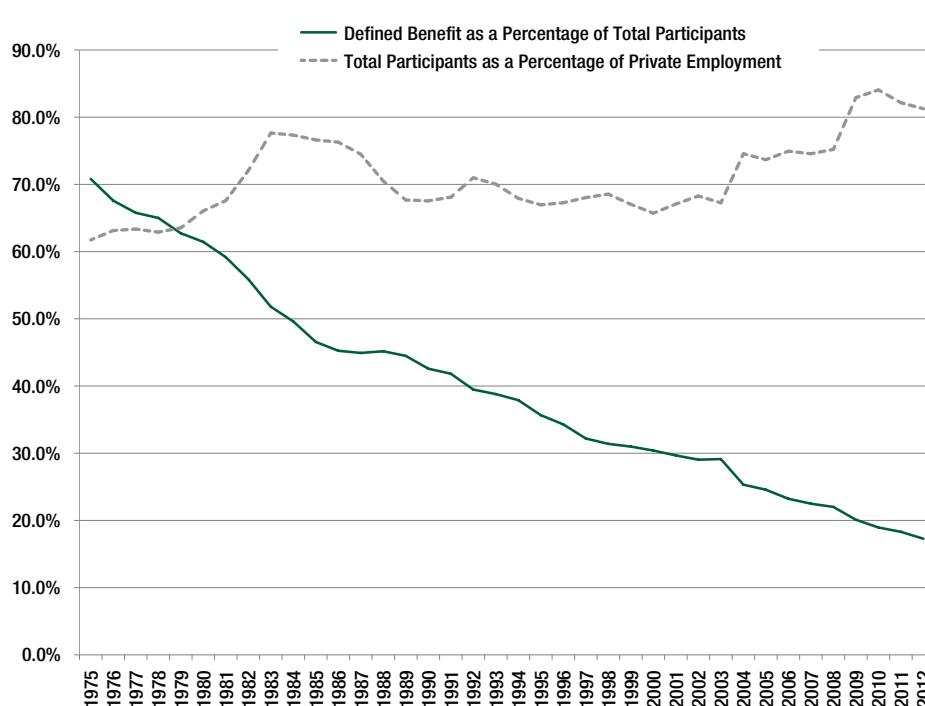
It is noteworthy that California, like most states and localities, continues to offer public workers defined benefit pensions while over the past 30 years the private pension system in the United States has gone through a radical transformation. Defined benefit plans were once the primary pension plan for private sector workers. In 1975 nearly 71 percent of the 38.4 million people who were active participants in a private sector pension plan were covered by a defined benefit plan, see Figure 5.⁴³ By 2012 only 17.3 percent of the 91.2 million people covered by a private sector pension were active participants in a defined benefit plan.

The same pattern holds in absolute terms as well despite the growth in the overall private sector workforce. In 1975, 27.2 million workers were covered by a defined benefit plan. By 2012, only 15.7 million workers were covered by a defined benefit plan. Total coverage of defined benefit plans in the private sector has declined both in relative and absolute terms.

It is noteworthy that California, like most states and localities, continues to offer public workers defined benefit pensions while over the past 30 years the private pension system in the United States has gone through a radical transformation.

FIGURE 5

**Percentage of Active Private Sector Pension Participants Covered by a Defined Benefit Plan Compared to Total Participants in a Private Sector Pension Plan Relative to Total Private Employment
1975 – 2012**



Source: U.S. Department of Labor

Figure 5 also presents the share of total private sector employees covered by a pension plan – either a defined benefit plan or a defined contribution plan. Figure 5 illustrates that while the availability of defined benefit plans has been declining for the past 40 years, total pension coverage in the private sector has been increasing. The increase in coverage is due to the growing availability of defined contribution plans that have not only replaced defined benefit plans that were previously available, but have expanded pension coverage to a wider share of the working population. This transformation of the private pension has radically changed the pension benefits most workers receive. Defined contribution plans are now the normal pension plan for the private sector workforce in the U.S. for those workers that have access to pension benefits.

Defined contribution plans are now the normal pension plan for the private sector workforce in the U.S. for those workers that have access to pension benefits.

According to Gale et al., the private sector's movement away from defined benefit plans (DB) toward defined contribution plans (DC) occurred for three reasons, "increased regulation of DB plans following passage of ERISA in 1974, the changing composition of the work force, and tax law changes."⁴⁴ Munnell et al. (2007) similarly found that:

In the private sector, the Employee Retirement Income Security Act of 1974 (ERISA) imposes minimum standards for participation, vesting, and funding; state and local plans are not covered by this legislation. ERISA also established the Pension Benefit Guaranty Corporation (PBGC), which collects premiums from plan sponsors and pays benefits (within limits and subject to certain restrictions) in the event of plan termination. Public plans are not covered by ERISA or the PBGC. The absence of these regulations could increase the desirability of defined benefit plans by lowering administrative costs and allowing later vesting.

The enactment of ERISA raised the costs of running a private defined benefit plan. It was not just the effect of the original legislation, but during the 1980s Congress passed significant pension legislation every few years. Congress also repeatedly raised PBGC premiums and imposed an excise tax on employers who claim the excess assets of terminated defined benefit plans. The cumulative impact of the legislative changes increased the costs of defined benefit plans relative to those for defined contribution plans.⁴⁵

Other researchers echoed the findings that ERISA significantly raised the costs for private sector employers to sponsor a defined benefit plan. Hustead (1998) illustrated that due to the higher regulatory burden, the cost for an employer to offer a defined benefit plan rose from 140 percent of the cost of offering a defined contribution plan in 1981 to more than 210 percent in 1996.⁴⁶ Kruse (1995) found that rising administrative costs due to ERISA were a contributory factor in the decline of the defined benefit plan in the private sector.⁴⁷

The implementation of the ERISA regulations has clearly been an important cause of the private sector's long-term transformation toward defined contribution plans from defined benefit plans. State and local government pension plans are not subject to ERISA regulations explaining, in part, why the California state and local governments still rely on defined benefit plans to such a large extent. The purpose of the ERISA regulations were, in part "to protect against private sector mismanagement of employee benefit plans which placed individual participants' potential benefits at risk."⁴⁸

The same concerns regarding the management of private sector defined benefit plans and labor force changes apply to public sector workers.

Beyond the more accurate accounting of the costs, analysts have also cited changes in the demand for defined benefit programs from employees. Rauh and Stefanescu summarize these changes:

The structure and dynamics of the labor force have changed significantly in the last twenty years. Employees started to attach greater value to flexibility and the control over their retirement funds offered by 401(k) accounts. Along with technological innovation, employment turnover increased and mobility became more valuable.⁴⁹

California's pension systems have amassed hundreds of billions of dollars in unfunded liabilities that are placing taxpayers at significant risk, essentially violating the purpose of ERISA. The underfunding of the defined benefit plans would not be permissible if ERISA requirements were applied to public pension systems. In fact, ERISA was implemented, in large part, to prohibit the private sector from underfunding defined benefit plans in the manner that the California government has been doing. California's consistent underfunding of its defined pension plans indicate that by not having to abide by the same rules as the private sector, the California government is able to ignore the full costs of maintaining a defined benefit plan.

ERISA's impact on the private sector provides an important lesson for California. The entitlement nature of the DB plans creates an unknown and heavy burden that, when coupled with budget constraints and current unfunded liabilities, inevitably lead to placing either potential benefits or taxpayers at risk.

These trends also illustrate the problems created when the full value of the risks are not taken into account. When ERISA forced private pensions to fully account for the risks created by defined benefit plans, most private sector businesses realized these plans were too costly to run. California, on the other hand, is not accounting for these costs. Due to this subsidy, California continues to offer a compensation package that is too costly to provide.

The result of these trends is the current large inequity between similarly situated private sector workers compared to public sector workers.

A TALE OF TWO TEACHERS

To illustrate this inequity, the potential retirement income of two teachers with the same lifetime earning profiles are compared. The public sector teacher is covered under CalSTRS 2@62 retirement benefit program. The private sector teacher has access to the typical private sector defined contribution benefit.⁵⁰

The calculations assume both teachers begin working at age 25; begin their careers earning the average starting salary for a teacher (\$39,972),⁵¹ and, adjusted for inflation, receive a 2 percent annual increase in their salaries each and every year until they both retire at age 67 – the Social Security retirement age for people born 1960 and after.⁵² By the time both workers

retire, they would have worked for 43 years and their final salary, in inflation adjusted dollars, would be \$91,825.

Despite their equivalent lifetime incomes, the income available to each person during retirement varies significantly. The public school teacher's initial annual pension is based on the formula:

$$\text{Retirement Benefit} = \text{Service Credit} * \text{Age Factor} * \text{Final Compensation.}^{53}$$

The Service Credit is the number of years the teacher worked, or in this case 43 years. The Age Factor is the percentage of final compensation upon which the retiree's pension is based. By retiring at 67, this hypothetical retiree would be *entitled* to 2.4 percent of his final compensation. The Final Compensation under the 2@62 formula is the average salary of the teacher over his or her final three years (36 consecutive months) of working. Applying this formula, the teacher in the hypothetical example would receive an annual pension of \$92,918 in his first year of retirement. This benefit would then be eligible for inflation and benefit adjustments. Public sector teachers are not eligible to receive Social Security benefits.

Determining the income of a private sector teacher during retirement is a more difficult calculation. First, his retirement income depends upon how much he saves throughout his working life and how much his employer contributes to his retirement. It is important to note that for this comparison the savings and return assumptions are skewed in favor of the private sector worker amassing a larger retirement nest egg and may lead to a more generous retirement nest egg than data on 401(k) assets indicate.⁵⁴

The average employer defined contribution plan matches every dollar an employee contributes to his or her retirement account with a \$0.50 employer contribution that is capped at 6 percent of the employee's salary.⁵⁵ This indicates that if an employee is willing to allocate at least 6 percent of his salary toward his retirement account, his employer will allocate an additional 3 percent of the employee's salary toward his retirement.

Of course, employees can save more. A 2013 survey conducted by WorldatWork and the American Benefits Institute found most eligible employees currently participate in the firm's 401(k) plan; and "the most common level of employee participation reported by plan sponsors was between 5 percent and 7 percent of salary per employee paycheck."⁵⁶ This savings rate is slightly below the rule of thumb offered by financial planners to save between 10 percent and 15 percent of your income for retirement starting in your 20s.⁵⁷

Assuming that the private sector teacher follows the rule of thumb and saves 10 percent of his salary, and receives an additional employer match of 3 percent of his salary in an employer match (\$0.50 for every dollar of salary up to the first 6 percent of the employee's salary), the employee has a total annual contribution of 13 percent of his salary that is dedicated toward his retirement. Further assuming that he earns a constant annual return equal to the average annual inflation adjusted return of the S&P 500 over the last 43 years (3.4 percent), the private sector teacher would amass a \$677,433 nest egg (adjusted for inflation) for his retirement by the time he retires at age 67.

At age 67, the life expectancy of a man is an additional 16.1 years.⁵⁸ The life expectancy of a woman at age 67 is an additional 18.6 years.⁵⁹ Assuming the private sector retiree wants his nest egg to last 18.6 years, and his retirement assets earn the average inflation adjusted return on a 10-year Treasury bond over the last 43 years (2.2 percent), then this worker can spend \$44,819 a year.

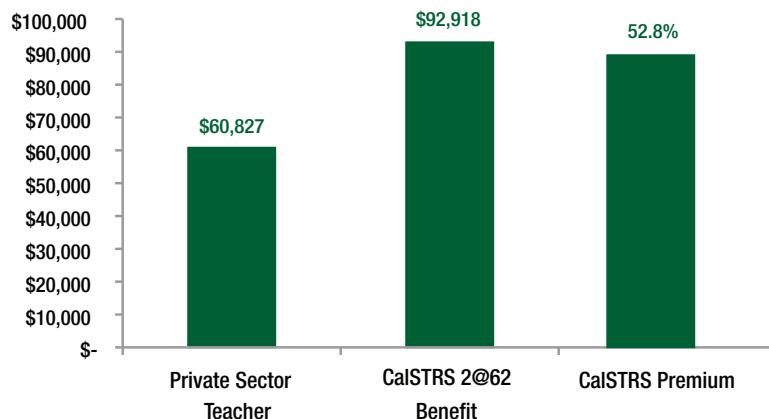
Under this assumption, the private sector teacher will spend down his entire retirement nest egg built up in his defined contribution retirement plan over the next 18.6 years. If he wants the nest egg to last longer, then he will need to spend less than \$44,819 per year.

In addition to the income from his defined contribution retirement plan, most private sector workers also are entitled to Social Security benefits. According to the Social Security Administration, the average monthly benefit for new retired workers in 2013 was \$1,334, or \$16,008 a year.

Adding together the income from his defined contribution plan and Social Security, this hypothetical private sector teacher's total annual income during his retirement would be \$60,827. The hypothetical California public school teacher that earns the exact same lifetime income over the exact same number of years would have a retirement income that is 52.8 percent larger than the hypothetical private sector teacher, see Figure 6.

FIGURE 6

**A Comparison of the Hypothetical Retirement Income
Government Worker under CalSTRS versus Typical Private
Sector Defined Contribution Plan**



While individual choices will alter the actual retirement income, the calculations illustrate that, when put on a comparable basis, the pension income offered to government workers is significantly more generous than the pension income similarly situated private sector workers should expect. These outcomes are consistent with the unwanted consequences created when a principal-agent problem exists.

The outcomes from California's public pension system are consistent with the outcomes of the principal-agent problem predicted by Summers (2010). California's public pension system, exempted from private sector accounting rules that required full accounting of the pension costs, has been able to offer retirement benefits that are more generous than private sector retirement benefits without setting aside assets that are sufficient to pay for these benefits. State and local leaders that offered these benefits were able to appease employees' compensation demands while at the same time, perhaps unintentionally, the full costs of the compensation packages were obscured from the taxpayers. The result is the current large unfunded liabilities of California's state and local public defined benefit pensions.

THE CONSEQUENCES FROM CALIFORNIA'S UNFUNDED PENSION LIABILITIES

In reference to the national problem of unfunded state and local public pensions, the Congressional Budget Office (CBO) noted that “most of the additional funding needed to cover pension liabilities is likely to take the form of higher government contributions and therefore will require higher taxes or reduced government services for residents.”⁶⁰ And, what is true for the nation overall, is true for California. In some parts of California, the tradeoffs are already evident.

Assuming a 6.2 percent discount rate and other minor demographic changes, current state spending on pensions is likely to increase from \$4.8 billion in 2011-2012 to \$14.6 billion, or the equivalent of 17.3 percent of current General Fund expenditures. Current state pension spending share of the General Fund is 5.7 percent. That increased spending on pensions is virtually certain to continue to crowd out non-pension spending, including education and social services.

The costs of delay to the state are large. At a 6.2 percent discount rate, the annual combined shortfall for CalPERS, CalSTRS, and UCRP is \$16.8 billion. The cost of delay over the next year is \$1.247 billion, or \$3.4 million each day. Those costs increase in subsequent years.⁶¹

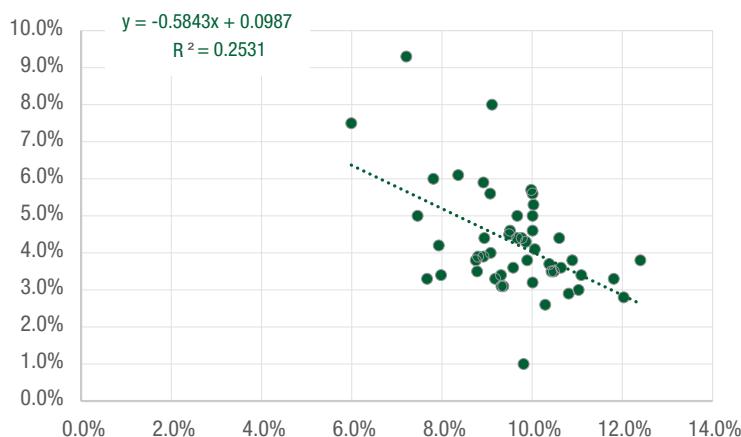
What is true for the nation overall, is true for California.

Novy-Marx and Rauh (2012) provide an estimate of the annual contributions that are required to fully fund state and local pension systems, adjusted for risk, over a 30-year timeframe.⁶² Assuming no policy changes, California would have to contribute an additional \$28.3 billion a year for the next 30 years into its defined benefit public pension systems to fully fund promised benefits.⁶³ This equates to an annual tax bill of \$1,994 per current household.⁶⁴

Relative to 2015 tax revenues, the \$28.3 billion contribution increase is the equivalent of a 20 percent increase over California's total state tax revenues of \$141.2 billion in 2015 (it is the equivalent of a 15.4 percent increase over California's total state and local tax revenues of \$183.7 billion as of 2012, the latest state and local tax revenue data available from the U.S. Census⁶⁵). Adjusted for inflation, such a tax increase would be the largest tax increase in California's history. According to the Tax Foundation, California's total state and local tax burden (adjusted to reflect the tax burden paid by residents versus the tax burden exported to other states) was 11.4 percent of state personal income as of 2011 – the latest data available.⁶⁶ If the entire shortfall of California's public pensions were to be filled through tax increases, then California's state and local tax burden would have to increase to 13.0 percent of state personal income.

The precise magnitude of the economic costs would vary depending upon how the unprecedented tax burden were levied. However, as Figure 7 shows, states that impose a higher tax burden experience slower economic growth. Specifically, Figure 7 compares the average tax burden for the 50 states between 2002 and 2011 (the latest 10-year period) to the compound average annual growth in personal income. As the linear trend line illustrates, those states that imposed a higher average tax burden tended to experience slower economic growth. As summarized in the Appendix, the economics literature that has examined the impact from taxes on economic growth supports these visual results.

FIGURE 7
Average Annual State and Local Tax Burden by States Compared to Compound Average Annual Growth in Personal Income
2002 - 2011



Source: The Tax Foundation

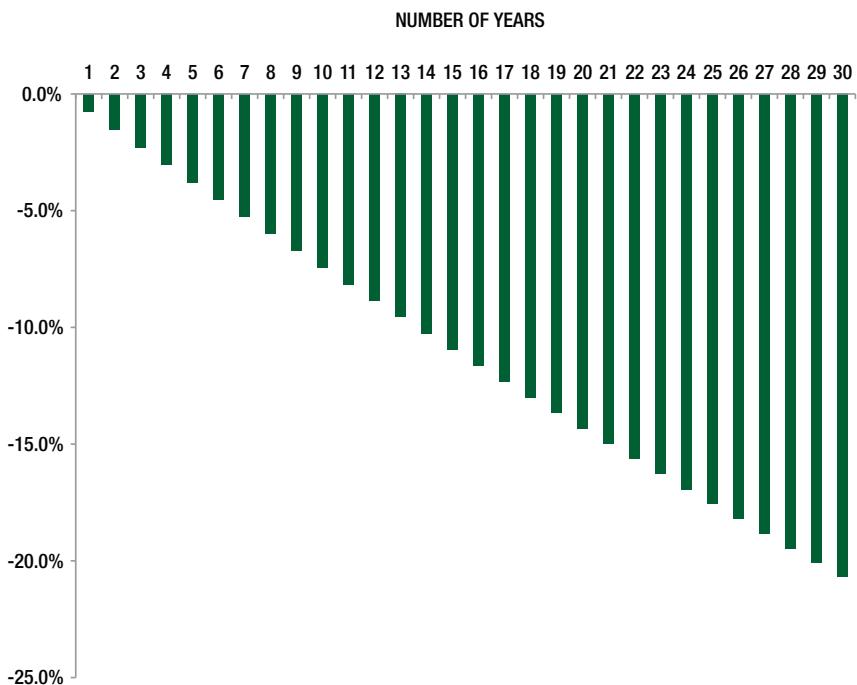
To provide a sense of the economic cost to California by raising the tax burden on Californians by \$1,994 per household, the results of Yakovlev (2014) are used to estimate the impact from the tax increase on California's state GDP growth.⁶⁷ Yakovlev (2014) identifies the empirical relationship between the average tax rate (tax burden) and state GDP growth, controlling for the other impacts on economic growth.⁶⁸ Based on his results, the average tax rate has a negative and significant impact on state GDP growth – a 1 percent increase in the tax rate decreases state GDP growth by 1.9 percent.⁶⁹

Yakovlev estimated the average tax rate by dividing total tax revenues by state GDP; therefore \$183.7 billion in tax revenues equaled 8.6 percent of total state GDP as of 2012 (California's state GDP in 2012 was \$2.1 trillion). Additional tax revenues of \$28.3 billion would raise this burden by

15.4 percent. Based on Yakovlev's (2014) results, average annual real state GDP growth would be expected to decline from 2.7 percent (the compound average annual growth rate between 1997 and 2014) to 1.9 percent. The implication from such a growth slowdown is significant. Over the 30 years it would take to pay down the unfunded pensions, the slower average annual rate of economic growth would cause California's economy to be 21 percent smaller compared to the baseline scenario, see Figure 8. These calculations exemplify the consequences for Californians if the entire unfunded burden is going to be closed through higher taxes: Californians will be significantly poorer.

FIGURE 8

Estimated Percentage Gap between Tax Increase Scenario Compared to Baseline Average Annual Growth of 2.7 percent over 30 Years to Fully Fund California's Public Defined Benefit Pensions



Source: Author Calculations based on estimated average tax elasticity from Yakovlev (2014)

The other option for California is to not raise taxes and pay the \$28.3 billion annual bill out of current revenues. Other government expenditures would, of course, suffer under such a scenario. Table 3 presents the total state and local expenditures in California as of 2012 (the latest data available) as compiled by the U.S. Census. The necessary \$28.3 billion annual pension payment to fully fund California's defined benefit public pensions is also inserted for perspective. As Table 3 illustrates, these expenditures would be

the 4th highest expenditure category for the state and local governments behind elementary & secondary expenditures, welfare expenditures, and higher education expenditures.

TABLE 3
Total State and Local Expenditures in California, 2012
U.S. Census Data

State & Local Expenditures	
Elementary & Secondary	\$66,954,180
Public welfare	\$60,431,781
Higher education	\$35,844,574
<i>Payments to fully fund pensions</i>	\$28,300,000
Hospitals	\$22,875,547
Highways	\$16,692,760
Interest on general debt	\$16,657,423
Police protection	\$14,881,826
Other and un-allocable	\$13,964,393
Correction	\$13,691,104
Health	\$13,174,662
Judicial and legal	\$8,722,504
Housing and community development	\$8,543,504
Fire Protection	\$6,772,039
Sewerage	\$6,280,438
Parks and recreation	\$5,364,530
Natural resources	\$5,326,757
Other governmental administration	\$5,288,756
Financial administration	\$5,178,530
Other education	\$4,931,406
Protective inspection and regulation	\$4,271,192
Solid waste management	\$3,956,443
Air transportation (airports)	\$3,519,019
Libraries	\$1,385,792
Sea and inland port facilities	\$1,260,739
Miscellaneous commercial activities	\$1,214,225
General public buildings	\$703,107
Employment security administration	\$504,340
Parking facilities	\$387,316
Veterans' services	\$8,516

Source: U.S. Census Department and Novy-Marx and Rauh (2012)

Making these payments out of current revenues requires state and local leaders to make significant cuts to other government services. While there are many possible choices, Table 4 presents three possible alternatives to provide perspective on the size of the expenditure *crowd out* that is necessary. One choice is to cut all line items equally – or an 8.1 percent budget sequester across all expenditure line items. Such an expenditure reduction would, among many other significant spending cuts, entail: a \$5.4 billion cut to the school budget, a \$4.9 billion cut in spending on income support programs, a \$2.9 billion cut to the higher education budget, and a \$1.9 billion cut to California’s hospital systems (all compared to the 2012 state and local expenditures as reported by the U.S. Census).

Alternatively, California could pay the \$28.3 billion in necessary pension payments by eliminating all expenditures on hospitals and fire services (with a \$1.3 billion excess); or eliminate all expenditures on police protection, parks and recreation, and judicial and legal expenditures (with a \$0.7 billion excess).

TABLE 4
Expenditure Cut Scenarios to pay for \$28.3 billion required Pension Contribution

Budgetary Line Item	Savings
Across-the-board Expenditure Sequester	8.1%
Eliminate Expenditures on:	
Hospitals + Fire Services	\$29,647,586
Police Protection + Parks & Recreation + Judicial & Legal	\$28,968,860

Source: Author calculations based on U.S. Census Department Data

Regardless of which budget tradeoffs are ultimately made, Table 4 illustrates how painful these tradeoffs will be. While these costs must be paid if California is to remain on its current pension path, California does not need to remain on this path.

Polls show that large majorities of Californians support cutbacks in government pension benefits.

An excessively large increase in the tax burden or a drastic cut in expenditures that does not reduce the burden of the public sector (or a combination of these policies) are the costs California’s citizens must bear if the current public sector defined benefit programs are held to be inviolable. However, the combination of the unaffordability of these promised benefits, the uncompensated risk transfer from public sector workers to taxpayers, and the overly-generous pension benefits in comparison to similarly situated private sector workers (created in part by the principal-agent problem) argues for fundamental reforms to the current system.

Polls show that large majorities of Californians support cutbacks in government pension benefits. According to a September 2015 Public Policy Institute of California poll, 68 percent of likely voters say state and local government expenditures on public pensions are a problem, and 67 percent favor offering new government employees 401(k) plans similar to most private sector employees.⁷⁰

IMPLEMENTING EFFECTIVE PENSION REFORM

The more comprehensively California reforms its public sector defined benefit pension plans, the greater the reduction in the economic costs outlined above. Comprehensive reform efforts recognize that the current pensions offered to public employees are unaffordable and overly generous.

Following the first law of holes – “if you find yourself in a hole stop digging” – the initial reforms should address retirement benefits for employees that have not yet been hired. All new employees should be ineligible for the current defined benefit programs. Instead, new employees should be eligible for a defined contribution retirement system whose terms are described below.

With respect to current employees, reforms should start by repealing the so-called California Rule, which would likely require a constitutional amendment. The California Rule, an unusual requirement that is adopted by a minority of states, mandates that once employees have been hired, they are entitled to both the retirement benefits they have earned for years already worked under the current retirement system, and the benefits they would earn under the current retirement system should they choose to continue working for the state (prospective benefits that may not be earned for many years).

The California Rule is a bad policy that traps taxpayers in an unaffordable pension system and ensures unequal treatment across different types of long-term contracts.

Once the California Rule has been repealed, California should implement a hard freeze across all defined benefit programs. Under a hard freeze, no public employee would be able to accrue any more benefits in the defined benefit program. All vested public employees should then be offered a choice: either receive a lump sum payment equal to the present value of their actuarially determined benefit under the defined benefit plan, or remain in the defined benefit plan.⁷¹ It is important to note that in order to accommodate the cash-out option, transition issues need to be addressed, including managing the current unfunded status of the funds as well as the impact from the cash-out option on the program’s funded status. Employees that choose the lump-sum payment would then transfer their share of the assets into an appropriate retirement account.

For those employees that choose to remain in the now frozen defined benefit plan, the plan would continue operating with the purpose of paying out current obligations. However, all employees who choose to remain in the plan should no longer receive the value of a put-option from the taxpayer without paying for the service. Therefore, either the costs of the put-option should be charged to the beneficiaries in the frozen defined benefit plans; or the plan’s assets should be altered (as practicable) to reflect the riskiness of the pension payments (or lack thereof).

The more comprehensively California reforms its public sector defined benefit pension plans, the greater the reduction in the economic costs outlined above.

All employees' future retirement benefits (new and current) should be received via a defined contribution plan that meets the average standards for the defined contribution plans of large private sector companies. According to a Towers Watson survey of private pension plan sponsors, these standards could include:⁷²

- No minimum length of service requirement for eligibility in the defined contribution pension plan;
- Participation in the defined contribution plan permitted upon hire;
- Non-matching and matching contributions up to a set percentage of pay with immediate eligibility; and
- Average matching and non-matching contributions equal to around 8 percent of pay for a total of 12 percent of pay including an assumed 4 percent contribution from employees (slightly less than the average contributed by employees in the private sector).

The standards across the private sector surveyed by Towers Watson varied. As such, the standards discussed above are illustrative of the type of terms California should consider. The actual defined contribution standards adopted, especially the matching and non-matching contribution rates, should be determined following an actuarial analysis determining the estimated costs to the government for the terms provided and the needs of the government to attract the necessary employees.

Due to the combination of a very large unfunded liability problem, coupled with the high promised benefit levels compared to similarly paid private sector workers, pension reforms could consider reducing the benefits that have been earned at the time of the plan's freeze in order to ensure taxpayers do not bear a disproportionate share of the unfunded pension liability costs.

Recent court rulings, such as Judge Klein's ruling in the Stockton, California bankruptcy case, support the right of municipalities to treat pension contracts similarly to all other contractual obligations in bankruptcy court.

Recent court rulings, such as Judge Klein's ruling in the Stockton, California bankruptcy case, support the right of municipalities to treat pension contracts similarly to all other contractual obligations in bankruptcy court. This ruling provides a sensible path for reforming California's pension system even at the state level.

But, while such a reform could reduce the overall economic costs from the unfunded pension problem, such a change would face legal impediments that would need to be overcome. If this path is taken, any reductions to the public employees' benefits should be bounded by the expected benefits available to comparable private sector workers to ensure that public employees do not bear an undue burden from the pension sectors underfunding.

There are important proposals under consideration that would cap the contributions that California's government could make toward employees retirement at 11 percent of base compensation (13 percent for safety employees) for all new labor contracts. Further, unless voters approved, the government's share of total retirement costs could not be more than 50 percent. These cap levels are similar to the average pensions offered by the private sector. Reforms, such as this, will help the state regain control over government retirement costs and is a significant improvement over the status quo.

CALIFORNIA'S PENSION CRISIS: DIVIDING COMMUNITIES AND GENERATIONS

California's pension crisis has been decades in the making. The incentives to over promise benefits yet underfund the pensions has created a severe underfunding problem. Without properly accounting for risk, California's unfunded liabilities are around \$170 billion or around 7 percent of total state GDP.

The unfunded liability problem is made worse due to accounting practices that fail to properly account for the risks of the funds' assets compared to the supposedly riskless liabilities (promised employee pensions). Properly accounting for risk, and California's estimated unfunded liabilities are more than twice as large at 16 percent of total state GDP and even larger by some estimates.

Making the problem worse, even as California underfunds its current defined benefit programs, pension costs continue to grow twice as fast as tax revenues. The excessive growth in pension payments is exerting upward pressure on California's tax burden—a burden that is already the 4th highest overall tax burden in the country. The excessive growth in pension payments is also crowding out spending on all other government priorities.

If left unaddressed, the financial consequences of these trends threatens the prosperity of California. On average, the necessary increase in the state and local tax burden to fully fund the state's current pension system will cause California's economy to be 21 percent smaller over the next 30 years compared to its current economic growth path. Alternatively, the state can maintain its current 4th highest tax burden in the country, but cut total state and local spending by more than 8 percent across the board.

California policymakers should take steps to reform the pension systems that are threatening the long term fiscal and economic health of California. Fundamental reform efforts should recognize that the current pensions offered to public employees are not only unaffordable, but overly generous as well. Therefore, the so-called California Rule, which prevents changes to promised pension benefits even if those benefits have not yet been earned, must be repealed.

California should follow the lead of the private sector and some states to transform its pension system into a defined contribution system. Such a transformation can create certainty with respect to current and future pension costs that are imposed on taxpayers while ensuring public employees receive a fair and sufficient pension for their retirement.

California faces difficult choices today because the state continues to offer defined benefit pensions to employees without properly accounting for the costs and without fully funding its promises. Effective pension reform offers the best path forward to address these difficult choices.

Given the value of state pension assets, the benefits from implementing a defined contribution system, and the benefits from properly accounting for the risks for those employees that choose to remain in a frozen defined benefit system, California has the opportunity to significantly reduce the adverse economic and financial consequences from its current pension crisis. But, only if the state acknowledges the size and scope of its current pension problem, and is willing to correct it.

APPENDIX: A BRIEF REVIEW OF THE ECONOMIC LITERATURE ON TAXES

There exists a robust economics literature that finds rising or high tax burdens negatively impact a state's economic performance. In a comprehensive review of the academic literature that has examined the relationship between taxes and economic growth, McBride (2012) found that

...the results consistently point to significant negative effects of taxes on economic growth even after controlling for various other factors such as government spending, business cycle conditions, and monetary policy. In this review of the literature, I find twenty-six such studies going back to 1983, and all but three of those studies, and every study in the last fifteen years, find a negative effect of taxes on growth. Of those studies that distinguish between types of taxes, corporate income taxes are found to be most harmful, followed by personal income taxes, consumption taxes, and property taxes.

These results support the Neo-classical view that income and wealth must first be produced and then consumed, meaning that taxes on the factors of production, i.e., capital and labor, are particularly disruptive of wealth creation.⁷³

Table 1 in McBride (2012) summarizes the results from all 26 studies reviewed. Box 1 reproduces the summaries from Table 1 for the 10 U.S. based studies (federal or state) from McBride (2012).

BOX 1:

U.S. Based Empirical Studies on the Effects of Taxes on Economic Growth

Karel Mertens & Morten Ravn, "The dynamic effects of personal and corporate income tax changes in the United States", *American Economic Review* 103(4): 1212-47 (2013).

Examined: U.S. Post-WWII exogenous changes in personal and corporate income taxes.

Findings: A 1 percentage point cut in the average personal income tax rate raises real GDP per capita by 1.4 percent in the first quarter and by up to 1.8 percent after three quarters. A 1 percentage point cut in the average corporate income tax rate raises real GDP per capita by 0.4 percent in the first quarter and by 0.6 percent after one year.

Robert Barro & C.J. Redlick, "Macroeconomic Effects of Government Purchases and Taxes", *Quarterly Journal of Economics* 51-102 (2011).

Examined: U.S (1912 to 2006)

Findings: Cut in the average marginal tax rate of one percentage point raises next year's per capita GDP by around 0.5 percent.

Christina Romer & David Romer, "The macroeconomic effects of tax changes: estimates based on a new measure of fiscal shocks, *American Economic Review* 763-801 (2010).

Examined: U.S. Post-WWII (104 tax changes, 65 exogenous)

Findings: Tax (federal revenue) increase of 1 percent of GDP leads to a fall in output of 3 percent after about 2 years, mostly through negative effects on investment.

Robert Reed, "The robust relationship between taxes and U.S. state income growth", *National Tax Journal* 57-80 (2008).

Examined: U.S. states (1970-1999, 5 year panels)

Findings: Robust negative effect of state and local tax burden. Multi-year panels mitigate misspecified lag effects, serial correlation, and measurement error.

N. Bania, J. A. Gray, & J. A. Stone, "Growth, taxes, and government expenditures: growth hills for U.S. states", *National Tax Journal* 193-204 (2007).

Examined: U.S. states

Findings: Taxes directed towards public investments first add then subtract from GDP.

Marc Tomljanovich, "The role of state fiscal policy in state economic growth", *Contemporary Economic Policy* 318-330 (2004).

Examined: U.S. states (1972 to 1998, multi-year panels)

Findings: Higher tax rates negatively affect short run growth, but not long run growth.

Olivier Blanchard & Robert Perotti, "An Empirical Characterization of The Dynamic Effects Of Changes In Government Spending And Taxes On Output", *Quarterly Journal of Economics*, 1329-1368 (2002).

Examined: U.S. Post-WWII (VAR/event study)

Findings: Positive tax shocks, or unexpected increases in total revenue, negatively affect private investment and GDP.

Howard Chernick, "Tax progressivity and state economic performance", *Economic Development Quarterly* 249-267 (1997).

Examined: U.S. states (1977 to 1993)

Findings: Progressivity of income taxes negatively affects GDP growth.

John Mullen & Martin Williams, "Marginal tax rates and state economic growth", *Regional Science and Urban Economics* 687-705 (1994).

Examined: U.S. states (1969 to 1986)

Findings: Higher marginal tax rates reduce GDP growth.

Jay Helms, "The effect of state and local taxes on economic growth: a time series-cross section approach", *Review of Economics and Statistics* 574-582 (1985).

Examined: U.S. states (1965 to 1979)

Findings: Revenue used to fund transfer payments retards growth.

The results from other academic and policy studies that have examined the relationship between taxes and economic activity substantiate the conclusion of McBride (2012), and are summarized below.

- **Prescott (2002):**⁷⁴ Edward Prescott, Nobel laureate, leverages a Growth Accounting framework to evaluate the impact from alternative tax rates on labor, capital, and technology on economic growth – tax policies impact the incentive to work, innovate, and accumulate capital. Countries whose tax policies discriminate against any of these factors of production discriminate against economic growth. Countries that impose significantly onerous tax policies (such as the labor taxes in France or the tax discrimination against productivity in Japan) risk “economic depressions.”
- **Mankiw and Weinzierl (2005):**⁷⁵ Mankiw and Weinzierl found that because lower tax rates appreciably increased the economy’s rate of growth, tax cuts are partly self-financing.
- **Ohanian, Raffo, and Rogerson (2008):**⁷⁶ Ohanian, Raffo, and Rogerson found that cross-country differences in tax rates explain the majority of the changes in the average hours worked per adult in OECD countries.
- **Barber and Odean (2003):**⁷⁷ Barber and Odean examine whether “individual investors consider taxes when making asset location decisions”, finding evidence that investors are sensitive to the tax implications of asset allocations.
- **Desai and Gentry (2003):**⁷⁸ Desai and Gentry investigate whether corporations respond to capital gains taxes finding that capital gains’ taxes significantly influence companies’ investment and financing decisions, the allocation of capital across firms, the timing of corporate decisions, and corporate tax planning activities.
- **Viard (2009):**⁷⁹ Viard illustrates that when income is comprehensively measured, taxes have negative and significant impacts on economic growth.
- **Gruber and Saez (2002):**⁸⁰ Gruber and Saez estimated that the elasticity of income to taxation for taxpayers with incomes above \$100,000 is around -0.6; the elasticity of income for taxpayers with lower incomes was estimated at approximately -0.2.
- **Carroll (2009):**⁸¹ Carroll estimated the economic costs created by income taxes or what is called the *excess burden of the income tax* (in this case the federal income tax) finding these costs to be very large – approximately 11 to 15 percent of total income tax revenues.
- **Becsi (1996):**⁸² Becsi focused on whether state and local taxes affect relative state economic growth. Becsi found “...that relative marginal tax rates have a statistically significant negative relationship with relative state growth averaged for the period from 1961 to 1992.”⁸³
- **Poulson and Kaplan (2008):**⁸⁴ Poulson and Kaplan directly examined the impact of higher average marginal state taxes on economic growth finding “...that higher marginal tax rates had a negative impact on economic growth in the states. ... Furthermore, states that held the rate of growth in revenue below the rate of growth in income achieved higher rates of economic growth.”⁸⁵
- **Dye (1999):**⁸⁶ Dye examined the relative economic growth impacts on those states following the adoption of an income tax. Overall, Dye found “...strong econometric evidence that an income tax

does indeed drive up the size of state government. Further, it has a significant adverse effect on the state's economy.”⁸⁷

- **Robbins and Robbins (1996):**⁸⁸ Robbins and Robbins, through a series of papers, illustrates that there is an elastic response between taxes and capital accumulation; they estimate that the elasticity of savings was between 0.7 and 1.1. Consequently, Robbins and Robbins (1996) finds that tax reforms that reduced the disincentives to save would have a large and positive impact on economic growth.

Overwhelmingly, these studies find that high or rising taxes reduce economic growth, and low or declining taxes increase economic growth.⁸⁹

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