Shrouded Costs of Government: The Political Economy of State and Local Public Pensions*

Edward L. Glaeser
Harvard University and NBER

Giacomo A. M. Ponzetto
CREI, Universitat Pompeu Fabra, and Barcelona GSE

January 2014

Abstract

Why do public-sector workers receive so much of their compensation in the form of pensions and other benefits? This paper presents a political economy model in which politicians compete for taxpayers' and government employees' votes by promising compensation packages, but some voters cannot evaluate every aspect of promised compensation. If pension packages are "shrouded," so that public-sector workers better understand their value than ordinary taxpayers, then compensation will be highly back-loaded. In equilibrium, the welfare of public-sector workers could be improved, holding total public-sector costs constant, if they received higher wages and lower pensions. Centralizing pension determination has two offsetting effects on generosity: more state-level media attention helps taxpayers better understand pension costs, and that reduces pension generosity; but a larger share of public-sector workers will vote within the jurisdiction, which increases pension generosity. A short discussion of pensions in two decentralized states (California and Pennsylvania) and two centralized states (Massachusetts and Ohio) suggests that centralization appears to have modestly reduced pensions, but, as the model suggests, this is unlikely to be universal.

Keywords: Public pensions, State and local government, Imperfect information, Elections, Public-sector unions
JEL codes: D72, D82, H75, H77

*We are grateful to James Poterba and Josh Rauh, to the editor, Wojciech Kopczuk, and to two anonymous referees for their helpful comments; and to Kristina Tobio for her outstanding assistance. Ponzetto gratefully acknowledges financial support from the Spanish Ministry of Science and Innovation (grants ECO-2011-25624 and Juan de la Cierva JCI-2010-08414), the Spanish Ministry of Economy and Competitiveness, through the Severo Ochoa Programme for Centres of Excellence in R&D (SEV-2011-0075), the Barcelona GSE Research Network and the Generalitat de Catalunya (grant 2009 SGR 1157). E-mail: eglaeser@harvard.edu, gponzetto@crei.cat.

1 Introduction

Credit-card companies and hotels have long charged "shrouded" fees that were difficult for most consumers to assess at the first point of purchase (Gabaix and Laibson 2006). States and localities commit to pension obligations that are similarly difficult for voters to assess. Novy-Marx and Rauh (2010) argue that states and localities have underestimated the shortfall in pension funding by trillions of dollars because of aggressive assumptions about returns on pension investments, and the continuing debate over their conclusions reinforces the point that pension promises are hard to evaluate (Mitchell and McCarthy 1999). How does the difficulty of evaluating the costs of future obligations impact the level of public wages and benefits, and what institutions lead to better outcomes for taxpayers and public-sector workers?

After discussing the remarkable heterogeneity of local pension arrangements across the United States in Section 2, in Section 3 we present a political economy model in the spirit of Glaeser, Ponzetto and Shapiro (2005) and Ponzetto (2011). Politicians compete for votes by making binding promises about public-sector wages and pensions.[1] These promises ensure that public-sector workers prefer their jobs to the private sector. Housing prices equilibrate to make citizens indifferent about locations.

Policy promises are heard by only a portion of the electorate. We assume that pension promises are understood less well than promises about wages and that public-sector workers are more aware of these promises, especially pension promises, than ordinary voters. Public-sector workers certainly have far stronger incentives to understand the value of their own retirement packages. Our information structure follows if taxpayers and public-sector workers both have access to public information sources (the "news"), but public-sector workers also have access to an added information source (the "union"), and all sources have a proportionally lower chance of appropriately reporting pension promises relative to wage promises.

Unlike Gabaix and Laibson (2006), we assume only limited information, not limited rationality, so the ignorant correctly infer what the politicians will do. Still, as in Glaeser, Ponzetto and Shapiro (2005), their ignorance impacts the political equilibrium because politicians cannot change the voting behavior of the ignorant by changing their promises. Our core political results would not change if uninformed voters naively underestimated future pension costs, as long as the marginal home buyer correctly anticipated the cost of pension obligations. Indeed, less rationality could easily strengthen our results.

As politicians are inherently identical in the model, a variant of the standard median voter result holds, and both politicians choose identical promises.[2] The pensions and wages offered by politicians reflect two first-order conditions that offset the benefits that workers receive against the cost imposed on taxpayers. The costs and benefits for the two groups are multiplied by the size of the group in the informed voting population. Some public-sector workers live outside the community, and this lowers their political clout; but public-sector

[1] It is possible to craft a similar model with retrospective voting, as long as voters do not fully understand the long-term ramifications of pension promises.

[2] A slight perturbation of the model, following our earlier work, would give one of the politicians privileged communications with public sector unions and that would lead to policy divergence between the candidates, where the politician with extra access would promise more generous pensions.

workers are better informed, and this effect increases their importance in the politicians' calculus.

If relatively more union voters understand pension promises, then this information asymmetry pushes the equilibrium towards greater pension obligations. When public-sector workers have a greater advantage over taxpayers in understanding pensions than wages, public-sector consumption is higher post-retirement and public-sector workers would borrow against their future pensions if they could. We don't allow such borrowing, because in reality public pensions are not alienable and typically cannot be taken in bankruptcy. If borrowing against pensions was easy, then public workers would receive no wages and receive all of their compensation in the form of pension promises.

The informational advantages of public-sector workers cause them to earn rents or quasi-rents, and the political equilibrium leads to a situation in which voters and public-sector workers could both benefit from a different age-earnings profile for public-sector workers. If public-sector workers earned higher wages while young in exchange for lower pension benefits, their welfare could improve at no cost to the taxpayer. Fitzpatrick (2012) finds that Illinois teachers choose not to forgo cash today in exchange for future pensions that have a substantially higher net present value (evaluated at market interest rates).

A pre-funding requirement for pensions will lead to lower pensions in equilibrium. Public-sector workers themselves, being liquidity constrained, moderate their pension demands if they have to contribute to pre-funding during their working life. Pre-funding has no impact on overall public-sector wages, so it unambiguously causes public-sector worker welfare to decline and housing prices to increase.[3]

The spatial equilibrium structure of the model means that we can separately analyze the impact of higher reservation utility, which reflects the general level of prosperity in the country as a whole, and higher private incomes in the area, which will be offset by higher housing prices. Higher incomes lead to higher public-sector wages, because they cause the cost of housing to increase, and that in turn increases the marginal benefit to public-sector workers of receiving higher wages, while leaving the marginal cost to taxpayers untouched, since their real incomes are determined by the reservation utility. We assume that workers move when they retire, so higher incomes have no impact on the cost of living when old, and therefore no impact on pensions. An increase in the cost of living in the retirement community does, however, increase pension benefits.

Increases in the reservation utility, on the other hand, cause benefits to rise and have an ambiguous impact on wages. The ambiguous effect reflects two opposite effects. A higher reservation utility means that taxpayers have a lower marginal utility of income, reducing the cost of pensions to them; but it also reduces housing prices, causing the marginal benefit of wages to public-sector workers to fall as well.

As the share of public-sector workers that live in the community rises, the amount paid to public-sector workers in both wages and pensions also increase, because the political

[3] Pre-funding would have an even stronger impact if we allowed for ongoing construction. If housing supply growth is positive and public pensions are not fully pre-funded, the drop in the home values for current owners does not fully capture the cost of pension promises. Some of the costs of future pensions are borne by future developers rather than current voters. Hence city growth induces more generous and more back-loaded public-sector compensation, as voters support deficit spending through the pension system. Stricter pre-funding requirements mitigate this additional distortion.

power of the public-sector workers has risen. Liquidity-constrained public-sector employees most strongly desire higher wages, although they find higher pensions politically easier to obtain. Hence, when government employees are a larger share of the local electorate they leverage their numerical clout particularly into higher wages: the back-loading of public-sector compensation falls as the fraction of government employees living in the community rises.

As the informational advantage of public-sector workers about wages falls, public-sector wages fall. As a consequence, pensions also fall if there is a positive degree of pre-funding, because lower public-sector wages (caused by better taxpayer knowledge about wages) increase the marginal utility cost to the public workers of paying for their own pensions by decreasing their consumption while young. As the informational advantage of public-sector workers about benefits falls, benefits certainly decline, but wages remain constant. Lower public-sector pensions do not affect government employees' marginal utility of consumption when young, because the tax benefit of lower pension pre-funding are completely offset by higher housing costs. Therefore, the back-loading of public-sector compensation increases with information asymmetry about pensions, but decreases with information asymmetry about wages.

In Section 4, we use these results to discuss the impact of allocating control over public pensions to the state or to lower levels of government. We assume that there are two offsetting effects of allocating control to a higher level of government. First, there are state media sources that will supplement the knowledge about pensions and wages at the local level. Our information structure implies that this greater knowledge will increase the knowledge of taxpayers about both wages and pensions, but it will have a greater impact on knowledge of pensions because that knowledge started at a lower level. We also assume that the share of public-sector workers who vote in the relevant election increases, since public-sector workers are quite likely to live in the state where they work, but they are far less likely to live in the community where they work.

The overall impact on wages and pensions depends on which effect dominates. If the impact of public-sector workers voting is more powerful, then state control will lead to more generous wages and pension benefits. If the impact of reduced information asymmetries between voters and workers is stronger, then state pensions and wages will be less generous. Our model suggests that the information effect may dominate the public-sector voter effect at least in larger cities, whose unionized government employees are likely to be city residents.

If the local news sources provide at least a modest amount of information, then moving to the state level will always lead to an efficient flattening of the consumption profile for state workers. Regardless of the relative importance of changes in the electorate and in the information set, the asymmetry between wage and pension knowledge declines, reducing the back-loading of public-sector compensation. This flattening means that if the move to state control held housing values constant, public-sector workers would be unambiguously better off.

The increased efficiency due to reduced shrouding can provide one justification for why pension arrangements for local workers are often determined at the state level. An alternative justification for this arrangement is that if localities are uncontrolled they will face a moral hazard problem that will lead them to accumulate pension obligations that will be eventually paid for by the state. While this second explanation appears highly relevant when discussing later centralization efforts, such as that of Ohio in the late 1960s, it seems far less relevant in understanding the early 20th century centralizations, such as teachers in California and Massachusetts, which occurred long before any obvious threat of insolvency. Moreover, it is far from clear that most states would actually feel obliged to take on local pension obligations.

In Section 5, we turn to four real world examples of states with different pension arrangements, both to understand why different systems evolve and to examine the impact of those systems. We compare two pairs of states: Massachusetts and California, and Ohio and Pennsylvania. Both pairs include a state with a central, state-level control over local pensions (Massachusetts and Ohio) and a state with abundant local heterogeneity in county and municipal pensions (California and Pennsylvania).

Massachusetts had a modest number of local pensions prior to World War II, but in 1945 the state passed a law which controlled the terms of local pension arrangements. The state has regularly reacted to perceived funding shortfalls by requiring higher levels of employee contributions. California's local pension plans are regulated at the state level, but counties and localities have discretion over the generosity of the plan, within limits, whether the plan is independent (like many of the county plans) or part of the broader CalPERS system. Both California and Massachusetts have generous pension arrangements, but California's local plans are typically more generous, primarily because the Massachusetts plans require significantly higher levels of member contribution.

Ohio's local plans were centralized in 1967, in response to an early under-funding problem, which appears to represent more of a response to the moral hazard problem. The program also provides large pensions, but it has a ten percent member contribution rate, which is slightly above Massachusetts. Pennsylvania has great heterogeneity in plan generosity. We consider Luzerne County, which is only slightly more generous than Ohio, and Pittsburgh, which is considerably more generous. Again, the main gap in generosity reflects differences in member contributions.

It is difficult to draw too much inference from four case studies, but in these cases central control seems to have led to lower pensions. To us this suggests the power of shrouding, because a primary difference between state and local control is that more media attention tends to be paid to pensions at the state level than purely local pension arrangements. In our examples, voter information appears to have played a larger role than increased voting by government employees. We do not, however, believe that this is necessarily a universal phenomenon.

We now turn to some basic facts about local pension arrangements across the United States and then present our model.

2 State and Local Public Pensions

In this section, we survey the heterogeneity in local and pension plan arrangements across the United States. Our focus is on municipal pension plans, but we discuss state plans as well, because we believe they shed light on what would happen in towns and municipalities if their pensions were determined at the state level. This discussion provides the institutional basis for the model that follows in the next section.

America's fifty states have fifty different arrangements concerning state and municipal pensions. There are, however, common features across the country. Almost all of states have state-level pension programs covering the direct employees of the state. In most cases, there is also an umbrella organization that some or all municipalities join. CalPERS, the California Public Employees Retirement System, may be the most famous example of such a super-system, as the nation's largest public pension fund, with over $200 billion of assets under management. Many of these programs also deal with healthcare costs, but we will not focus on the abundantly studied issues around healthcare costs in this paper.

Teachers, who typically represent a large share of municipal employment, often have their own statewide systems that are distinct from, if often quite similar to, the more general state program. Often the teacher systems are at once a part of and independent from the state system. The California State Teacher Retirement System, CalSTRS, has $150 billion under management, making it another financial behemoth. But unlike the CalPERS plan for localities, participation in CalSTRS is obligatory for every school district and every school teacher, and every teacher faces exactly the same defined benefit program. That program is financed primarily with employer and employee contributions, currently at 8.25 and 8 percent of compensation respectively. The state also makes contributions.

By contrast, participation in CalPERS, as in many state-level municipal programs, is voluntary, and the municipalities that do participate have the option to contract tailored programs with CalPERS. As a result, some California plans are considerably more generous than others. The California system lies somewhat in the middle of American states in the degree of autonomy its grants to localities.

The most centralized state systems, such as South Dakota and Utah, enroll all municipal employees in a statewide system, managed down to every detail at the state level. These states have not eliminated local negotiation over wages, or other working conditions, but the pension payments are fixed at the state level. Both localities and workers must contribute a proportion of their wages, and retired workers receive payments that are determined by a formula based on past compensation and other factors, including years of service and age of retirement. Even within these statewide systems, however, there are sector-specific pension differences for different groups such as teachers, policemen and firefighters.

In these states, there is no distinction between the state system and the municipal system, but in most of America, the local systems—even if managed at the state level—have their own characteristics. For example, Minnesota has a statewide Public Employees Retirement Association for employees of local government, but this is distinct from the Minnesota State Retirement System, which manages retirement for the state's own workers. The Minnesota system sets terms, mandates payments and manages the system's investments.

The next level of centralization occurs in states, like Massachusetts, that have a state system which is officially voluntary, but does in fact manage all, or almost all (Boston is excluded), of the local systems. Somewhat bizarrely, even though Massachusetts sets the terms of pensions and mandates employer and employee contributions to investment funds, over 50 localities continue to maintain control over the investments related to their public pensions.

Massachusetts is at one end of a spectrum of "voluntary" statewide programs, some of which are virtually universal while some have far more sporadic membership. Each state followed a different path towards their system, and provided different incentives or rules for joining the statewide system (when it exists). In the majority of these systems, terms are set centrally, but in a number of important systems, even those municipalities that join the central system have discretion over the generosity of plan.

Within CalPERS, local governments can choose whether to have systems that accrue pensions at 1.5% or 2% or even 3% rate; that percentage is multiplied by years of service to determine the pension as a share of final compensation (subject to a maximum). Texas, Oklahoma and Tennessee also allow discretion in the nature of the plan. Localities face a menu and choose their preferred option subject to the political process and bargaining with employees.

Those localities that participate in statewide systems also face clear funding requirements set at the state level. Historically, some systems once operated as pay-as-you-go systems, requiring only that localities pay for the current year's retired employees. Funding shortfalls, especially in the 1980s, caused many states to switch to somewhat more conservative systems, often moving gradually towards "full funding." Of course, full funding is often calculated using extremely high expected rates of return that still leave the possibility of substantial cash shortfalls.

Completely local pension systems would seem to be the extreme of decentralization, but even in that case, the state government can still exercise a fair amount of control over local pensions. Cities have no independent constitutional rights; they are always creatures of state government. For example, every one of California's county pension system is a matter of state law, even though the pensions have different terms that were determined by collective bargaining at the state level. State law also governs the pensions of Boston and New York. Yet in most cases, even thought the state does exercise ultimate legislative power, the legislature will often defer to the city's wishes.

Another dramatic difference across states comes from their participation in Social Security. When Social Security was originally established, constitutional issues deterred any attempt to involve lower levels of government. The Federal government did not appear to have the power to compel states and municipalities to contribute to any sort of pension system for their employees, and as a result they were completely excluded from Social Security. In the 1950s, Congress made it possible for states to enter voluntarily into Social Security, and the majority of states have taken that option. Still, some states have remained outside of the Social Security system, including Massachusetts.

Finally, Figure 1 shows the considerable variation across states in the average benefits paid to retired state employees in 2010. Public-pension benefits per beneficiary have a strong positive correlation with state wages, but the relationship is far from perfect.[4] These figures do not control for retiree characteristics such as the age distribution, for employee characteristics such as the occupational mix, nor even whether the state participates in Social Security. Thus, they can only be seen as very coarse numbers; but they do suggest that some states are more generous than others, even holding state income levels constant. One of the goals of our model is to provide a framework that can help explain those differences.

[4] The wages are calculated across all employees in the state in 2011. The benefits are calculated using the Census report on state and local pension funds that reports benefits paid and beneficiaries.

3 A Political Economy Model of Public Pensions

In this section, we present our core model of the political economy of public-sector pensions. In the next section, we specifically focus on the issues that relate to central and local control of pension promises. There are several key assumptions in the model. Perhaps the most critical assumption is that pension promises are "shrouded." While this model is in the spirit of Gabaix and Laibson (2006), applying their logic to the public sector, we are not assuming any irrationality. Our voters do expect to pay workers' pensions, but not every voter is aware of the pensions promised by individual politicians. They are ignorant, but not irrational.

Some voters are also unaware of wage promises, but we assume that understanding the magnitude of pension obligations is somewhat more difficult than understanding current compensation. The logic of the model, therefore, should extend to any complex form of compensation including health-related benefits. We also assume that public-sector workers know more about pensions and wages than ordinary voters. In reality, workers should know more about their compensation packages because they have far stronger incentives to understand these packages than voters. In our model, this information asymmetry emerges, for instance, if we assume that workers and taxpayers both have access to the same news-related sources of information, but public-sector workers also have access to an added source of information: the "union."

Another key assumption is that public-sector workers cannot freely borrow against future pensions. This assumption ensures that pensions are not a perfect substitute for wages from the workers' perspective. In the case of other forms of shrouded compensation, there could be other reasons why workers would prefer cash to the benefit. Workers might, for example, just not value health benefits at their cost.

We also impose several less critical assumptions. A pre-funding requirement may be imposed exogenously on government pensions. All public-sector workers vote in state elections, but only a fraction vote in local elections, because they may choose to live outside of the locality. State workers earn rents (or potentially quasi-rents) and as such there must be a rationing device, which we assume is a lottery that occurs before the start of the model. An agent may win a public-sector position in a locality that differs from his preferred place of residence, and thus choose to commute from the one to the other. For ease of reference, all parameters in the model are listed in Table 1.

3.1 Economic Environment

In its basic structure, the model follows an overlapping generations setup. Agents live for two periods.

We focus on a representative city with an exogenously determined housing stock, which can be interpreted as a fixed regulatory growth limit on new construction. The number of city residents equals the number of homes, so population is also exogenously given.

The city government employs an exogenous fraction $q < 1/2$ of city population. Public employees are selected by a public-sector lottery, and all winners choose to work for the local government. In principle, there is a participation constraint that requires local governments to provide sufficient compensation to make that decision optimal, but that constraint does not bind in equilibrium because public employees have enough political clout to obtain an attractive compensation package.

Private-sector workers employed in the city earn a fixed location-specific income Y when they are young; they must save to consume during their retirement. We assume that Y is large enough for the city to exist in equilibrium despite the cost of supporting its local government. Public-sector workers earn wages w_t while young and are paid a pension benefit B_{t+1} when they are older. Private- and public-sector workers pay for the cost of public-sector wages with lump sum taxes. Since houses are homogeneous, we can also think of these taxes as property taxes. Proportional taxes on housing value will have an equivalent impact on initial housing prices as lump-sum taxes since both imply the same tax burden.

Taxpayers and current public-sector workers also pay for the unfunded portion of pensions paid to last period's workers, who are now retired, and the funded portion of pensions that will be paid to current workers during the next period. Specifically, we assume that a fixed proportion $\phi \in [0, 1]$ of pension obligations must be pre-funded, where $\phi = 0$ represents the baseline case of a pure pay-as-you-go system. Funds that are set aside to pay future pensions earn the market rate of return r and are given to retired public-sector workers during the next period. Taxes in period t thus equal

$$T_t = q\left[(1-\phi) B_t + w_t + \frac{\phi}{1+r} B_{t+1}\right]. \tag{1}$$

People live in the city when they are young and retire elsewhere when they are old. The cost of housing during retirement is an exogenous amount R. At the start of each period t, the retiring old workers sell their homes to young workers at the current price H_t. The newly-built houses are sold by developers to the young. Each buyer can take out a mortgage for the full amount H_t. He will repay the principal in the following period, but must pay interest $H_t r / (1+r)$ while living in the house.

Therefore, public-sector workers in period t have disposable income

$$C^P_{W,t} = w_t - T_t - \frac{r}{1+r} H_t, \tag{2}$$

and when retired in the following period $t+1$ they have disposable income

$$C^P_{R,t+1} = B_{t+1} + H_{t+1} - H_t - R. \tag{3}$$

These disposable incomes also coincide with public-sector employees' consumption level when their borrowing constraint binds, as it always does in equilibrium.

Private-sector workers, which we will also refer to as taxpayers even if public-sector workers pay identical taxes, have a disposable income net of lifetime housing costs

$$A^T_t = Y - T_t - H_t + \frac{H_{t+1} - R}{1+r}. \tag{4}$$

They optimally choose their savings given current taxes T_t and rational expectations of future policy, which enable perfect foresight of future house prices H_{t+1}.

All agents derive utility from consumption according to the intertemporally separable logarithmic specification:

$$U_t = \log C^i_{W,t} + \beta \log C^i_{R,t}, \tag{5}$$

with a discount factor $\beta \in (0,1]$. The optimal consumption path is then

$$C^i_{R,t+1} = \beta\,(1+r)\,C^i_{W,t}. \tag{6}$$

Hence, public-sector workers face a binding borrowing constraint whenever

$$C^P_{R,t+1} > \beta\,(1+r)\,C^P_{W,t}. \tag{7}$$

The lifetime consumption utility of a public-sector employee from generation t is then

$$\begin{aligned} U^P_t &= \log C^P_{W,t} + \beta \log C^P_{R,t+1} \\ &= \log\left\{(1-q)\,w_t - q\left[(1-\phi)\,B_t + \frac{\phi}{1+r}B_{t+1}\right] - \frac{r}{1+r}H_t\right\} \\ &\qquad + \beta\log\left(B_{t+1} + H_{t+1} - H_t - R\right). \end{aligned} \tag{8}$$

Private-sector employees optimally choose

$$C^T_{W,t} = \frac{A^T_t}{1+\beta} \text{ and } C^T_{R,t+1} = \frac{\beta\,(1+r)}{1+\beta}A^T_t, \tag{9}$$

Up to an irrelevant additive constant, the lifetime consumption utility of a private-sector employee from generation t is

$$\begin{aligned} U^T_t &= (1+\beta)\log A^T_t \\ &= (1+\beta)\log\left\{Y - q\left[(1-\phi)\,B_t + w_t + \frac{\phi}{1+r}B_{t+1}\right] - H_t + \frac{H_{t+1}-R}{1+r}\right\}, \end{aligned} \tag{10}$$

3.2 Spatial Equilibrium

The spatial structure of our economy consists of three levels. We consider cities within a state and we assume that the state itself is small relative to the aggregate size of the nation. The size of each cohort is substantially larger than the sum of the housing stock in all cities in the state. A young worker can choose between living in the state or moving out of it. Living in the rest of the country provides a constant reservation utility $\bar{U}$, independent of current conditions within the state.

Since individuals choose their location when young, they must be indifferent between living in that location and locating someplace else. This critical spatial indifference condition implies that housing prices H_t in the representative city must be such that the anticipated utility of living in the city for those who have lost the public employment lottery equals the reservation utility of moving out of state. For the sake of notation, define the equivalent reservation income

$$\bar{A} \equiv (1+\beta)\,[\beta\,(1+r)]^{-\frac{\beta}{1+\beta}}\,e^{\frac{\bar{U}}{1+\beta}}. \tag{11}$$

Spatial indifference then requires that in equilibrium

$$Y - T_t - H_t + \frac{H_{t+1}-R}{1+r} = \bar{A}, \tag{12}$$

so the equilibrium consumption levels of private-sector employees are constant

$$C^T_{W,t} = \frac{\bar{A}}{1+\beta} \equiv \bar{C}_W \text{ and } C^T_{R,t+1} = \frac{\beta(1+r)}{1+\beta}\bar{A} \equiv \bar{C}_R. \tag{13}$$

This indifference condition means that changes in pensions, or institutional conditions that impact public-sector compensation, do not affect the welfare of these citizens. They will instead affect housing prices in the city, which adjust to compensate residents for expected future tax payments.

3.3 The Politicians' Problem

The model contains one key optimization problem: the political choice of public-sector compensation policies w_t and B_{t+1}. We model policy-making as the outcome of an electoral process with binding platform commitments but imperfectly and heterogeneously informed voters, following Ponzetto (2011).

The election is contested by two parties, labelled L and R, whose only goal is to win office and which accordingly choose their policy proposals to maximize the probability of obtaining a majority of the votes cast. The electorate consists of a continuum of voters, whose total mass can be normalized to unity each period. Following the probabilistic-voting approach (Lindbeck and Weibull 1987), voters' preferences for the competing parties comprise two independent elements. Each voter derives utility $U^i_t(w_t, B_{t+1})$ from the policy vector (w_t, B_{t+1}) enacted by the winner of the election.[5] Moreover, the two parties have fixed characteristics, such as ideology or the personal qualities of party leaders, that cannot be credibly altered with the choice of an electoral platform; and the voters have individual tastes, respectively ξ^i_L and ξ^i_R, for these characteristics.

In the standard probabilistic-voting model, parties choose binding policy platforms and all voters perfectly observe them. We relax the assumption of perfect information, and instead consider a random process of imperfect information acquisition. Information arrives independently across agents. By the time the election is held, voter i has observed all proposals with probability $\theta^i_B \in [0,1)$. Capturing our crucial assumption that pension proposals are shrouded, the voter observes wage proposals but not pension proposals with probability $\theta^i_w - \theta^i_B > 0$. Hence, θ^i_w is the probability that a voter has observed (at least) wage proposals. With complementary probability $1-\theta^i_w$ the voter reaches the election completely uninformed, though with rational expectations.

Given his information Ω^i_t, voter i votes forms rational beliefs $\left(\tilde{w}^C_t, \tilde{B}^C_{t+1}\right)$ about the policies that each candidate $C \in \{L, R\}$ has proposed and would enact if elected. Although each atomistic voter has probability zero of deciding the election with his ballot, we set aside the rational-voter paradox through the conventional assumption that voting is costless, so all agents turn out to vote. As a consequence, a voter's decision is summarized by his preference to support one party over the other. Voter i chooses to support party R if and only if

$$\mathbb{E}\left[U^i_t\left(\tilde{w}^L_t, \tilde{B}^L_{t+1}\right)|\Omega^i_t\right] + \xi^i_L \leq \mathbb{E}\left[U^i_t\left(\tilde{w}^R_t, \tilde{B}^R_{t+1}\right)|\Omega^i_t\right] + \xi^i_R. \tag{14}$$

[5]To simplify notation, here we denote utility by $U^i_t(w_t, B_{t+1})$, indexing the utility function by period instead of including explicitly among its arguments the predetermined values B_t and H_t.

An individual's relative assessment of the two candidates' non-policy characteristics can be disaggregated into a common and an idiosyncratic component: $\xi_L^i - \xi_R^i = \Psi + \psi^i$. Both Ψ and ψ^i are unobservable to politicians, and independently drawn from common-knowledge probability distributions. The common shock Ψ accounts for the aggregate uncertainty in the electoral outcome. The idiosyncratic shock ψ^i provides the intensive margin of political support, and is independent and identically distributed across agents. For the sake of clarity, we assume that ψ^i has a uniform distribution with support $\left[-\bar{\psi}, \bar{\psi}\right]$ sufficiently wide that each voter's ballot is not perfectly predictable on the basis of policy considerations only.[6]

Voters in a local election are divided into two groups: fraction q of public-sector workers, and fraction $1-q$ of taxpayers. All members of either group $j \in \{P, T\}$ have an identical utility function $U_t^j\left(w_t, B_{t+1}\right)$ and identical information-acquisition probabilities θ_B^j and θ_w^i. Since there is a continuum of agents of either type and the arrival of information is independent across agents, these probabilities coincide with the shares of voters from each group that have observed proposals respectively for both policies or for w_t alone.

As we derive in the appendix, this probabilistic-voting setup leads each candidate to maximize the political support function

$$\begin{aligned} V_t\left(w_t^C, B_{t+1}^C\right) = q &\left\{\theta_B^P U_t^P\left(w_t^C, B_{t+1}^C\right) + \left(\theta_w^P - \theta_B^P\right) \mathbb{E}\left[U_t^P\left(w_t^C, \tilde{B}_{t+1}^C\right) | w_t^C\right]\right\} \\ &+ (1-q)\left\{\theta_B^T U_t^T\left(w_t^C, B_{t+1}^C\right) + \left(\theta_w^T - \theta_B^T\right) \mathbb{E}\left[U_t^T\left(w_t^C, \tilde{B}_{t+1}^C\right) | w_t^C\right]\right\}. \quad (15) \end{aligned}$$

Intuitively, a politician gains support if his policy proposals are more attractive for the voters who learn about them. The intensive margin of political support makes the relationship continuous: a candidate's probability of victory increases smoothly with his platform's appeal to informed voters.[7]

Voters' preferences are weighted by their level of information, because so is their response to policy proposals. An uninformed agent would fail to notice a deviation from the expected policy choice, and thus could not react to such a deviation when casting his vote. Politicians optimally set each policy w_t^C and B_{t+1}^C to cater disproportionately to the preferences of those voters who are disproportionately likely to observe the respective proposal, because only those voters' ballots reflect directly the policy commitments.

The unconditional beliefs $\left(\bar{w}_t^C, \bar{B}_{t+1}^C\right)$ for $\Omega_t^i = \varnothing$ are pinned down by rational expectations. In equilibrium, voters have perfect foresight and their priors are precisely correct. However, for voters who have observed wage proposals $\left(w_t^L, w_t^R\right)$ but not pension proposals $\left(B_{t+1}^L, B_{t+1}^R\right)$, rational expectations only pin down beliefs $\tilde{B}_{t+1}^C$ for the equilibrium proposal w_t. Hence, multiple Nash equilibria of could be supported by arbitrary beliefs off the equi-

[6] This assumption simplifies the analytical derivations but hardly involves a loss of generality. In a symmetric pure-strategy Nash equilibrium of the platform-proposal game the policy proposals are independent of the specific distribution of ψ_i.

[7] An analogous political support function could be derived from a retrospective voting model, following Strömberg (2004). Such a model would consider an incumbent running for re-election against an untested challenger drawn randomly from the same pool of politicians. Each voter would support the incumbent's re-election if he understands he's been provided with sufficiently high utility, with an idiosyncratic threshold that reflects taste shocks Ψ and ψ^i. We would then have to assume that voters are imperfectly aware of the impact that political choices have on incomes and housing values.

librium path.[8] We focus our attention on a unique equilibrium supported by off-equilibrium beliefs consistent with trembling-hand equilibrium refinements.

Intuitively, voters interpret unexpected platforms as mistakes that the candidates are infinitesimally likely to make. In the spirit of agent-strategic perfect equilibrium, we assume that such trembles are independent across a player's choices. Then, an agent who observes an unexpected wage proposal w_t^C interprets it as a mistake that conveys no information on the choice of B_{t+1}^C. Then the beliefs $\tilde{B}_{t+1}^C | w_t^C$ coincide with the unconditional rational expectation $\tilde{B}_{t+1}^C$, regardless of the observation w_t^C.[9] Under this assumption, the political support function can be written

$$V_t\left(w_t^C, B_{t+1}^C\right) = \theta_B^P q U_t^P\left(w_t^C, B_{t+1}^C\right) + \theta_B^T (1-q) U_t^T\left(w_t^C, B_{t+1}^C\right) + \left(\theta_w^P - \theta_B^P\right) q U_t^P\left(w_t^C, \bar{B}_{t+1}^C\right) + \left(\theta_w^T - \theta_B^T\right)(1-q) U_t^T\left(w_t^C, \bar{B}_{t+1}^C\right). \quad (16)$$

Inference of independent trembles off the equilibrium path considerably increases analytical tractability, but it is not necessary to derive any of our main results. The same conclusions obtain qualitatively if we assume instead, as in proper equilibrium, that more disadvantageous trembles are an order of magnitude less likely than more advantageous ones. Then, observing a tremble on w_t^C would lead voters who have not observed the announcement B_t^C to infer that it coincides almost surely with the announcement that is optimal for candidate C conditional on announcing w_t^C.[10]

3.4 Dynamic Equilibrium

To solve the model, we must account for the dynamic structure of an overlapping generations economy. With anything short of full pre-funding, current pension promises B_{t+1} directly influence future taxes T_{t+1}. This connection implies an indirect impact on future house prices H_{t+1} through the spatial indifference condition, and on future wages w_{t+1} and pension promises B_{t+1} through the political optimality conditions.

Since pension promises influence future voting behavior, current political choices affect future political choices, as in Persson and Svensson (1989).[11] Our approach follows in the dynamic political economy tradition of Krusell and Rios-Rull (1999) where the median voter during each period determines policy outcomes, and like Besley and Coate (1998), the power of a special interest group creates inefficiencies. But unlike Acemoglu, Golosov and Tsyvinski (2008), our political leaders make binding promises and therefore there is no scope for institutions that would bind politicians while in office.

The timeline within each period t is the following.

---

[8] An arbitrary wage proposal w_t^* could be supported in Nash equilibrium if voters who observe a deviation $w_t^C \neq w_t^*$ but do not observe B_{t+1}^C were assumed to infer with certainty an infinitely bad pension proposal—either so low that public-sector retirees can afford no consumption, or so high that taxpayers cannot.

[9] Such beliefs could be motivated more formally by the assumption that that policy proposals are made simultaneously and non-cooperatively by two distinct politicians from the same party. One announces a wage proposal and the other a pension proposal, with the shared goal of leading the party to electoral victory.

[10] Formal derivations of the results under this alternative assumptions are provided in the working-paper version, available from the authors on request.

[11] Battaglini and Coate (2008) present a more recent treatment of this issue.

1. The city inherits from the previous period binding pension promises B_t.
2. The house price H_t is determined so that taxpayers' spatial indifference condition holds. The young buy houses and move to the city. The old retire, sell their houses and leave the city.
3. Politicians simultaneously announce binding policy proposals $\left(w_t^C, B_{t+1}^C\right)$. Each voter i is informed of wage proposals with probability θ_w^i and of pension proposals with probability θ_B^i. The election is held.
4. The winning candidate's policy proposal is implemented. Public-sector workers earn wages w_t, while taxes T_t are levied to defray these wages, the unfunded component of current pensions B_t, and the funded component of future pensions B_{t+1}. Workers choose how much to save and invest in capital markets.

The period then ends, and the process beings anew for period $t+1$. Period-t voters become old and sell their houses at a price H_{t+1}. The link between generations is the joint evolution of pensions and house prices.

A dynamic equilibrium is characterized by a recursive structure. At the beginning of each period, house prices H_t are determined by spatial equilibrium given past policy choices and rational expectations of future policy choices w_t and B_{t+1}. Then political competition determines the equilibrium policies w_t and B_{t+1}. The political equilibrium depends on current conditions B_t and H_t. Crucially, it also depends on voters' rational expectations of how current policy choices will determine future house prices H_{t+1}.

We will disregard the possibility for politicians to develop a reputation and restrict our analysis to Markov perfect equilibria in which house prices H_t depend on past policy choices exclusively through the inherited pension burden B_t. Such an equilibrium is described by three time-invariant functions $H(B_t)$, $w(B_t)$ and $B'(B_t)$ such that for any pension obligations B_t equilibrium house prices are $H_t = H(B_t)$, public employees' wages $w_t = w(B_t)$ and public-sector pension promises $B_{t+1} = B'(B_t)$.

For any pension burden B_t and house prices H_t, the rational expectation of future house prices $H_{t+1} = H(B_{t+1})$ then implies that the utility of public-sector employees is defined by

$$U^P(w_t, B_{t+1}; B_t, H_t) = \log\left[(1-q)\,w_t - (1-\phi)\,qB_t - \frac{r}{1+r}H_t - \frac{\phi q}{1+r}B_{t+1}\right] + \beta\log\left[B_{t+1} + H(B_{t+1}) - H_t - R\right], \quad (17)$$

and likewise for taxpayers

$$U^T(w_t, B_{t+1}; B_t, H_t) = (1+\beta)\log\left[Y - (1-\phi)\,qB_t - H_t - qw_t - \frac{\phi q}{1+r}B_{t+1} + \frac{H(B_{t+1}) - R}{1+r}\right]. \quad (18)$$

Letting $\bar{B}_{t+1}$ denote voters' unconditional expectation, the political support function is defined by

$$V\left(w_t, B_{t+1}; B_t, H_t, \bar{B}_{t+1}\right) = \theta_B^P qU^P(w_t, B_{t+1}; B_t, H_t) + \theta_B^T(1-q)\,U^T(w_t, B_{t+1}; B_t, H_t) + \left(\theta_w^P - \theta_B^P\right)qU^P\left(w_t, \bar{B}_{t+1}; B_t, H_t\right) + \left(\theta_w^T - \theta_B^T\right)(1-q)\,U^T\left(w_t, \bar{B}_{t+1}; B_t, H_t\right). \quad (19)$$

Having defined these functions, we can give the formal definition of a dynamic equilibrium.

Definition 1 *A Markov perfect dynamic rational expectations equilibrium is given by three functions $H(B_t)$, $w(B_t)$, and $B'(B_t)$ such that*

1. *For any pension burden B_t, house prices $H_t = H(B_t)$ satisfy the spatial indifference condition*

$$Y - (1-\phi)\, qB_t - H(B_t) - qw(B_t) - \frac{\phi q}{1+r} B'(B_t) + \frac{H(B'(B_t)) - R}{1+r} = \bar{A}$$

given rational expectations of policies $w_t = w(B_t)$ and $B_{t+1} = B'(B_t)$, and of future house prices $H_{t+1} = H(B'(B_t))$.

2. *For any pension burden B_t and house prices $H_t = H(B_t)$, policy choices $w_t = w(B_t)$ and $B_{t+1} = B'(B_t)$ satisfy the political optimality condition*

$$(w(B_t), B'(B_t)) = \arg\max_{w_t, B_{t+1}} V(w_t, B_{t+1}; B_t, H(B_t), B'(B_t)),$$

given rational expectations of pension promises $\bar{B}_{t+1} = B'(B_t)$.

We will focus on linear stationary Markov perfect dynamic rational expectations equilibria, in which house prices dynamics are described by the function

$$H(B_t) = K - hB_t \tag{20}$$

for endogenous constants K and h. Our assumptions allow us to derive an explicit solution for the dynamic equilibrium under this linearity condition.

3.5 The Efficient Benchmark

We begin by characterizing the equilibrium in the absence of political-economy frictions. Since we have assumed that the housing stock does not grow, real-estate markets lead voters to internalize fully the dynamic consequences of policy choices, despite the short-sighted preferences implicit in the overlapping generations framework. Thus, the first-best is attained so long as all voters have perfect information: $\theta_B^P = \theta_w^P = \theta_B^T = \theta_w^T = 1$.[12]

To simplify the exposition, we also assume a pay-as-you-go system with no pre-funding ($\phi = 0$), although this last assumption has no qualitative impact on the following proposition (all proofs are provided in the appendix).

Proposition 1 *Suppose that voters have perfect information ($\theta_B^P = \theta_w^P = \theta_B^T = \theta_w^T = 1$) and public-sector pensions are not pre-funded ($\phi = 0$). There is a unique linear Markov perfect dynamic rational expectations equilibrium. At any point on the equilibrium path, both public-*

[12] The crucial assumption is that information is homogeneous across voters and issues, $\theta_B^P = \theta_w^P = \theta_B^T = \theta_w^T = \theta$. The equilibrium is unchanged if $\theta < 1$.

and private-sector employees have consumption levels $\bar{C}_W$ as young workers and $\bar{C}_R$ as old retirees.

In steady state, public-sector wages equal

$$w_{ss} = Y - \frac{R}{1+r} - \bar{A} + \bar{C}_W,$$

public-sector pensions equal

$$B_{ss} = R + \bar{C}_R,$$

and house prices equal

$$H_{ss} = \frac{1+r}{r}\left[Y - \frac{R}{1+r} - \bar{A} - q\left(w_{ss} + B_{ss}\right)\right].$$

Equilibrium dynamics converge to the steady state with public-sector wages

$$w\left(B_t\right) = w_{ss} + \frac{q}{1-q}\frac{B_t - B_{ss}}{1+r},$$

public-sector pensions

$$B'\left(B_t\right) = \frac{B_{ss} - qB_t}{1-q},$$

and house prices

$$H\left(B_t\right) = H_{ss} + q\left(B_{ss} - B_t\right).$$

The undistorted equilibrium reflects utilitarian welfare maximization for each cohort of city residents. The probabilistic-voting setup induces politicians to maximize voters' welfare whenever all voters are identically informed, and a fortiori when they have perfect information. Moreover, a cohort cannot increase its aggregate wealth by establishing an unfunded pension system and imposing the burden of funding it on future generations of city residents. The cost of pension liability is fully capitalized in the price of housing. If the housing stock is not growing, all future housing belong to current city residents, who are therefore induced to internalize the future costs of accumulated pension debt.

The assumption that housing prices fully capitalize future debt obligations has a long pedigree in economics. Daly (1969) suggested that Ricardian equivalence will hold at the local level because homeowners feel the cost of future tax obligations immediately through losses in property values.[13] Epple and Schipper (1981) tied this insight directly to municipal pension funding, and provided some evidence that this capitalization appears to occur in Pittsburgh.[14] McKay (2011) examines San Diego housing prices and shows that these prices fall after a public announcement of unfunded pension liabilities, relative to prices in surrounding areas. This work both demonstrates some capitalization but also shows that

[13] Banzhaf and Oates (2011) develop a useful analysis that provides conditions under which this capitalization should be imperfect even in a fully rational mode.

[14] Stadelman and Eichenberger (2012) argue that owners should be more sensitive to debt financing because of capitalization, and then show that areas in Switzerland with more tenants relative to owners are more likely to use debt rather than taxes.

homeowners have at least in one instance underestimated the true extent of pension liabilities.

With perfect information and therefore full capitalization, the efficient equilibrium described by Proposition 1 equalizes period by period the consumption level of government employees and private employees. Since the latter are indifferent ex ante between locating in the city or in the out-of-state reservation location, everyone's consumption is constantly pinned down by the reservation consumption levels $\bar{C}_W$ and $\bar{C}_R$. This implies that the consumption path of public-sector employees is optimal, just like the one of private-sector employees. Moreover, it comoves perfectly with the reservation value $(\partial \ln \bar{C}_W / \partial \ln \bar{A} = \partial \ln \bar{C}_R / \partial \ln \bar{A} = 1)$.

In the steady state, housing prices H_{ss} are constant. Thus retirees realize no capital gains or losses on the sale of their city house. The steady state public-sector pension B_{ss} then equals the sum of the consumption level $\bar{C}_R$ and the cost of housing in the retirement locale R (hence$\partial B_{ss}/\partial \bar{A} > 0$ and $\partial B_{ss}/\partial R = 1$). The steady state public-sector wage w_{ss} equals the consumption level $\bar{C}_W$ plus taxes paid to defray public-sector compensation $(q(w_{ss} + B_{ss}))$ and the user cost of housing $H_{ss}r/(1+r)$.

The user cost of housing itself fully reflects the productivity value of the city. Productivity is properly measured by the difference between net earnings for a private-sector employee in the city $(Y - R/(1+r))$ and in the reservation location $(\bar{A})$, adjusted for the cost of paying an exogenous number q of local government employees. On net, housing values remain intuitively increasing in city productivity $(\partial H_{ss}/\partial Y > 0$, $\partial H_{ss}/\partial R < 0$ and $\partial H_{ss}/\partial \bar{A} < 0)$ and decreasing in the size of the public sector the city must support $(\partial H_{ss}/\partial q < 0)$. Changes in the user cost of housing are perfectly mirrored in public-sector wages, which therefore share the same comparative statics $(\partial w_{ss}/\partial Y > 0$, $\partial w_{ss}/\partial R < 0$ and $\partial w_{ss}/\partial \bar{A} < 0)$ [15]

Transition to the steady state reflects the dynamic feedback between public-sector pensions and house prices. If the city has inherited, e.g., pension obligations below the steady state level $(B_t < B_{ss})$, the direct effect is that taxes T_t are lower by the exact amount of the reduction in aggregate pension payout $(q(B_{ss} - B_t))$. In the absence of city growth, this fall in taxes is immediately and entirely capitalized in higher house prices $(H_t - H_{ss} = q(B_{ss} - B_t))$. While working in the city, public-sector employees pay lower taxes; on the other hand, they incur a higher housing cost. Since the user cost of housing is only a fraction $r/(1+r)$ of house value, it only reflects an identical fraction of the change in taxes. Hence, the equilibrium level of consumption $\bar{C}_W$ requires a lower public-sector wage $(w_t < w_{ss})$.

On the other hand, upon retiring public-sector employees must repay a larger mortgage H_t. Hence, the equilibrium level of consumption requires a higher public-sector pension $(B_{t+1} > B_{ss})$. The increase in future pensions is multiplied by a dynamic feedback loop. If pension promises increase by $B_{t+1} - B_{ss}$, expected house price appreciation declines proportionally $(H_{t+1} - H_{ss} = q(B_{ss} - B_{t+1}))$. Facing a lower capital gain, public-sector retirees need an even larger pension increase to preserve their consumption level $\bar{C}_R$. For any $q < 1/2$, the multiplier remains bounded, and equilibrium dynamics converge to the steady state by dampened oscillation.

[15] The first-best wage w_{ss} does not depend on the size of the public sector q. House prices capitalize the public-sector wage bill qw_{ss}, which is then proportional to the number of public semployees.

3.6 Imperfect Information

The main focus of our analysis is on distortions in public-sector compensation arising from asymmetric information. Whenever public-sector workers are more informed about their compensation than other taxpayers ($\theta_w^P > \theta_w^T$ and $\theta_B^P > \theta_B^T$), they obtain a more generous treatment than their mere numbers would warrant. Furthermore, if their informational advantage is greater for pensions than wages ($\theta_w^P/\theta_w^T < \theta_B^P/\theta_B^T$), public-sector pensions are more generous than public-sector wages.

Precisely this pattern of information asymmetry emerges from a simple process of information acquisition. All voters receive information about policy proposals from local news sources. Capturing our fundamental assumption that pension obligations are "shrouded," an agent who has learned about wage proposals need not also learn or understand pension proposals. Such shrouding reflects directly lower availability of information about pensions than wages. State employees' salaries are publicly disclosed every year, and can be easily consulted online.[16] No such database exists for the accruing pensions of currently employed civil servants. Moreover, shrouding reflects the greater difficulty of understanding the accrual of pension obligations. A voter may be informed of a debate about the cost of public-sector pensions, but still unable to grasp the actual impact of different policy proposals.

In addition to the local news that reach all taxpayers, public-sector workers naturally have more opportunities and greater incentives to become informed of policy proposals concerning their own compensation. We can summarize all such phenomena by treating public-sector unions as a preferential source of information that public employees alone have access to. Pension information remains equally shrouded when it is provided by the union.

As we show in the appendix, these assumptions yield a distribution of information that can be summarized by two measures of symmetry

$$0 < \rho_B \equiv \frac{\theta_B^T}{\theta_B^P} < \rho_w \equiv \frac{\theta_w^T}{\theta_w^P} < 1. \tag{21}$$

Greater asymmetry on the shrouded issue ($\rho_B < \rho_w$) is an intuitive consequences of diminishing returns to information acquisition. Receiving additional news from the union makes public-sector workers better informed across the board, but their informational advantage is stronger for pension proposals, which are more difficult to get to know and which taxpayers are more likely to ignore ($\rho_B < \rho_w$). Furthermore, its strength is increasing in the degree of shrouding of public-sector pensions, which increases information asymmetry over pensions (i.e., it reduces ρ_B) but not over wages (ρ_w).

We introduce these information asymmetries in the setting of Proposition 1, preserving at first the simplifying assumption that $\phi = 0$. The political equilibrium then features distortions that systematically favor public-sector employees, and more so for the shrouded policy choice—pension promises.

[16] E.g., data for Massachusetts are provided by the *Boston Herald* at http://www.bostonherald.com/projects/your_tax_dollars.bg; for California by the *Sacramento Bee* at http://www.sacbee.com/statepay. Data for Ohio and Pennsylvania are directly available from government websites, respectively at http://www.tos.ohio.gov/state_salary and http://www.pennwatch.pa.gov/employees/Pages/Employee-Compensation.aspx

Proposition 2 *Suppose that public-sector pensions are not pre-funded ($\phi = 0$). There is a unique linear Markov perfect dynamic rational expectations equilibrium. At any point on the equilibrium path, the ratio of the consumption levels of private- and public-sector employees equals*

$$\tau_W \equiv \frac{\bar{C}_W}{C_W^P} = \rho_w$$

for young workers and

$$\tau_R \equiv \frac{\bar{C}_R}{C_R^P} = \rho_B$$

for old retirees.

In steady state, public-sector wages equal

$$w_{ss} = Y - \frac{R}{1+r} - \bar{A} + \frac{\bar{C}_W}{\tau_W},$$

public-sector pensions equal

$$B_{ss} = R + \frac{\bar{C}_R}{\tau_R},$$

and house prices equal

$$H_{ss} = \frac{1+r}{r}\left[Y - \frac{R}{1+r} - \bar{A} - q\left(w_{ss} + B_{ss}\right)\right].$$

Equilibrium dynamics converge to the steady state with public-sector wages

$$w\left(B_t\right) = w_{ss} + \frac{q}{1-q}\frac{B_t - B_{ss}}{1+r},$$

public-sector pensions

$$B'\left(B_t\right) = \frac{B_{ss} - qB_t}{1-q},$$

and house prices

$$H\left(B_t\right) = H_{ss} + q\left(B_{ss} - B_t\right).$$

The differences between Proposition 2 and Proposition 1 highlight that political power derives from superior knowledge of policy choices. Since public-sector employees are more informed than taxpayers about their own compensation, the strategic optimal proposal for office-seeking politicians provides higher consumption levels for public- than private-sector employees ($\tau_R, \tau_W < 1$). These political rents from superior information explain why government employment is attractive in our model, and rationed by the public-sector lottery.

Furthermore, since information about pensions is more asymmetric than for wages because of shrouding, the political equilibrium displays a greater tilt in favor of public-sector retirees than public-sector workers ($\tau_R < \tau_W$). Thus, shrouding is at the root of back-loaded public-sector compensation, and explains why government employees are liquidity constrained while young.

Compensation promises display a direct link between superior information and higher equilibrium consumption. The politically optimal ratio of marginal utilities (and thus of consumption levels) for retirees coincides with the ratio of information about retirement benefits ($\tau_R = \rho_B$). Analogously, the politically optimal ratio for working-age employees coincides with the ratio of information about wages ($\tau_W = \rho_w$).[17]

The transition dynamics are unchanged from the efficiency benchmark in Proposition 1, aside from the differences in the respective steady-state values. The latter essentially retain the same comparative statics on economic primitives as in the first best.[18] However, the steady state now reflects not only underlying economic conditions but also political asymmetries.

Political power derives from superior knowledge of policy choices. Public employees' pensions and their consumption during retirement reflect asymmetric information about pension proposals themselves ($\partial B_{ss}/\partial \rho_B < 0$ and $\partial C_W^P/\partial \rho_B < 0$). Public-sector wages and government employees' consumption during youth reflect asymmetric information concerning wage proposals ($\partial w_{ss}/\partial \rho_w < 0$ and $\partial C_W^P/\partial \rho_w < 0$).

Producer interests can capture policy-making over the issues they most care about without bargaining with politicians or offering them campaign contributions, but merely by disseminating political information to their members, as Ponzetto (2011) finds for the case of trade policy. Freeman (1986) reviews the impact of public-sector unions on wages and benefits. In our model, when politicians know that their proposals for public-sector compensation are widely broadcast among unionized public employees but relatively less visible to taxpayers, they make generous offers to avoid alienating the constituency that is disproportionately mobilized by these proposals.

The more media coverage a policy choice receives, the more policy proposals reflect the general interests of taxpayers rather than those of knowledgeable insiders. Greater shrouding of pension promises constitutes a decrease in transparency, and as such it entails greater capture of policy-making by public-sector workers and a consequent increase in their pensions. The transparency of wage policy is unaffected by changes in shrouding, which therefore do not affect the politically optimal wage rate.

The effects of political power on public-sector compensation and housing prices are always opposite. The reason is that, in equilibrium, rents (or quasi-rents) are transferred to public employees from property owners. At the stage of political competition, electoral considerations pit public-sector workers against taxpayers. The former vote for higher benefits, and the latter for lower taxes that would increase their lifetime consumption. Given

[17] The last result relies on off-equilibrium inference of independent trembles. If we assumed instead inference of conditionally optimal trembles off the equilibrium path, the equilibrium would feature an even more favorable treatment of public employees: $\tau_W < \rho_w$ and $\tau_R = \rho_B$. Taxpayers' opposition to higher wage promises would decline if they believed them to be accompanied by lower pension promises. As a consequence, wage proposals would be more generous in the political equilibrium. However, imperfectly informed taxpayers would remain opposed to over-generous wage proposals, while they can never oppose over-generous pension proposals they are unaware of. Therefore, shrouding would continue to induce inefficient back-loading ($\tau_R < \tau_W$).

[18] The only difference concerns the effect of the reservation value $\bar{A}$ on steady state wages w_{ss}. If the political power of public-sector employees is very high, their equilibrium consumption C_W^P might rise with the reservation value faster than house prices do. Public-sector wages then rise with $\bar{A}$, instead of falling as they do with smaller information asymmetries.

rational expectations and spatial indifference, however, such an increase in consumption is inconsistent with equilibrium. The expectation of lower taxes due to lower public-sector compensation instead leads agents to bid up the price of houses in the city. Thus taxpayers are essentially running a proxy competition against public employees on behalf of developers. When the information advantage of public-sector workers is lower, the eventual outcome is a rise in real-estate values ($\partial H_{ss}/\partial \rho_w > 0$ and $\partial H_{ss}/\partial \rho_B > 0$). This result is consistent with Gyourko and Tracy's (1989) empirical finding that public-sector unions earn rents for their workers, and these rents are negatively capitalized in local land values.

3.7 Inefficiency

As Proposition 2 has established, there are two key interest groups in this model: the developer (or initial land owner) and public-sector workers.

Welfare for public-sector workers equals

$$U^P = \log C_W^P + \beta \log C_R^P, \tag{22}$$

which is time invariant on the transition path as established in Proposition 2, and in fact more generally as we shall show below.

The developer earns profits at the founding of the city, through any combination of revenues from the sale of the housing stock and taxes imposed on the first generation of residents.[19] In the equilibrium described by Proposition 2, developer profits equal

$$\Pi = \frac{1+r}{r}\left[Y - \bar{A} - \frac{R}{1+r} - q\left(w_{ss} + \frac{B_{ss}}{1+r}\right)\right]. \tag{23}$$

Developers internalize exactly the cost of providing steady-state wages and pensions. The comparative statics on profits are identical to those of steady-state housing prices, with the only difference that profits take into account the one-year lag in the accrual of pension obligations.

Intuitively, the institutional preferences of the initial developer are diametrically opposite to those of the public-sector union, which is its long-run political rival. Minimal information asymmetries are optimal for the developer, who consequently would like unions to play a minimal role. Conversely, he wishes that the taxpayers who buy his homes were as informed as possible, and particularly desires maximum transparency of public-sector pensions. The Henry George theorem (Arnott and Stiglitz 1979) would suggest taking developer profits as a measure of welfare. However, this equivalence only holds if public-sector workers dissipate their rents through some initial competition for public-sector jobs, which we do not model.

Our model-based approach to measuring efficiency relies on comparing equilibrium outcomes to a counterfactual optimum that maximizes public employees' utility subject to the constraint that developer profits are not lower than in equilibrium. Intuitively, maximum utility could be provided at the same cost ($w_{ss} + B_{ss}/(1+r)$) if the compensation package yielded the optimal compensation profile ($\tau_W^* = \tau_R^*$). Thus, the extent to which political

[19] The choice between the two instruments affects the political equilibrium (w_1, B_1) and thus the transition to the steady state, but has no impact on the developer's aggregate profits.

inefficiency is leading to welfare losses can be measured by the back-loading of public-sector compensation

The following proposition shows our results for this welfare criterion.

Proposition 3 *A sufficient statistic for inefficiency is the tilt in government employees' lifetime consumption path*

$$\Gamma \equiv \frac{\tau_W}{\tau_R} = \frac{C_R^P}{\beta(1+r)\,C_W^P}.$$

In the unique linear Markov perfect dynamic rational expectations equilibrium without pre-funding ($\phi = 0$), public-sector employees' consumption is inefficiently back-loaded ($\Gamma = \rho_w/\rho_B > 1$). The degree of inefficiency is entirely determined by information asymmetries. It is increasing in the asymmetry of information about pensions ($\partial\Gamma/\partial\rho_B < 0$) but decreasing in the asymmetry of information about wages ($\partial\Gamma/\partial\rho_w > 0$).

Throughout the equilibrium path, and a fortiori in the steady state, public-sector workers receive back-loaded compensation. Their borrowing constraint is binding, and their equilibrium consumption suboptimally low while working and suboptimally high while retired. Proposition 1 established that, instead, in the first best all workers smooth consumption to identical levels during the two stages of their life (for $\beta(1+r) = 1$). Thus, public employees could be made better off at no cost to the developer or to the taxpayer if their total compensation were kept constant, but their pensions reduced and their wages increased. The political equilibrium is inefficient because it prevents this optimal readjustment.

The key source of inefficiency is the shrouded nature of pension promises. Their relative opacity makes it easier for the public-sector trade union to give its members an informational edge concerning pensions than current salaries. Thus, public-sector pensions are more captured by public employees' than public-sector wages. Compensation is back-loaded to shroud it and confuse taxpayers about its actual cost.

Paying public employees with generous pensions becomes, in our model, a form of inefficient redistribution relative to paying those workers with wages. While economic logic tends to predict that interest groups should bargain in a way that minimizes the deadweight losses from redistribution (Stigler 1982; Becker 1983), a number of authors have highlighted different reasons why this result might fail.[20] Acemoglu and Robinson (2001) emphasize that inefficiencies might have dynamic benefits for interest groups, such as agricultural subsidies that maintain the size of the farmers lobbies.[21] Indeed, one benefit of public sector pensions is that they keep public workers in the system for many years, creating a potent potential electoral force.[22] In our model, as in Coate and Morris (1995), inefficient redistribution occurs when it is more shrouded from voters than efficient redistribution.

[20] Kovenock and Roberson (2009) examine inefficient redistribution in a standard model of political competition. Bullock (1995) presents a procedure for testing the efficient redistribution hypothesis.

[21] Drazen and Limão (2008) suggest that restricting redistribution to inefficient instruments may increase governmental bargaining power, which seems less relevant in this case.

[22] Generous pensions don't necessarily increase the number of public-sector workers, but their structure should increase government employees' tenure. If workers with a long time horizon in the public sector are more effective and interested in lobbying, then the long tenures associated with generous pensions would increase the power of public-sector unions

Our results accord with the empirical finding that government performance improves with media scrutiny (Besley and Burgess 2002; Adserà, Boix, and Payne 2003; Ferraz and Finan 2008; Snyder and Strömberg 2010; Boffa, Piolatto, and Ponzetto 2013). Closest to our analysis, Strömberg (2004) provides evidence that public spending is skewed towards constituencies with greater political information. Ponzetto (2011) shows that a special interest group exerts particularly influence over those policies for which it enjoys a particularly sharp information advantage. This phenomenon can account for the observed inefficient protectionist bias of trade policy, since industry insiders are more informed about policy proposals affecting their industry.

By an analogous mechanism, Proposition 3 highlights that inefficiency in the structure of public-sector compensation derives not merely from asymmetric information across voters, but crucially from differential asymmetry across voters and policies. Since public-sector employees have a higher information advantage concerning pension promises than wages, their equilibrium compensation is inefficiently back-loaded. In fact, inefficiency increases with information asymmetry regarding pensions ($\partial\Gamma/\partial\rho_B < 0$), but instead decreases with information asymmetry regarding wages ($\partial\Gamma/\partial\rho_w > 0$). In the limit as shrouding disappears ($\rho_w = \rho_B$) the superior information of government employees allow them to extract rents efficiently.

Because inefficiency derives from the relative asymmetry of information about pensions compared to wages, it declines if shrouding is reduced, but not necessarily when transparency, naively construed, increases. An increase in efficiency derives only from targeted transparency on the more opaque and distorted policy dimension. On the contrary, efficiency declines if taxpayers receive new information that is as skewed towards wages as their original knowledge. Public employees do suffer a decline in their overall benefits, but they respond to the increased pressure by obtaining benefits that are ever more skewed towards shrouded entitlements.

The distinction between efficient and inefficient voter information is the point where developer profits and aggregate efficiency diverge. The developer aims at an across-the-board reduction in public employees' compensation. Consequently he appreciates, and would promote if possible, any news coverage, whether focused on pensions or wages ($\partial\Pi/\partial\rho_B > 0$ and $\partial\Pi/\partial\rho_w > 0$). Instead, efficiency increases when pensions fall but wages rise, and thus when the former become more visible but the latter less ($\partial\Gamma/\partial\rho_B < 0$ but $\partial\Gamma/\partial\rho_w > 0$).

3.8 Limits to the Political Clout of Government Employees

Propositions 2 and 3 show that information asymmetries increase the political clout of local government employees relative to taxpayers, and entail inefficient distortions to the optimal composition of public-sector compensation.

A second source of such distortions would be ongoing construction. If the housing stock grew over time, the capitalization of pension promises into house prices would be dampened. Some of the cost of future public-sector pensions would be borne by developers rather than current homeowners. Since homeowners are also voters but developers are not, expected city growth would reduce political opposition to generous pensions for local government employees. As a consequence, in equilibrium public-sector pensions would be higher, and the lifetime profile of public-sector compensation more inefficiently back-loaded.[23]

On the other hand, there are also countervailing factors that act instead to reduce the influence of public-sector employees on policy choices. One such factor is a requirement for pre-funding pension promises, $\phi > 0$. A more direct electoral mechanism is the possibility that some local government employees do not live, and therefore do not vote, in the city that employs them.

To consider this possibility, assume that the state is composed of N identical cities, which are all identical except for location-specific amenities. Individuals have idiosyncratic tastes for these amenities, such that each of the cities is preferred to all others by a fraction $1/N$ of agents. Private-sector employees can costlessly choose to work in the city whose amenities they like best. Its hedonic value is normalized to zero.

Winners of the public-sector lottery for each city, however, are selected randomly. As a consequence, only a fraction $1/N$ of winners have an idiosyncratic preference for living in the city whose government has offered them a job. For the remainder $(N-1)/N$, taking up residence in the city has a utility cost ξ_i due to taste mismatch, independently and identically distributed across worker-city pairs with cumulative distribution function $F(\xi_i)$.

As an alternative, a public-sector employee can choose to live in one city and commute to work in another, though we assume that he must live within the state. The choice of commuting between two cities involves a hedonic cost ψ. We can interpret this parameter as the opportunity cost of commute time, assuming that welfare is separable in the utility of consumption and that of leisure, and that public-sector employment contracts do not provide workers with a choice of the number hours worked.

Therefore, an agent i who has won the public-sector lottery in city c but prefers living in city d chooses to commute if and only if

$$\log\left(w_t^c - T_t^d - \frac{r}{1+r}H_t^d\right) + \beta\log\left(B_{t+1}^c + H_{t+1}^d - H_t^d - R\right) - \psi > \log\left(w_t^c - T_t^c - \frac{r}{1+r}H_t^c\right) + \beta\log\left(B_{t+1}^c + H_{t+1}^c - H_t^c - R\right) - \xi_i. \quad (24)$$

In a symmetric equilibrium, public-sector compensation and housing prices are identical across cities. Thus a fraction

$$\gamma = \frac{1 + (1-N)F(\psi)}{N} \in \left[\frac{1}{N}, 1\right] \quad (25)$$

of local government employees choose to live in the city for which their work. This proportion will critically determine their political clout in the city. Hence γ can be interpreted directly as a parameter that determines the electoral power of city employees. We assume that γ is large enough and ψ small enough that all lottery winners accept their public-sector job offers.[24]

[23] The model retains an analytical solution analogous to Proposition 2, but displaying these additional effects, if we assume that the housing stock grows at a constant exogenous rate δ. The working-paper version develops this extension.

[24] Sufficient but not necessary conditions are $\gamma > \rho_w/(1-q+\rho_w q)$ and $\psi \approx 0$.

When public-sector employees live and own houses in one city but work and earn compensation in another, the definition of equilibrium is slightly different from Definition 1. Not only do local government employees constitute a smaller fraction of the electorate (γq instead of q). Some of the voters (share $(1-\gamma)\,q$ in a symmetric equilibrium) are liquidity-constrained employees of another city, whose self-interest is to minimize public-sector wages and pensions in their place of residence. Since public-sector employees' superior information derives from workplace interactions and local trade-union leaders, we assume it concerns only their own compensation. Thus, commuting government employees are no more informed than other taxpayers about policy proposals in their place of residence.

The intuition underpinning the equilibrium is unchanged, and we provide the detailed derivation in the appendix.

Proposition 4 *There is a unique symmetric linear Markov perfect dynamic rational expectations equilibrium. At any point on the equilibrium path, the ratio of the consumption levels of private- and public-sector employees equals*

$$\tau_W \equiv \frac{\bar{C}_W}{C_W^P} = \frac{\rho_w\,(1-q)}{\gamma\,(1-q) - (1-\gamma)\,\rho_w q}$$

for young workers and

$$\tau_R \equiv \frac{\bar{C}_R}{C_R^P} = \frac{\rho_B\,(1-q) + \phi\,[\gamma + (1-\gamma)\,\rho_B]\,q\tau_W}{\gamma\,(1-q) - (1-\gamma)\,\rho_B q + \phi\,[\gamma + (1-\gamma)\,\rho_B]\,q} < \tau_W$$

for old retirees.

Both ratios are decreasing in information asymmetries concerning wages ($\partial\tau_W/\partial\rho_w > 0$, $\partial\tau_R/\partial\rho_w \geq 0$) and in the share of local government employees living in the city ($\partial\tau_W/\partial\gamma < 0$, $\partial\tau_R/\partial\gamma < 0$), and increasing in the size of local government ($\partial\tau_W/\partial q \geq 0$, $\partial\tau_R/\partial q \geq 0$). The latter is also decreasing in information asymmetries concerning pensions ($\partial\tau_R/\partial\rho_B > 0$) and in pre-funding ($\partial\tau_R/\partial\phi > 0$).

In steady state, public-sector wages equal

$$w_{ss} = Y - \frac{R}{1+r} - \bar{A} + \frac{\bar{C}_W}{\tau_W},$$

public-sector pensions equal

$$B_{ss} = R + \frac{\bar{C}_R}{\tau_R},$$

and house prices equal

$$H_{ss} = \frac{1+r}{r}\left\{Y - \frac{R}{1+r} - \bar{A} - q\left[w_{ss} + \left(1 - \phi\frac{r}{1+r}\right)B_{ss}\right]\right\}.$$

Equilibrium dynamics converge to the steady state with public-sector wages

$$w\,(B_t) = w_{ss} + \frac{(1-\phi)\,q}{1-(1-\phi)\,q}\frac{B_t - B_{ss}}{1+r},$$

public-sector pensions

$$B'(B_t) = \frac{B_{ss} - (1-\phi) q B_t}{1-(1-\phi) q},$$

and house prices

$$H(B_t) = H_{ss} + (1-\phi) q (B_{ss} - B_t).$$

Comparing Proposition 4 with Proposition 2 highlights two direct consequences of pre-funding ($\phi > 0$). First, the capitalization of pension promises into house prices is proportionally reduced ($\partial H(B_t)/\partial B_t = (1-\phi) q$) because a lower fraction of the burden must be borne by future homeowners when current taxpayers are paying for it in advance instead. Thus, convergence to the steady state is faster. In the limit case when pensions are fully funded ($\phi = 1$) there is no dynamic link between the policy choices of each generation ($H(B_t) = H_{ss}$ irrespective of B_t), since each one prepays entirely any promises it makes to its public employees. Pensions then jump immediately to their steady state level (B_{ss}).

Second, pre-funding reduces the impact of steady-state pensions (B_{ss}) on steady-state house prices (H_{ss}) because a pre-funded system is intrinsically less costly than a pay-as-you-go system in a dynamically efficient economy. The former is financed at the market rate of return r, while the latter has an internal rate of return equal to city growth, which we assumed to be nil. This effect would be reversed if the local economy had a growth rate above the interest rate. Leeds (1985) failed to find evidence of a negative impact of unfunded pension liabilities on local property values.

Further indirect effects of pre-funding arise from its impact on the political equilibrium, which is also crucially affected by the residence of local government employees. The greater the fraction of public-sector workers that vote in local elections, the greater their clout over policy making. Thus, public-sector wages and pensions rise with the share that resides in the city ($\partial w_{ss}/\partial\gamma > 0$ and $\partial B_{ss}/\partial\gamma > 0$).[25] In our model, public employees' wages and pensions tend to rise together as a consequence of the political power of public-sector unions, rather than exhibiting a negative comovement, as predicted by the theory of compensating differentials (Smith 1981).

Pre-funding reduces the generosity of pension benefits ($\partial B_{ss}/\partial\phi < 0$) because government employees' demand for generous pensions declines when more pre-funding is required. Liquidity-constrained public-sector workers would rather defray their share of the cost of pension obligations through lower capital gains on their house upon retirement. If instead they are constrained by a pre-funding requirement to defray it through lower net income while working, they prefer lower pensions when old and lower taxes when young.

This mechanism also explains why public-sector pensions increase with information asymmetry on both issues ($\partial B_{ss}/\partial\rho_w \leq 0$ as well as $\partial B_{ss}/\partial\rho_B < 0$). With any pre-funding requirement ($\phi > 0$), the two types of compensation become complementary. If public employees expect higher wages because knowledge of the relevant proposals is more asymmetric ($\partial w_{ss}/\partial\rho_w < 0$), they are more aggressive in their pension demands because they know they can afford their share of pre-funding.

Finally, a larger public sector implies lower wages and pensions if any government employees commute across city lines ($\partial w_{ss}/\partial q < 0$ and $\partial B_{ss}/\partial q < 0$ if $\gamma < 1$). Then, as government

[25] Comparative statics on compensation levels mirror those on the equilibrium consumption ratios τ_W and τ_R.

employment rises, resident public-sector employees are fighting their political battles more and more against their non-resident peers rather than against private-sector employees. The former are the more formidable opponents because they are liquidity constrained and thus particularly oppose higher taxes.

As always, the ultimate political opponents of local government employees are homeowners. Thus, steady-state house prices not only decline with information asymmetries ($\partial H_{ss}/\partial \rho_w > 0$ and $\partial H_{ss}/\partial \rho_B > 0$), but they also fall as the electoral weight of public-sector workers rises ($\partial H_{ss}/\partial \gamma < 0$), and conversely rise with pre-funding ($\partial H_{ss}/\partial \phi > 0$).[26] The same comparative statics apply to developer profits, which are still expressed by equation (23). Thus, developers prefer as many local government employees as possible to be hired outside of the city, so they cannot vote in local elections. They also want maximum pre-funding to ensure that residents are keen proxy fighters in the political battle against public-sector workers.

On the other side of the political rivalry, public-sector unions would conversely favor minimal pension pre-funding. They would also like as many of their members as possible to reside and vote in the city that employs them, so as to exert greater electoral clout. However, individual local government employees do not internalize this consequence of their location choice, since each of them is atomistically small and thus cannot affect the outcome of an election with his single ballot.[27]

As in Proposition 3, our measure of aggregate efficiency highlights that neither the developers' interests nor those of the public-sector union are aligned with social welfare.

Corollary 1 *In the unique symmetric linear Markov perfect dynamic rational expectations equilibrium, public-sector employees' consumption is inefficiently back-loaded (*$\Gamma > 1$*). The degree of inefficiency is increasing in the asymmetry of information about pensions (*$\partial \Gamma/\partial \rho_B < 0$*) but decreasing in the asymmetry of information about wages (*$\partial \Gamma/\partial \rho_w > 0$*). It is decreasing in pre-funding (*$\partial \Gamma/\partial \phi < 0$*) and in the share of local government employees living in the city (*$\partial \Gamma/\partial \gamma < 0$*).*

The comparative statics on back-loading display the opposite welfare consequences of the two checks on the political clout of local government employees. A pre-funding requirement increases efficiency ($\partial \Gamma/\partial \phi < 0$). It blunts the temptation to accumulate unfunded pension liabilities that will be partially defrayed by future developers instead of current voters. Moreover, it reduces public-sector employees' willingness to leverage their privileged information into higher pension benefits, since it requires their own taxes to rise in line with their pension promises. Nonetheless, shrouding implies inefficient back-loading even if public-sector pensions are required to be fully pre-funded.[28]

[26] The impact of local government size q on house values and developer profits is ambiguous. As in Proposition 2, there is a direct negative effect because the city needs to support more public-sector employees. On the other hand, the compensation of each employee declines. We would expect the direct effect to dominate, but this is not a fully general result.

[27] Unionized public-sector insiders would also wish to limit the size of the local government workforce, since its expansion would entail a decrease in their compensation. This individual preference, however, may not translate into the policy preferences of the union leadership. The public-sector union as a whole might, e.g., aim at maximizing the total wage bill of its membership, rather than the individual utility of each member.

[28] Formally, if $\phi = 1$, then $\Gamma = 1/\left[q + (1-q)\,\rho_B/\rho_w\right] > 1$.

On the other hand, a lower share of resident public-sector employees reduces efficiency ($\partial\Gamma/\partial\gamma > 0$). The political influence of local government employees declines, but it also gets increasingly concentrated on the shrouded component of their compensation. Their clout is more and more dependent on information asymmetry rather than numbers. Moreover, a larger fraction of their political opponents consists of employees of other city governments, who are themselves liquidity constrained and thus keener to fight high wages than generous pensions.[29]

Although we have not yet turned to the topic of centralized pension bargaining, the results in this section already allow us to understand one major way in which states regulate localities: pre-funding requirements. As we discussed in Section 2, localities that participate in state systems are subject to state rules about pre-funding. These rules may be relatively lax, because of high assumed returns, but they do represent some attempt to regulate localities' behavior. Pre-funding is also a policy choice that in many cases only came about during the 1980s.

Pre-funding has no impact on wages or the consumption of public sector workers during their working life. Pre-funding, however, reduces pension promises and the consumption of retired public-sector workers, causing a decline in their lifetime welfare. As a consequence, public-sector unions should typically favor laxer pre-funding rules, which are presumably achieved in reality by assuming higher growth rates. Union power may also explain why public-sector pensions have not followed private-sector systems in moving from defined-benefit to defined-contribution schemes (Poterba, Venti, and Wise 2007). Conversely, developer profits increase with pre-funding because of the decrease in pensions. Fiscal discipline should therefore be the developers' mantra and they should push for tighter pre-funding requirements. We think that these results help make sense of the political divisions over pre-funding requirements.

What does pre-funding do to the overall efficiency of the system? As pre-funding increases, the ratio of public consumption when young to public consumption when old increases. This means that the gap between equilibrium worker welfare and worker welfare given the first-best consumption profile has decreased. As such, pre-funding doesn't just redistribute from workers to land owners: it also increases the efficiency of the system. This is one reason why pre-funding requirements may be so universal.

In the next section we turn to a broader discussion of centralized control over public-sector pensions.

[29] Inefficient back-loading also depends on the size of the local government (q), but two opposing forces are in play. On the one hand, back-loading tends to increase when the electorate includes more non-resident public employees, because liquidity constraints make them disproportionately opposed to generous wages. On the other hand, back-loading tends to decrease when local government employees shoulder a greater share of pre-funding, because this requirement reduces their demand for pensions, again due to liquidity constraints. The latter effect dominates if resident employees are more numerous, more powerful, and more sensitive to the current tax impact of their future pensions: hence, if shrouding, pre-funding and the share of local government employees living in the city are high. Formally, $\partial\Gamma/\partial q < 0$ if and only if $\rho_B < \gamma\phi/(1-\gamma)(1-\phi)$.

4 Decentralization and Control over Pensions

The primary purpose of the model is to enable us to consider the issues raised in Section 2, which highlighted the heterogeneity in local control over pensions. In our model, we assume that there are two primary differences between local and state pension setting. First, when pensions are set at the local level, only a fraction of public sector workers vote in each election because some of them live outside the locality ($\gamma < 1$). When pensions are set at the state level, then all public sector workers vote in the election. Second, we assume that there is an additional source of information about pensions and wages when the process occurs at the state level. Statewide news media cover statewide public-policy issues, which increases the probability that voters know about both public-sector wages and public-sector pensions.

Formally, we assume that each voter receives information about policy proposals from local news with probability θ_L. In addition to this chance of being informed by local sources, every individual has probability θ_S of being informed of statewide policy proposals by state-level media. Finally, each public-sector worker has probability θ_U of being informed of wage proposals by the union.

The arrival of information is independent across sources. In every case, shrouding is reflected in an individual's lower ability to learn and understand about pension proposals. An agent that has received information about wage proposals from a given source has a conditional probability $\pi < 1$ of gaining knowledge of pension proposals as well from the same source.

As in equation (21) above, the distribution of information can be summarized by two measures of symmetry. Under centralization, these are ρ_B^S for pensions and ρ_w^S for wages, such that $0 < \rho_B^S < \rho_w^S < 1$. Under decentralization they are ρ_B^L for pensions and ρ_w^L for wages, such that $0 < \rho_B^L < \rho_w^L < 1$. The effects of centralization on the information structure admit the following characterization.

Lemma 1 *Centralization reduces information asymmetry on all issues ($\rho_w^S > \rho_w^L$ and $\rho_B^S > \rho_B^L$). It reduces the relative asymmetry of information about pensions compared to wages if and only if local news are sufficiently informative: $\rho_B^S/\rho_w^S > \rho_B^L/\rho_w^L$ if and only if $\theta_L > \bar{\theta}_L$, for a threshold $\bar{\theta}_L \in (0, \max\{\theta_S, \theta_U\})$.*

This lemma provides a comparison of information asymmetries with centralized and decentralized policy-making. Diminishing returns to information imply that the statewide news source is more relevant for taxpayers, who rely on news only, than for public-sector workers, who also receive information from the unions. Thus centralization reduces the knowledge advantage of public employees on all policy dimensions ($\rho_w^S > \rho_w^L$ and $\rho_B^S > \rho_B^L$).

The relative asymmetry in information about pensions and wages can be attenuated in two ways: by making taxpayers more informed about pensions, or by making taxpayers less informed about wages. In the limit as local news disappear ($\theta_L \to 0$) decentralization induces complete capture of both policy dimensions by public employees ($\rho_w \simeq \rho_B \simeq 0$). Relative asymmetry is then minimized. However, in the case we consider most realistic, local news are more informative ($\theta_L > \bar{\theta}$). The empirical findings of Gentzkow (2006) and Snyder and Strömberg (2010) suggest that local newspapers are the main source of information about state and local policy, which would imply $\theta_L > \theta_S$. Informative local news imply that decentralized government lets public employees capture pensions but not wage-setting. Then the relative asymmetry on the two issues declines with centralization, as well as the absolute asymmetry on each.

We first turn to the impact of centralization on public-sector compensation and housing prices.

Proposition 5 *Centralization reduces public employees' wages and first-period consumption if and only if the share of public employees living in the city is above a critical value* $\bar{\gamma}_w$. *This threshold is increasing in the total number of public employees* ($\partial\bar{\gamma}_w/\partial q > 0$) *and in the information provided by local news* ($\partial\bar{\gamma}_w/\partial\theta_L > 0$)*, and decreasing in the information provided by statewide news and public-sector unions* ($\partial\bar{\gamma}_w/\partial\theta_S < 0$ *and* $\partial\bar{\gamma}_w/\partial\theta_U < 0$)*.*

Centralization reduces public employees' pensions and their consumption while retired if and only if the share of public employees living in the city is above a critical value $\bar{\gamma}_B$*, decreasing in the information provided by statewide news* ($\partial\bar{\gamma}_B/\partial\theta_S < 0$)*. When local news are sufficiently informative* ($\theta_L > \bar{\theta}_L$)*, a reduction in public-sector pensions is more likely than one in public-sector wages* ($\bar{\gamma}_B < \bar{\gamma}_w$)

The impact on public employees' wages captures clearly the opposite pull of the two political consequences of centralization. On the one hand, centralization empowers public-sector workers by enabling all of them to vote for the politicians in charge of setting their salaries. On the other hand, centralization curbs the political power that public-sector unions derive from superior information, by increasing the news coverage of policy issues that reaches all taxpayers alike. The former effect dominates in cities with a low share of public workers in the electorate, and the latter in those whose employees are more likely to also be residents ($\gamma > \bar{\gamma}_w$).

When the local public sector is larger, the importance of electoral weight is greater. Then centralization is less likely to reduce public-sector wages ($\partial\bar{\gamma}_w/\partial q > 0$), because government employees have a lot to gain from a higher residence share. Centralization is more likely to reduce public-sector wages when local news sources are weaker ($\partial\bar{\gamma}_w/\partial\theta_L > 0$) and statewide news sources stronger ($\partial\bar{\gamma}_w/\partial\theta_S < 0$) because it then implies a greater increase in taxpayers' knowledge and thus in their power. It is also more likely to reduce wages when the union is stronger ($\partial\bar{\gamma}_w/\partial\theta_U < 0$) and exerts greater control over local politics.

By the same mechanism, centralization reduces pensions in cities with enough public employees in their electorate ($\gamma > \bar{\gamma}_B$), and this is more likely when centralization generates more public information ($\partial\bar{\gamma}_B/\partial\theta_S < 0$). Indeed, in the regular case of informative local news ($\theta_L > \bar{\theta}_L$), centralization reduces public-sector wages whenever it reduces public-sector pensions, but may reduce pensions alone ($\bar{\gamma}_B < \bar{\gamma}_w$). This is intuitive because, as we saw in lemma 1, centralization then reduces information asymmetries concerning pensions more than those concerning wages.

Proposition 6 *Centralization increases house prices if and only if the share of public employees living in the city is above a critical value* $\bar{\gamma}_H$*, decreasing in the information provided by statewide news* ($\partial\bar{\gamma}_H/\partial\theta_S < 0$)*. When local news are sufficiently informative* ($\theta_L > \bar{\theta}_L$)*, an increase in house prices is more likely than a decline in public-sector wages, but less likely than one in pensions* ($\bar{\gamma}_B < \bar{\gamma}_H < \bar{\gamma}_w$)*.*

The effect of centralization on house prices follows the familiar pattern. The more informative statewide sources, the more likely a reduction in the political power of public-sector unions. Such a decrease, by reducing the compensation of local government employees, yields a corresponding increase in house prices. Given that house prices reflect both the cost of pensions and that of wages, it is intuitive that likelihood that centralization increases them should be intermediate between those of reducing each component of public employees' lifetime compensation.

In cities with a very high share of public-sector workers in the electorate ($\gamma > \bar{\gamma}_w$), centralization reduces their political power across the board, so that both their wages and their pensions decline and house prices conversely rise. Yet, centralization need not be an unmitigated harm for public employees. It can yield a decrease in pensions, but at the same time an increase in wages. In fact, this pattern is consistent both with a decline in aggregate compensation and a rise in house prices ($\bar{\gamma}_H < \gamma < \bar{\gamma}_w$), and with an increase in aggregate compensation and a fall in house prices, when fewer public employees are local residents ($\bar{\gamma}_B < \gamma < \bar{\gamma}_H$).

The possibility of a decline in public-sector pensions matched by an increase in public-sector wages immediately suggests efficiency benefits of centralization, in the light of Proposition 3. We now turn to the impact of centralization on the welfare of public sector workers and developer profits. As before, we consider the value of the city to its developer in time zero as one element in social welfare. Public sector workers present the second element in total social welfare.

Proposition 7 *Centralization reduces the lifetime utility of public-sector workers if and only if the share of public employees living in the city is above a critical value $\bar{\gamma}_U$, decreasing in the information provided by statewide news ($\partial\bar{\gamma}_U/\partial\theta_S < 0$). When local news are sufficiently informative ($\theta_L > \bar{\theta}_L$), a reduction in public employees' welfare is more likely than one in public-sector wages, but less likely than one in house prices, and a fortiori than one in public-sector pensions ($\bar{\gamma}_B < \bar{\gamma}_H < \bar{\gamma}_U < \bar{\gamma}_w$).*

Centralization increases the present value of developer profits if and only if the share of public employees living in the city is above a critical value $\bar{\gamma}_\Pi$, decreasing in the information provided by statewide news ($\partial\bar{\gamma}_\Pi/\partial\theta_S < 0$). When local news are sufficiently informative ($\theta_L > \bar{\theta}_L$), an increase in public-sector pensions is more likely than a decline in public employees' welfare, and a fortiori than one in their wages. It is less likely than an increase in steady-state house prices, and a fortiori than a decrease in public-sector pensions ($\bar{\gamma}_B < \bar{\gamma}_H < \bar{\gamma}_\Pi < \bar{\gamma}_U < \bar{\gamma}_w$).

Comparing the first part of the proposition with proposition 5 reveals that the qualitative effect of centralization on public-sector worker's welfare is the same as that on their compensation. Identically, the comparison with proposition 6 shows that the effect of centralization on developer profits is qualitatively the same as its effect on steady-state house prices. Quantitatively, however, centralization can reduce public employees' pensions while instead increasing their lifetime welfare ($\bar{\gamma}_B < \gamma < \bar{\gamma}_H$), through a more than compensating increase in wages. Conversely, an increase in developer profits is a stricter condition than an increase in housing prices ($\bar{\gamma}_H < \bar{\gamma}_\Pi$). Centralization can reduce public-sector pensions enough to lift steady-state house values, and yet reduce total developer profits because of the inefficiency of pay-as-you-go pensions when the interest rate is above the growth rate.[30]

Proposition 7 attests to the distributive tension connected with the choice between centralization and decentralization. Developers (and taxpayers more generally) want centralization when they expect the reduction in information asymmetry dominates the increase in the fraction of public-sector workers voting in the district ($\gamma > \bar{\gamma}_\Pi$). Public sector workers have the opposite preference, and support centralization when they believe that their greater voting numbers should dominate their reduced information advantage ($\gamma < \bar{\gamma}_U$).

Yet the final result also highlights the scope for consensual efficiency gains. There is a non-empty interval $[\bar{\gamma}_\Pi, \bar{\gamma}_U]$ for which centralization represents a Pareto improvement. Public-sector pensions fall ($\gamma > \bar{\gamma}_B$), house prices rise ($\gamma > \bar{\gamma}_H$) and so do developer profits ($\gamma > \bar{\gamma}_\Pi$). But public employee' wages also rise ($\tilde{\gamma} < \bar{\gamma}_w$) and so does their lifetime utility ($\tilde{\gamma} < \bar{\gamma}_U$). The decline in pensions is more than compensated by the increase in wages, since under local policy pensions are too high relative to wages. Intuitively, public employees are willingly trading off an inefficient source of asymmetric political power, privileged information, for an efficient symmetric one, participation in the election. This creates aggregate efficiency gains that under some parameter values can be shared among all parties involved, leading to a Pareto improvement.

A starker result is obtained when we measure efficiency by the welfare loss for public-sector workers compared to the first-best compensation profile that costs the same to the city developer.

Proposition 8 *When local news are sufficiently informative ($\theta_L > \bar{\theta}_L$), centralization reduces the inefficient back-loading of public-sector compensation ($\Gamma_S < \Gamma_L$). The threshold is always interior ($0 < \bar{\theta}_L < \max\{\theta_S, \theta_U\}$). It increases with the information conveyed by rival sources of information ($\partial\bar{\theta}_L/\partial\theta_S > 0$ and $\partial\bar{\theta}_L/\partial\theta_U > 0$) and with the shrouding of public-sector pensions ($\partial\bar{\theta}_L/\partial\pi < 0$).*

These results follows directly from Lemma 1 given the equilibrium value of inefficient back-loading (Γ_S or Γ_L), which is determined by the relative asymmetry of information about pensions compared to wages. In what we consider the regular case of sufficient local information, centralization is always efficient in the sense of yielding greater consumption smoothing for public-sector employees, although its effect on their welfare and on the public-sector payroll can change sign depending on participation by public employees in local elections (γ).

Nonetheless, the proposition can also be read as a cautionary note against relying on the notion that any increase in public information is always efficient. As Proposition 3 emphasized, transparency is efficient if it reduces the shrouding of pensions, but not if it merely provides more information about wages. Proposition 8 shows that, if local media are the main source of political news ($\theta_L > \max\{\theta_S, \theta_U\}$), then the efficiency of centralization is guaranteed. If instead local coverage is dominated by other sources of information, centralization is efficient only if the difference between these sources is no too large, and if pensions are not too shrouded. Otherwise, the flatter public-sector compensation profile may

[30]With full prefunding ($\phi = 1$) centralization increases developer profits if and only if it increases steady-state house prices: $\bar{\gamma}_H = \bar{\gamma}_\Pi$.

be obtained by local taxpayers who are uninformed about all policies, rather than by the statewide electorate, whose knowledge becomes more skewed as it rises above a negligible starting point.

Centralization always tends to reduce back-loading because it implies all public employees vote in the relevant election, which shifts their power from pensions towards wages, as shown by Corollary 1. This effect, however, could be more than undone by a statewide news source dispelling taxpayers' across-the-board ignorance of policy proposals when local news source are very uninformative ($\theta_L \approx 0$).

Our model thus predicts that there are conditions under which centralization is efficient, and more restrictive conditions under which it is beneficial for both sides, private developers and public-sector unions. However, we do not know whether increased information or increased voting will be more powerful in the real world. We believe that the model has served to highlight the relevant parameters which will determine the impacts of centralization. We hope that this will inform future empirical work.

At this point, we turn to a discussion of the history of centralized control over pensions in Massachusetts, California, Ohio and Pennsylvania. We discuss the first two states at length, discussing their history and current systems. We then compare Ohio and Pennsylvania today.

5 Local Pension Funds and State Control

The complexity and endogeneity of state-level pension rules do not lend themselves to easy characterization or straightforward statistical work. Using funding ratios from Novy-Marx and Rauh (2009), which provide only a combined estimate for states and localities, we did not see a clear linkage between the level of funding and the degree of local control, perhaps because the bulk of the funding concerns state employees. We believe that further investigation of this topic is a pressing area for future research.

Here we turn to a discussion of two pairs of states, to see whether there is an obvious connection between generosity and centralization. California and Massachusetts are two wealthy progressive states; Ohio and Pennsylvania are Rust Belt neighbors. One state in each of the pairs has substantial local control, while the other is more centralized, reflecting the remarkably heterogeneous rules for local pension systems across America.

5.1 Massachusetts and California

The path of public pensions in Massachusetts begins with police, expands to firemen, state employees (in 1911), teachers (in 1913) and eventually all local public employees. In 1913, Massachusetts adopted a statewide teachers' system which required employees to make contributions to an annuity fund, ranging from three to seven percent of their income. These payments would be used at retirement to fund an annuity, and the State would match the annuity payments out of general revenues.

While teachers had become entirely subsumed into the state system in 1913, Massachusetts never forced localities to adopt local pension systems. Instead, a 1945 law mandated that a pension system proposal, with terms dictated at the state level, had to be on the ballot in every subsequent state election until every city or town accepted it, and eventually the system became widespread. The 1945 law created the core Massachusetts system where salaries continue to be negotiated at a local level, but the rules regarding pensions are set at the state level.[31]

Although the system was originally pay-as-you-go, repeated funding crises led to more pre-funding, especially after 1987. Today, despite identical pension generosity, under-funding differs widely from towns, like wealthy Wellesley and Lexington, which have funding ratios over 85 percent, to poorer areas than can have funding ratios that are closer to 40 percent. Moreover, these funding ratios reflect aggressive estimates of future returns (8.25%), which may not be realized.[32]

State control has probably restricted pensions in larger cities, which have strong local unions, but since many communities did not have pensions when the system was fully voluntary (without a ballot mandate), state intervention appears to have increased pensions in smaller places where local public workers are unlikely to live.

Like Massachusetts, California adopted pensions early. In 1895, California passed an "act to create and administer a Public School Teachers' Annuity and Retirement Fund in the several counties, and cities and counties of the state," which was expanded in 1913. As in Massachusetts, teachers' pensions required employee contributions, but these were modest in California and were supplemented with statewide inheritance and transfer taxes. The state moved towards a standard pay-as-you-go system in 1944, but after 1972 began pre-funding teachers' pensions.

For other local public employees, California began with more centralization than Massachusetts, but ended up with more local heterogeneity, perhaps because it is a far larger state. In 1937, California enacted the County Employees Retirement Act, now known as the "37 Act", which has enabled the creation of 20 distinct county retirement plans, still in place today. Home rule is much stronger in California than in Massachusetts, which may partially explain its greater heterogeneity of pension plans.

In 1939, the state legislature enabled smaller jurisdictions, including counties, to join the state employees retirement system (SERS, now CalPERS) that is in place today. The system involves a number of generally applicable rules, but there is plenty of scope for negotiation with CalPERS about the generosity of the pension plan. CalPERS is best seen as the manager of local plans, which have autonomy only within a band of possible contribution rates and overall generosity. CalPERS typically requires local governments to make appropriate contributions, but CalPERS limited authority means that localities under financial pressure limit their contributions.

In California, unlike Massachusetts outside of Boston, local governments negotiate with local unions over their pension systems, and California has far more generous pensions. On average, the Massachusetts system pays $21,500 in benefits per active benefit recipient. The California system pays $36,000 per active benefit recipient. This difference seems quite large, especially since similar: median household income was higher in Massachusetts in 2010 than in California.

[31] Somewhat oddly, despite central control over pension terms, many localities continue to manage their portfolios at the local level.

[32] State law mandates that they set aside funds to close the funding gap by 2040, but it would not be surprising if this gap were pushed out further if returns continue to fall below 8.25 percent, or if localities raise insufficient revenues.

For a worker who retires at 65 with 40 years of service, the Massachusetts system provides a maximum payment of 80 percent of pay (averaged over the last three years of service). Cost of living adjustments are optional for the community, and in recent years, the employee will have to contribute nine percent of earnings to receive this pension.

By comparison, in the Los Angeles plan, there are contributory and non-contributory options. The non-contributory option (Plan D) will also delivery 80 percent of top pay to employees who retire after 45 years of service at the age of 65. In the contributory plan, the workers' payment is only six percent of salary if the employee begins work at age 25, and it only passes nine percent if the employee starts at 45. Moreover, the maximum payment is 100 percent of pay, which is reached after 42 years of service. This plan seems substantially more generous than the Massachusetts system, and this is true for a large number of local California plans.

California's jurisdictions may have such generous pensions because they are large enough so that workers are likely to live and vote within their particular county, but not large enough to have a dedicated media focused on delivering hard analysis of pension deals. California's local heterogeneity can also mean that poorly managed governments end up taking on particularly onerous pension obligations.[33]

5.2 Ohio and Pennsylvania

The neighboring states of Pennsylvania and Ohio are similar in many ways, but they are polar opposites in the degree of local control over pensions. Pennsylvania is the extreme of local heterogeneity and control, with over 1,400 distinct, locally administered pension plans. Ohio epitomizes centralization, with a single statewide system that covers all local employees, outside of Cincinnati. That statewide system was put in place in 1967 to address under-funding problems at the local level.

Despite the proliferation of Pennsylvania plans, the average generosity of these plans is not particularly high. The average benefit per beneficiary is under $21,000 in 2010. To get an actual appreciation of terms, we compare the Ohio system with two Pennsylvania jurisdictions: Pittsburgh and Luzerne County. The average Ohio annuity per recipient in 2010 was $22,500.[34] While this is higher than the Pennsylvania average, the numbers are not exactly comparable, because Ohio workers make significant contributions, do not receive Social Security, and because the Pennsylvania benefits number includes other benefits.

The core Ohio plan requires a ten percent member contribution, and the most traditional plan offers 2.2 percent of final salary per year of service, up to 30 years, and 2.5 percent of final salary per year of service after that point. As such, a forty year veteran of the system can expect to receive 91 percent of final salary.

Despite a 1987 reform that made the Pittsburgh system less generous, the current system requires only four percent of the worker's salary. The normal benefit after 20 years of service is 50 percent of average salary, but workers earn an increment of one percent per year of service over twenty, so a forty year veteran could earn 70 percent of peak salary. The one

[33] An added difference between California and Massachusetts is that since 1955, the State Supreme Court has ruled that no part of a pension system may be eliminated for existing workers, except if any reduction in benefits is offset by a comparable advantage (Monahan 2012).

[34] https://www.opers.org/pubs-archive/investments/cafr/2010_CAFR_LoRes.pdf

percent increment is capped at $100 per month, but that is not limiting except for workers earning over $120,000 per year. There is a reduction in payments equal to one-half of social security payments received after age 65.

The Luzerne County system includes a contributory component of five percent or more, and the retiree receives a pension equal to the actuarial value of that contribution plus interest. In addition, the employee receives a pension of between one and two percent per years of service, depending on the class of service. Thus a twenty year worker might expect to receive 30 percent of final salary plus the accumulated value of total pension contributions.

Overall, the Ohio plan seems to be distinctly less generous than Pittsburgh's plan, particularly for workers with less than 25 years of service, since the payment is the same as a share of earnings and the contribution rate is far higher. When comparing the Ohio and Luzerne plans, it is perhaps easiest to assume that, since Ohio public employers contribute 14 percent of salary, they are paying for 60 percent of the Ohio plan, and possibly more if the plan is under-funded. In that case, the employer-funded Ohio plan amounts to around 1.4 percent per year of service making it roughly comparable to the Luzerne county plan.

Local plans can be modest, especially when (as in Luzerne County) resources are limited. But in larger local jurisdictions, both in California and Pennsylvania, the pension plans do seem to be quite generous, certainly more so than the two comparison centralized plans that we considered. As in California, Pennsylvania's local control has also led some communities, like Scranton, to face particularly large funding shortfalls.

6 Conclusion

This paper has presented a model of the political economy of public-sector pensions. The model suggests that pensions are likely to be generous, in part, because pension promises are less easily observable than promises about more direct forms of compensation. The shrouded nature of public pensions presents one explanation for why they are typically far more generous in the public than in the private sector. The model also predicts that pensions will be more generous when public-sector workers are more likely to live in the community or when pre-funding requirements are lower.

In the model, pensions are inefficiently generous. Redistributing between public-sector workers and taxpayers could be either good or bad depending on one's perspective, but the model implies that public-sector worker welfare can be improved, holding total public sector costs fixed, if pensions are reduced and wages increased. This result is corroborated by Fitzpatrick's (2012) finding that many teachers are unwilling to buy larger pensions, even at a small fraction of their total cost.

The implications of the model go far beyond pensions to all forms of compensation that are difficult to evaluate. Healthcare promises, particularly for retirees, are doubly shrouded. They involve promises far in the future, involving in-kind benefits that are inherently difficult to evaluate. The shrouded nature of these benefits can explain why public-sector healthcare costs have been particularly high.

The model does not specifically discuss different types of public projects, but there as well, shrouding should matter. If the costs of large-scale infrastructure projects are difficult to assess, then we should not be surprised to see that the public sector has a penchant for such undertakings. Certainly, there has been a regular tendency to understate the cost of these projects and overstate the projected revenues.

The results of the model enable us to analyze the choice of centralization over pension rules. Centralization leads to more overall information and often less information asymmetry between public-sector workers and taxpayers. Centralization also ensures that public-sector workers will all vote in the election. The impact of centralization on pension generosity depends on whether the informational force dominates or whether the impact of union voting dominates. Since union workers are likely to live in big cities, we speculate that moving to centralized control over big city pensions may be particularly likely to reduce generosity.

We then used the logic of the model to discuss four states. In two of these states, Ohio and Massachusetts, local pension benefits are determined at the state level. In the other two states, California and Pennsylvania, benefits are set locally. In our examples, centralized control appeared to reduce pension generosity. If this conclusion is correct, then it suggests the power of shrouding. A primary difference between state and local control is that statewide institutions, including the media, will be focused on the costs of state level compensation. This should have the impact of reducing shrouding and reducing the back-loading of compensation.

Transparency is a watchword in public policy today, and this paper formalizes the costs of limited transparency. Shrouding is the opposite of transparency, and in our model shrouding creates the potential for considerable social losses. The remaining question is what institutions can significantly reduce the adverse consequences of the shrouded costs of government.

A Appendix

A.1. Derivation of the Political Support Function

Given the realization of the common shock Ψ, the fraction of citizens of type j who vote for party R equals

$$s_R^j = \frac{1}{2} + \frac{1}{2\bar{\psi}} \cdot \left[\left(\begin{array}{l} \theta_B^j \left[U_t^j \left(w_t^R, B_{t+1}^R \right) - U_t^j \left(w_t^L, B_{t+1}^L \right) \right] \\ + \left(\theta_w^j - \theta_B^j \right) \left\{ \mathbb{E} \left[U_t^j \left(w_t^R, \tilde{B}_{t+1}^R \right) | w_t^R \right] - \mathbb{E} \left[U_t^j \left(w_t^L, \tilde{B}_{t+1}^L \right) | w_t^R \right] \right\} \\ + \left(1 - \theta_w^j \right) \left[\mathbb{E} U_t^j \left(\tilde{w}_t^R, \tilde{B}_{t+1}^R \right) - \mathbb{E} U_t^j \left(\tilde{w}_t^L, \tilde{B}_{t+1}^L \right) \right] \end{array} \right) - \Psi \right]. \quad \text{(A1)}$$

Thus the realization of Ψ determines the number of ballots cast for each candidate: party R receives more votes than party L if and only if

$$\begin{aligned} \Psi < q & \left(\begin{array}{l} \theta_B^P \left[U_t^P \left(w_t^R, B_{t+1}^R \right) - U_t^P \left(w_t^L, B_{t+1}^L \right) \right] \\ + \left(\theta_w^P - \theta_B^P \right) \left\{ \mathbb{E} \left[U_t^P \left(w_t^R, \tilde{B}_{t+1}^R \right) | w_t^R \right] - \mathbb{E} \left[U_t^P \left(w_t^L, \tilde{B}_{t+1}^L \right) | w_t^R \right] \right\} \\ + \left(1 - \theta_w^P \right) \left[\mathbb{E} U_t^P \left(\tilde{w}_t^R, \tilde{B}_{t+1}^R \right) - \mathbb{E} U_t^P \left(\tilde{w}_t^L, \tilde{B}_{t+1}^L \right) \right] \end{array} \right) \\ + (1-q) \cdot & \left(\begin{array}{l} \theta_B^T \left[U_t^P \left(w_t^R, B_{t+1}^R \right) - U_t^P \left(w_t^L, B_{t+1}^L \right) \right] \\ + \left(\theta_w^T - \theta_B^T \right) \left\{ \mathbb{E} \left[U_t^P \left(w_t^R, \tilde{B}_{t+1}^R \right) | w_t^R \right] - \mathbb{E} \left[U_t^P \left(w_t^L, \tilde{B}_{t+1}^L \right) | w_t^R \right] \right\} \\ + \left(1 - \theta_w^T \right) \left[\mathbb{E} U_t^P \left(\tilde{w}_t^R, \tilde{B}_{t+1}^R \right) - \mathbb{E} U_t^P \left(\tilde{w}_t^L, \tilde{B}_{t+1}^L \right) \right] \end{array} \right). \end{aligned} \quad \text{(A2)}$$

For any distribution of the unobservable common shock Ψ, party R seeks to maximize the right-hand side, and party L to minimize it. This leads both parties to solve the same problem:

$$\max_{w_t^C, B_{t+1}^C} \left\{ \begin{array}{l} q \left\{ \theta_B^P U_t^P \left(w_t^C, B_{t+1}^C \right) + \left(\theta_w^P - \theta_B^P \right) \mathbb{E} \left[U_t^P \left(w_t^C, \tilde{B}_{t+1}^C \right) | w_t^C \right] \right\} \\ + (1-q) \left\{ \theta_B^T U_t^T \left(w_t^C, B_{t+1}^C \right) + \left(\theta_w^T - \theta_B^T \right) \mathbb{E} \left[U_t^T \left(w_t^C, \tilde{B}_{t+1}^C \right) | w_t^C \right] \right\} \end{array} \right\}. \quad \text{(A3)}$$

A.2. Proof of Proposition 1

With perfect information ($\theta_B^P = \theta_w^P = \theta_B^T = \theta_w^T = 1$) the political support function is

$$V \left(w_t, B_{t+1}; B_t, H_t \right) = q U^P \left(w_t, B_{t+1}; B_t, H_t \right) + (1-q) U^T \left(w_t, B_{t+1}; B_t, H_t \right). \quad \text{(A4)}$$

Given expectations of linear house price dynamics $H(B_{t+1}) = K - hB_{t+1}$, its maximum is defined by the first-order conditions

$$\frac{1}{(1-q) w_t - (1-\phi) q B_t - \frac{r}{1+r} H_t - \frac{\phi q}{1+r} B_{t+1}} = \frac{1+\beta}{Y - (1-\phi) q B_t - H_t - q w_t - \frac{\phi q}{1+r} B_{t+1} + \frac{H(B_{t+1}) - R}{1+r}} \quad \text{(A5)}$$

and

$$q\left\{\frac{\beta(1-h)}{B_{t+1}+H(B_{t+1})-H_t-R}-\frac{\phi q}{(1+r)\left[(1-q)w_t-(1-\phi)qB_t-\frac{r}{1+r}H_t-\frac{\phi q}{1+r}B_{t+1}\right]}\right\}$$
$$=\frac{(1+\beta)(1-q)(\phi q+h)}{(1+r)\left[Y-(1-\phi)qB_t-H_t-qw_t-\frac{\phi q}{1+r}B_{t+1}+\frac{H(B_{t+1})-R}{1+r}\right]} \quad \text{(A6)}$$

These can be written as constant consumption ratios

$$\tau_W\equiv\frac{C^T_{W,t}}{C^P_{W,t}}=\frac{Y-(1-\phi)qB_t-H_t-qw_t-\frac{\phi q}{1+r}B_{t+1}+\frac{H(B_{t+1})-R}{1+r}}{(1+\beta)\left[(1-q)w_t-(1-\phi)qB_t-\frac{r}{1+r}H_t-\frac{\phi q}{1+r}B_{t+1}\right]}=1 \quad \text{(A7)}$$

for young workers and

$$\tau_R\equiv\frac{C^T_{R,t+1}}{C^P_{R,t+1}}=\frac{\beta(1+r)}{1+\beta}\frac{Y-(1-\phi)qB_t-H_t-qw_t-\frac{\phi q}{1+r}B_{t+1}+\frac{H(B_{t+1})-R}{1+r}}{B_{t+1}+H(B_{t+1})-H_t-R}$$
$$=\frac{\phi q+(1-q)h}{q(1-h)} \quad \text{(A8)}$$

for old retirees.

Therefore, a Markov perfect dynamic rational expectations equilibrium is given by three functions $H(B_t)$, $w(B_t)$, and $B'(B_t)$ that satisfy simultaneously:

1. The spatial equilibrium condition

$$Y-(1-\phi)qB_t-H(B_t)-qw(B_t)-\frac{\phi q}{1+r}B'(B_t)+\frac{H(B'(B_t))-R}{1+r}=\bar{A}. \quad \text{(A9)}$$

2. The political optimality condition for public-sector wages

$$Y-(1-\phi)qB_t-H(B_t)-qw(B_t)-\frac{\phi q}{1+r}B'(B_t)+\frac{H(B'(B_t))-R}{1+r}$$
$$=(1+\beta)\tau_W\left[(1-q)w(B_t)-(1-\phi)qB_t-\frac{r}{1+r}H(B_t)-\frac{\phi q}{1+r}B'(B_t)\right]. \quad \text{(A10)}$$

3. The political optimality condition for public-sector pensions

$$Y-(1-\phi)qB_t-H(B_t)-qw(B_t)-\frac{\phi q}{1+r}B'(B_t)+\frac{H(B'(B_t))-R}{1+r}$$
$$=\frac{(1+\beta)\tau_R}{\beta(1+r)}\left[B'(B_t)+H(B'(B_t))-H(B_t)-R\right]. \quad \text{(A11)}$$

Using the spatial equilibrium condition and linear house price dynamics $H(B_t)=K-hB_t$, the political optimality condition for public-sector pensions can be solved for pension dynamics:

$$B'(B_t)=\frac{B_{ss}-hB_t}{1-h}\text{ for }B_{ss}\equiv R+\frac{\beta(1+r)\bar{A}}{(1+\beta)\tau_R}. \quad \text{(A12)}$$

Substituting $H(B_t)$ and $B'(B_t)$ in the spatial equilibrium condition,

$$qw(B_t) = Y - \bar{A} - \frac{rK+R}{1+r} - \frac{\phi q + h}{1+r}\frac{B_{ss}}{1-h} + \left[h + \frac{(\phi q + h)h}{(1+r)(1-h)} - (1-\phi)q\right] B_t. \quad \text{(A13)}$$

Substituting them in the political optimality condition for public-sector wages,

$$(1-q)w(B_t) = \frac{\bar{A}}{(1+\beta)\tau_W} + \frac{r}{1+r}K + \frac{\phi q}{1+r}\frac{B_{ss}}{1-h} + \left[(1-\phi)q - \frac{rh}{1+r} - \frac{\phi q}{1+r}\frac{h}{1-h}\right] B_t. \quad \text{(A14)}$$

By the method of undetermined coefficients, these are jointly satisfied for all B_t if and only if

$$K = \frac{1+r}{r}\left[(1-q)Y - (1-q)\bar{A} - (1-q)\frac{R}{1+r} - \frac{q\bar{A}}{(1+\beta)\tau_W} - \frac{\phi q + (1-q)h}{(1+r)(1-h)}B_{ss}\right], \quad \text{(A15)}$$

while h is defined by

$$\left(\frac{r}{1+r}h - 1\right)[h - (1-\phi)q] = 0, \quad \text{(A16)}$$

whose unique root in $[0,1)$ is

$$h = (1-\phi)q. \quad \text{(A17)}$$

Thus pension dynamics are

$$B'(B_t) = \frac{B_{ss} - (1-\phi)qB_t}{1-(1-\phi)q} \text{ for } B_{ss} \equiv R + \frac{\beta(1+r)\bar{A}}{(1+\beta)\tau_R}, \quad \text{(A18)}$$

and wage dynamics are

$$w(B_t) = w_{ss} + \frac{(1-\phi)q}{1-(1-\phi)q}\frac{B_t - B_{ss}}{1+r} \text{ for } w_{ss} \equiv Y - \frac{R}{1+r} - \bar{A} + \frac{\bar{A}}{(1+\beta)\tau_W}. \quad \text{(A19)}$$

The definitions of B_{ss}, h, K and w_{ss} allow the intuitive rewriting

$$H(B_t) = H_{ss} + (1-\phi)q(B_{ss} - B_t) \quad \text{(A20)}$$

for

$$H_{ss} \equiv \frac{1+r}{r}\left[Y - \bar{A} - \frac{R}{1+r} - qw_{ss} - \left(\frac{\phi}{1+r} + 1 - \phi\right)qB_{ss}\right]. \quad \text{(A21)}$$

The unique linear stationary Markov perfect dynamic rational expectations equilibrium features equalized consumption levels

$$\tau_W = 1 \text{ and } \tau_R = 1, \quad \text{(A22)}$$

and steady-state values

$$B_{ss} = R + \bar{C}_R = R + \frac{\beta(1+r)}{1+\beta}\bar{A}, \quad \text{(A23)}$$

$$w_{ss} = Y - \frac{R}{1+r} - \bar{A} + \bar{C}_W = Y - \frac{R}{1+r} - \frac{\beta}{1+\beta}\bar{A}, \tag{A24}$$

and

$$H_{ss} = \frac{1+r}{r}\left\{Y - \frac{R}{1+r} - \bar{A} - q\left[w_{ss} + \left(\frac{\phi}{1+r} + 1 - \phi\right)B_{ss}\right]\right\} =$$
$$\frac{1+r}{r}\left\{(1-q)\,Y - \frac{1+r\,(1-\phi)\,q}{1+r}R - \left[1 + \frac{\beta}{1+\beta}r\,(1-\phi)\,q\right]\bar{A}\right\}. \tag{A25}$$

A.3. Microfoundations of Imperfect Information

Each agent receives information about policy proposals from the news with probability $\theta_L \in (0,1)$. An agent who has received such information acquires knowledge of wage proposals, but need not be informed of pension proposals. The conditional probability of gaining knowledge of pension proposals too is $\pi \in (0,1)$. In addition to the probability θ_L of being informed by the news, and independent of the arrival of such information, every public-sector worker has probability $\theta_U \in (0,1)$ of being informed of wage proposals by the union. Once again, the conditional probability of learning about pensions remains π regardless of the source of information.

This structure implies that the information probabilities for taxpayers are

$$\theta_w^T = \theta_L \text{ and } \theta_B^T = \pi\theta_L, \tag{A26}$$

while those for public-sector workers are

$$\theta_w^P = \theta_L + \theta_U - \theta_L\theta_U \text{ and } \theta_B^P = \pi\left(\theta_L + \theta_U\right) - \pi^2\theta_L\theta_U. \tag{A27}$$

To summarize the distribution of information, we define two measures of symmetry

$$\rho_w = \frac{\theta_w^T}{\theta_w^P} \text{ and } \rho_B = \frac{\theta_B^T}{\theta_B^P}, \tag{A28}$$

with the following properties.

Symmetry of wage information equals

$$\rho_w = \frac{\theta_L}{\theta_L + \theta_U - \theta_L\theta_U}, \tag{A29}$$

such that it increases when local news provide more information

$$\frac{\partial\rho_w}{\partial\theta_L} = \frac{\theta_U}{\left(\theta_L + \theta_U - \theta_L\theta_U\right)^2} > 0 \tag{A30}$$

and it declines when public-sector unions provide more information

$$\frac{\partial\rho_w}{\partial\theta_U} = -\frac{\theta_L\left(1-\theta_L\right)}{\left(\theta_L + \theta_U - \theta_L\theta_U\right)^2} < 0. \tag{A31}$$

Symmetry of pension information equals

$$\rho_B = \frac{\theta_L}{\theta_L + \theta_U - \pi\theta_L\theta_U}, \tag{A32}$$

such that it increases when local news provide more information

$$\frac{\partial \rho_B}{\partial \theta_L} = \frac{\theta_U}{\left(\theta_L + \theta_U - \pi\theta_L\theta_U\right)^2} > 0, \tag{A33}$$

and it declines when public-sector unions provide more information

$$\frac{\partial \rho_B}{\partial \theta_U} = -\frac{\theta_L\left(1 - \pi\theta_L\right)}{\left(\theta_L + \theta_U - \pi\theta_L\theta_U\right)^2} < 0, \tag{A34}$$

as well as when pensions are more shrouded.

$$\frac{\partial \rho_B}{\partial \pi} = \frac{\left(\pi\theta_L\right)^2\theta_U}{\left[1 - \left(1 - \pi\theta_L\right)\left(1 - \pi\theta_U\right)\right]^2} > 0. \tag{A35}$$

For any policy proposal, public-sector workers are more likely to informed than taxpayers, but their information advantage is greater for pensions than wages:

$$0 < \rho_B < \rho_w < 1. \tag{A36}$$

The relative symmetry of information about pensions compared to wages is measured by the ratio

$$\frac{\rho_B}{\rho_w} = \frac{\theta_L + \theta_U - \theta_L\theta_U}{\theta_L + \theta_U - \pi\theta_L\theta_U} < 1, \tag{A37}$$

which is higher when pensions are less shrouded,

$$\frac{\partial\left(\rho_B/\rho_w\right)}{\partial \pi} = \frac{\theta_L\theta_U\left(\theta_L + \theta_U - \theta_L\theta_U\right)}{\left(\theta_L + \theta_U - \pi\theta_L\theta_U\right)^2} > 0, \tag{A38}$$

and when either source provides less information:

$$\frac{\partial\left(\rho_B/\rho_w\right)}{\partial \theta_L} = \frac{-\left(1 - \pi\right)\theta_U^2}{\left(\theta_L + \theta_U - \pi\theta_L\theta_U\right)^2} < 0 \tag{A39}$$

and

$$\frac{\partial\left(\rho_B/\rho_w\right)}{\partial \theta_U} = \frac{-\left(1 - \pi\right)\theta_L^2}{\left(\theta_L + \theta_U - \pi\theta_L\theta_U\right)^2} < 0. \tag{A40}$$

A.4. Proof of Proposition 2

For $\phi = 0$ and given expectations of linear house price dynamics $H\left(B_{t+1}\right) = K - hB_{t+1}$, the utility functions are

$$U^P\left(w_t, B_{t+1}; B_t, H_t\right) = \log\left[\left(1 - q\right)w_t - qB_t - \frac{r}{1+r}H_t\right] + \beta\log\left[K - R - H_t + \left(1 - h\right)B_{t+1}\right] \tag{A41}$$

and

$$U^{T}\left(w_t,B_{t+1};B_t,H_t\right)=(1+\beta)\log\left[Y-qB_t-H_t-qw_t+\frac{K-R-hB_{t+1}}{1+r}\right]. \tag{A42}$$

The maximum of the political support function is described by the first-order conditions for pensions

$$\frac{\theta_B^P q\beta\left(1-h\right)}{K-R-H_t+\left(1-h\right)B_{t+1}}=\frac{\theta_B^T\left(1-q\right)\left(1+\beta\right)h}{K-R+\left(1+r\right)\left(Y-qB_t-H_t-qw_t\right)-hB_{t+1}} \tag{A43}$$

and for wages

$$\frac{\theta_w^P q\left(1-q\right)}{\left(1-q\right)w_t-qB_t-\frac{r}{1+r}H_t}-\frac{\theta_B^T\left(1+\beta\right)q\left(1-q\right)}{Y-qB_t-H_t-qw_t+\frac{K-R-hB_{t+1}}{1+r}} -\frac{\left(\theta_w^T-\theta_B^T\right)\left(1+\beta\right)q\left(1-q\right)}{Y-qB_t-H_t-qw_t+\frac{K-R-h\bar{B}_{t+1}}{1+r}}=0. \tag{A44}$$

In a rational expectations equilibrium, $\bar{B}_t=B_{t+1}$. The first-order condition for wages is then

$$\frac{\theta_w^P q\left(1-q\right)}{\left(1-q\right)w_t-qB_t-\frac{r}{1+r}H_t}=\frac{\theta_w^T\left(1+\beta\right)q\left(1-q\right)}{Y-qB_t-H_t-qw_t+\frac{K-R-hB_{t+1}}{1+r}}. \tag{A45}$$

The two political optimality conditions can then be written as constant consumption ratios

$$\tau_R=\frac{C_{R,t+1}^T}{C_{R,t+1}^P}=\rho_B\frac{\left(1-q\right)h}{q\left(1-h\right)} \tag{A46}$$

for old retirees and

$$\tau_W=\frac{C_{W,t}^T}{C_{W,t}^P}=\rho_w \tag{A47}$$

for young workers.

Thus, the unique linear stationary Markov perfect dynamic rational expectations is defined by three functions $H\left(B_t\right)=K-hB_t$, $w\left(B_t\right)$, and $B'\left(B_t\right)$ that satisfy simultaneously the same three equilibrium conditions as in the proof of Proposition 1 above, up to a difference in the political equilibrium values τ_R and τ_W.

Since $\phi=0$ implies $h=q$, the constant consumption ratio during retirement is then $\tau_R=\rho_B$, and public-sector employees are liquidity constrained because

$$\tau_R=\rho_B<\tau_W=\rho_w. \tag{A48}$$

The steady state values are

$$B_{ss}=R+\frac{\bar{C}_R}{\rho_B}, \tag{A49}$$

such that $\partial B_{ss}/\partial\rho_B<0$,

$$w_{ss}=Y-\frac{R}{1+r}-\bar{A}+\frac{\bar{C}_W}{\tau_W} \tag{A50}$$

such that $\partial w_{ss}/\partial \tau_W < 0$ but $\partial w_{ss}/\partial \bar{A}$ becomes ambiguous, and

$$\begin{aligned} H_{ss} &= \frac{1+r}{r}\left[Y - \bar{A} - \frac{R}{1+r} - q\left(w_{ss} + B_{ss}\right)\right] \\ &= \frac{1+r}{r}\left\{(1-q)\,Y - \frac{1+qr}{1+r}R - \bar{A} - \frac{q}{1+\beta}\left[\frac{1-\tau_W}{\tau_W} + \beta\left(\frac{1+r}{\rho_B} - 1\right)\right]\bar{A}\right\} \end{aligned} \quad \text{(A51)}$$

such that $\partial H_{ss}/\partial \tau_W > 0$ and a fortiori $\partial H_{ss}/\partial \rho_B > 0$ and $\partial H_{ss}/\partial q < 0$.

The transition dynamics are identical to those of Proposition 1, up to the difference in B_{ss}.

Developer profits can be extracted identically through a sale price H_0 or through a tax that the city charter imposes on the first generation of residents. It is convenient to denote this transfer by qB_0. The appeal of this formulation is that it nest as two special cases both the baseline in which the developer can sell real estate but cannot levy taxes ($B_0 = 0$), and the alternative in which public-sector pensions immediately jump to the steady state ($B_0 = B$). The value of B_0 is irrelevant from the developer's point of view: the present value of his profits depends only on steady-state values. Thus, developer profits are

$$\Pi = H_0 + qB_0 = H_{ss} + qB_{ss} = \frac{1+r}{r}\left[Y - \bar{A} - \frac{R}{1+r} - q\left(w_{ss} + \frac{B_{ss}}{1+r}\right)\right]. \quad \text{(A52)}$$

A.5. Proof of Proposition 3

For given consumption rates $\tau_W = \bar{C}_W/C_W^P$ and $\tau_R = \bar{C}_R/C_R^P$, the welfare of public-sector workers is

$$U^P = \bar{U} - \log \tau_W - \beta \log \tau_R. \quad \text{(A53)}$$

In steady state the cost of public-sector compensation is

$$w_{ss} + \frac{B_{ss}}{1+r} = Y - \bar{A} + \frac{\bar{A}}{(1+\beta)\,\tau_W} + \frac{\beta\bar{A}}{(1+\beta)\,\tau_R}. \quad \text{(A54)}$$

At the same cost, a maximum utility

$$U^* = \bar{U} + (1+\beta)\left[\log\left(\frac{1}{\tau_W} + \frac{\beta}{\tau_R}\right) - \log(1+\beta)\right] \quad \text{(A55)}$$

could be provided by the optimal compensation profile $\tau_W^* = \tau_R^*$. The extent to which political inefficiency is leading to welfare losses can be measured by the difference the two

$$U^* - U^P = (1+\beta)\log\left(1 + \beta\frac{\tau_W}{\tau_R}\right) - \beta\log\frac{\tau_W}{\tau_R} - (1+\beta)\log(1+\beta)\,. \quad \text{(A56)}$$

Thus, a sufficient statistic for inefficiency is the tilt in government employees' lifetime consumption path

$$\Gamma \equiv \frac{\tau_W}{\tau_R} = \frac{C_R^P}{\beta\,(1+r)\,C_W^P}. \quad \text{(A57)}$$

The welfare loss $U^* - U^P$ is a function of Γ alone (up to the exogenous preference parameter β). It is maximized at the efficient level $\Gamma = 1$, and monotonically decreasing in the back-loading of public-sector compensation ($\partial\left(U^* - U^P\right)/\partial\Gamma < 0$ for all $\Gamma > 1$).

A.6. Proof of Proposition 4

We focus on a representative city, and denote with a star variables relating to other cities in the state.

Commuting employees of other city governments have consumption utility

$$\begin{aligned} U_t^C &= \log C_{W,t}^C + \beta \log C_{R,t+1}^C \\ &= \log \left\{ w_t^* - q w_t - q \left[(1-\phi) B_t + \frac{\phi}{1+r} B_{t+1} \right] - \frac{r}{1+r} H_t \right\} \\ &\quad + \beta \log \left(B_{t+1}^* + H_{t+1} - H_t - R \right), \quad \text{(A58)} \end{aligned}$$

and given the rational expectation of future house prices $H_{t+1} = H(B_{t+1})$,

$$\begin{aligned} & U^C \left(w_t, B_{t+1}; B_t, H_t, w_t^*, B_{t+1}^* \right) \\ &= \log \left\{ w_t^* - q w_t - q \left[(1-\phi) B_t + \frac{\phi}{1+r} B_{t+1} \right] - \frac{r}{1+r} H_t \right\} \\ &\quad + \beta \log \left[B_{t+1}^* + H(B_{t+1}) - H_t - R \right]. \quad \text{(A59)} \end{aligned}$$

The election is decided by an electorate that comprises γq local government employees, $(1-\gamma^*) q$ commuters, and $1-q+(\gamma^*-\gamma) q$ private-sector employees. Let $\bar{B}_{t+1}$ denote voters' unconditional expectations. For simplicity, we do not distinguish between commuters' prior expectations $\left(\bar{w}_t^*, \bar{B}_{t+1}^*\right)$ and their observations of actual proposals $\left(w_t^*, B_{t+1}^*\right)$, since they are both exogenous to the city and they coincide in a rational expectations equilibrium. The political support function is defined by

$$\begin{aligned} & V \left(w_t, B_{t+1}; B_t, H_t, \bar{B}_{t+1}, w_t^*, B_{t+1}^* \right) \\ &= \gamma q \left[\theta_B^P U^P (w_t, B_{t+1}; B_t, H_t) + \left(\theta_w^P - \theta_B^P \right) U^P \left(w_t, \bar{B}_{t+1}; B_t, H_t \right) \right] \\ &+ (1-\gamma^*) q \left[\theta_B^T U^C \left(w_t, B_{t+1}; B_t, H_t, w_t^*, B_{t+1}^* \right) + \left(\theta_w^T - \theta_B^T \right) U^C \left(w_t, \bar{B}_{t+1}; B_t, H_t, w_t^*, B_{t+1}^* \right) \right] \\ &+ \left[1-q+(\gamma^*-\gamma) q \right] \left[\theta_B^T U^T (w_t, B_{t+1}; B_t, H_t) + \left(\theta_w^T - \theta_B^T \right) U^T \left(w_t, \bar{B}_{t+1}; B_t, H_t \right) \right]. \quad \text{(A60)} \end{aligned}$$

A symmetric Markov perfect dynamic rational expectations equilibrium is given by identical initial values B_0 for all cities and by three functions $H(B_t)$, $w(B_t)$, and $B'(B_t)$ such that:

1. For any pension burden B_t, house prices $H_t = H(B_t)$ satisfy the spatial indifference condition for private-sector employees

$$Y - (1-\phi) q B_t - H(B_t) - q w(B_t) - \frac{\phi q}{1+r} B'(B_t) + \frac{H(B'(B_t)) - R}{1+r} = \bar{A} \quad \text{(A61)}$$

given rational expectations of policies $w_t = w(B_t)$ and $B_{t+1} = B'(B_t)$, and of future house prices $H_{t+1} = H(B'(B_t))$.

2. For any pension burden B_t, the share of resident public-sector employees in every city is

$$\gamma^* = \gamma = \frac{1}{N} + \frac{1-N}{N} F \begin{pmatrix} \psi + U^P \left(w\left(B_t\right), B'\left(B_t\right); B_t, H\left(B_t\right)\right) \\ -U^C \left(w\left(B_t\right), B'\left(B_t\right); B_t, H\left(B_t\right), w\left(B_t\right), B'\left(B_t\right)\right) \end{pmatrix}, \quad \text{(A62)}$$

given constant symmetry $B_t^* = B_t$ and thus house prices $H_t^* = H_t = H(B_t)$ and rational expectations of policies $w_t = w(B_t)$ and $B_{t+1} = B'(B_t)$.

3. For any pension burden B_t and house prices $H_t = H(B_t)$, policy choices $w_t = w(B_t)$ and $B_{t+1} = B'(B_t)$ satisfy the political optimality condition

$$\left(w\left(B_t\right), B'\left(B_t\right)\right) = \arg \max_{w_t, B_{t+1}} V\left(w_t, B_{t+1}; B_t, H_t, B'\left(B_t\right), w\left(B_t\right), B'\left(B_t\right)\right), \quad \text{(A63)}$$

given rational expectations of pension promises $\bar{B}_{t+1} = B'(B_t)$ and constant symmetry $B_t^* = B_t$ and thus $w_t^* = w(B_t)$ and $B_{t+1}^* = B'(B_t)$ for all t.

Given expectations of linear house price dynamics $H(B_{t+1}) = K - hB_{t+1}$, the utility functions are

$$U^P\left(w_t, B_{t+1}; B_t, H_t\right) = \log\left[(1-q)w_t - (1-\phi)qB_t - \frac{r}{1+r}H_t - \frac{\phi q}{1+r}B_{t+1}\right] + \beta \log\left[K - R - H_t + (1-h)B_{t+1}\right], \quad \text{(A64)}$$

$$U^C\left(w_t, B_{t+1}; B_t, H_t, w_t^*, B_{t+1}^*\right) = \log\left[w_t^* - qw_t - (1-\phi)qB_t - \frac{r}{1+r}H_t - \frac{\phi q}{1+r}B_{t+1}\right] + \beta \log\left[K - R - H_t + B_{t+1}^* - hB_{t+1}\right], \quad \text{(A65)}$$

and

$$U^T\left(w_t, B_{t+1}; B_t, H_t\right) = (1+\beta)\log\left[Y + \frac{K-R}{1+r} - (1-\phi)qB_t - H_t - qw_t - \frac{\phi q + h}{1+r}B_{t+1}\right]. \quad \text{(A66)}$$

The maximum of the political support function is described by the first-order conditions for wages

$$\frac{\theta_B^P \gamma (1-q)}{(1-q)w_t - (1-\phi)qB_t - \frac{r}{1+r}H_t - \frac{\phi q}{1+r}B_{t+1}} + \frac{\left(\theta_w^P - \theta_B^P\right)\gamma(1-q)}{(1-q)w_t - (1-\phi)qB_t - \frac{r}{1+r}H_t - \frac{\phi q}{1+r}\bar{B}_{t+1}} =$$
$$\frac{\theta_B^T (1-\gamma^*) q}{w_t^* - qw_t - (1-\phi)qB_t - \frac{r}{1+r}H_t - \frac{\phi q}{1+r}B_{t+1}} + \frac{\left(\theta_w^T - \theta_B^T\right)(1-\gamma^*) q}{w_t^* - qw_t - (1-\phi)qB_t - \frac{r}{1+r}H_t - \frac{\phi q}{1+r}\bar{B}_{t+1}}$$
$$+ \frac{\theta_B^T \left[1 - q + (\gamma^* - \gamma) q\right](1+\beta)}{Y + \frac{K-R}{1+r} - (1-\phi)qB_t - H_t - qw_t - \frac{\phi q + h}{1+r}B_{t+1}}$$
$$+ \frac{\left(\theta_w^T - \theta_B^T\right)\left[1 - q + (\gamma^* - \gamma) q\right](1+\beta)}{Y + \frac{K-R}{1+r} - (1-\phi)qB_t - H_t - qw_t - \frac{\phi q + h}{1+r}\bar{B}_{t+1}} \quad \text{(A67)}$$

and for pensions

$$\theta_B^P \gamma q \left\{ \frac{\beta (1-h)}{K - R - H_t + (1-h) B_{t+1}} - \frac{\phi q}{(1+r)\left[(1-q) w_t - (1-\phi) q B_t\right] - r H_t - \phi q B_{t+1}} \right\}$$
$$= \theta_B^T (1-\gamma^*) q$$
$$\cdot \left\{ \frac{\beta h}{K - R - H_t + B_{t+1}^* - h B_{t+1}} + \frac{\phi q}{(1+r)\left[w_t^* - q w_t - (1-\phi) q B_t\right] - r H_t - \phi q B_{t+1}} \right\}$$
$$+ \frac{\theta_B^T \left[1 - q + (\gamma^* - \gamma) q\right] (1+\beta)(\phi q + h)}{(1+r)\left[Y - (1-\phi) q B_t - H_t - q w_t\right] + K - R - (\phi q + h) B_{t+1}}. \quad \text{(A68)}$$

Rational expectations imply $\bar{B}_{t+1} = B_{t+1}$, while symmetry implies $w_t^* = w_t$, $B_{t+1}^* = B_{t+1}$ and $\gamma^* = \gamma$. The first-order condition for wages is then

$$\frac{\theta_w^P \gamma (1-q) - \theta_w^T (1-\gamma) q}{(1-q) w_t - (1-\phi) q B_t - \frac{r}{1+r} H_t - \frac{\phi q}{1+r} B_{t+1}} =$$
$$\frac{\theta_w^T (1-q)(1+\beta)}{Y + \frac{K-R}{1+r} - (1-\phi) q B_t - H_t - q w_t - \frac{\phi q + h}{1+r} B_{t+1}}, \quad \text{(A69)}$$

and for pensions

$$q \left\{ \frac{\left[\theta_B^P \gamma (1-h) - \theta_B^T (1-\gamma) h\right] \beta}{K - R - H_t + (1-h) B_{t+1}} - \frac{\left[\theta_B^P \gamma + \theta_B^T (1-\gamma)\right] \phi q}{(1+r)\left[(1-q) w_t - (1-\phi) q B_t\right] - r H_t - \phi q B_{t+1}} \right\} =$$
$$\frac{\theta_B^T (1-q)(1+\beta)(\phi q + h)}{(1+r)\left[Y - (1-\phi) q B_t - H_t - q w_t\right] + K - R - (\phi q + h) B_{t+1}}. \quad \text{(A70)}$$

provided that

$$\gamma > \max\left\{ \frac{\rho_w q}{1 - q + \rho_w q}, \frac{\rho_B h}{1 - h + \rho_B h} \right\}. \quad \text{(A71)}$$

These two political optimality conditions can be written as constant consumption ratios

$$\tau_W = \frac{C_{W,t}^T}{C_{W,t}^P} = \frac{\rho_w (1-q)}{\gamma (1-q) - \rho_w (1-\gamma) q} \quad \text{(A72)}$$

for young workers, such that

$$\frac{\partial \tau_W}{\partial \rho_w} = \frac{\gamma (1-q)^2}{\left[\gamma (1-q) - \rho_w (1-\gamma) q\right]^2} > 0, \quad \text{(A73)}$$

$$\frac{\partial \tau_W}{\partial \gamma} = -\frac{\rho_w (1-q)(1 - q + \rho_w q)}{\left[\gamma (1-q) - \rho_w (1-\gamma) q\right]^2} < 0, \quad \text{(A74)}$$

and

$$\frac{\partial \tau_W}{\partial q} = \frac{\rho_w^2 (1-\gamma)}{\left[\gamma (1-q) - \rho_w (1-\gamma) q\right]^2} \geq 0; \quad \text{(A75)}$$

and

$$\tau_R = \frac{C^T_{R,t+1}}{C^P_{R,t+1}} = \frac{\rho_B (1-q)(\phi q + h) + [\gamma + \rho_B (1-\gamma)] \phi q^2 \tau_W}{[\gamma (1-h) - \rho_B (1-\gamma) h] q} \tag{A76}$$

for old retirees, such that

$$\frac{\partial \tau_R}{\partial \rho_w} = \frac{[\gamma + \rho_B (1-\gamma)] \phi q^2}{[\gamma (1-h) - \rho_B (1-\gamma) h] q} \frac{\partial \tau_W}{\partial \rho_w} \geq 0, \tag{A77}$$

$$\frac{\partial \tau_R}{\partial \rho_B} = \frac{\gamma (1-q)(\phi q + h)(1-h) + \gamma (1-\gamma) \phi q^2 \tau_W}{[\gamma (1-h) - \rho_B (1-\gamma) h]^2 q} > 0, \tag{A78}$$

and

$$\frac{\partial \tau_R}{\partial \gamma} = -\rho_B \frac{(1-q)(\phi q + h)(1-h+\rho_B h) + \phi q^2 \tau_W}{[\gamma (1-h) - \rho_B (1-\gamma) h]^2 q} + \frac{[\gamma + \rho_B (1-\gamma)] \phi q^2}{[\gamma (1-h) - \rho_B (1-\gamma) h] q} \frac{\partial \tau_W}{\partial \gamma} < 0. \tag{A79}$$

Therefore, a symmetric linear Markov perfect dynamic rational expectations equilibrium is given by a share of resident public-sector employees in every city

$$\gamma = \frac{1 + (1-N) F(\psi)}{N}, \tag{A80}$$

which we assume satisfies the condition

$$\gamma > \max \left\{ \frac{\rho_w q}{1 - q + \rho_w q}, \frac{\rho_B h}{1 - h + \rho_B h} \right\}; \tag{A81}$$

and by three functions $H(B_t) = K - hB_t$, $w(B_t)$, and $B'(B_t)$ that satisfy simultaneously the same three equilibrium conditions as in the proof of Proposition 1 above, up to a difference in the political equilibrium values τ_R and τ_W. Thus, there is a unique symmetric linear Markov perfect dynamic rational expectations equilibrium, with house-price sensitivity $h = (1-\phi) q$.

Jointly with $\rho_w \geq \rho_B$ this implies that the condition for an interior political equilibrium is

$$\gamma > \frac{\rho_w q}{1 - (1-\rho_w) q} \geq \frac{\rho_B (1-\phi) q}{1 - (1-\rho_B)(1-\phi) q}. \tag{A82}$$

Writing out

$$\tau_R = (1-q) \frac{\rho_B + \rho_w \frac{\gamma + \rho_B (1-\gamma)}{\gamma (1-q) - \rho_w (1-\gamma) q} \phi q}{\gamma (1-q) - \rho_B (1-\gamma) q + [\gamma + \rho_B (1-\gamma)] \phi q} \tag{A83}$$

we can derive

$$\frac{\partial \tau_R}{\partial \phi} = \frac{\rho_w - \rho_B}{\gamma (1-q) - \rho_w (1-\gamma) q} \cdot \frac{[\gamma + \rho_B (1-\gamma)] \gamma q (1-q)^2}{\{\gamma (1-q) - \rho_B (1-\gamma) q + [\gamma + \rho_B (1-\gamma)] \phi q\}^2} > 0. \tag{A84}$$

Writing the consumption ratio for retirees

$$\tau_R = \frac{\rho_B (1-q) + \phi [\gamma + (1-\gamma)\rho_B] q\tau_W}{\gamma - [\gamma + (1-\gamma)\rho_B](1-\phi) q} \tag{A85}$$

we can derive

$$\frac{\partial \tau_R}{\partial q} = \frac{(1-\gamma)\rho_B^2 + \phi[\gamma + (1-\gamma)\rho_B](\gamma\tau_W - \rho_B)}{\{\gamma - [\gamma + (1-\gamma)\rho_B](1-\phi) q\}^2} + \frac{\phi [\gamma + (1-\gamma)\rho_B] q}{\gamma - [\gamma + (1-\gamma)\rho_B](1-\phi) q} \frac{\partial \tau_W}{\partial q} \geq 0 \tag{A86}$$

because

$$\gamma\tau_W - \rho_B = \frac{\gamma(\rho_w - \rho_B)(1-q) + (1-\gamma)\rho_w\rho_B q}{\gamma(1-q) - \rho_w(1-\gamma) q} > 0. \tag{A87}$$

Steady-state house prices are

$$H_{ss} = \frac{1+r}{r} \cdot \left\{(1-q)\left(Y - \frac{R}{1+r} - \bar{A}\right) - q\left[\frac{\bar{C}_W}{\tau_W} + \left(1 - \phi\frac{r}{1+r}\right)\left(R + \frac{\bar{C}_R}{\tau_R}\right)\right]\right\}, \tag{A88}$$

such that

$$\frac{\partial H_{ss}}{\partial \phi} = q\left[R + \frac{\bar{C}_R}{\tau_R} + \left(\frac{1+r}{r} - \phi\right)\frac{\bar{C}_R}{\tau_R^2}\frac{\partial \tau_R}{\partial \phi}\right] > 0, \tag{A89}$$

while $\partial H_{ss}/\partial q$ is generally ambiguous.

It is convenient to parametrize the fiscal transfer from the first generation of residents to the developer by $(1-\phi) qB_0$. Developer profits equal

$$\Pi = H_0 + (1-\phi) qB_0 = H_{ss} + (1-\phi) qB_{ss} = \frac{1+r}{r}\left[Y - \bar{A} - \frac{R}{1+r} - q\left(w_{ss} + \frac{B_{ss}}{1+r}\right)\right]. \tag{A90}$$

A.7. Proof of Corollary 1

Back-loading is

$$\Gamma = \frac{\tau_W}{\tau_R} = \frac{\gamma\frac{1-q+\phi q}{\rho_B} - (1-\gamma)(1-\phi) q}{\gamma\left(\frac{1-q}{\rho_w} + \frac{\phi q}{\rho_B}\right) - (1-\gamma)(1-\phi) q} \tag{A91}$$

such that $\partial\Gamma/\partial\rho_w > 0$, while $\partial\Gamma/\partial\rho_B < 0$ because $\partial\tau_W/\partial\rho_B = 0$ and $\partial\tau_R/\partial\rho_B > 0$. Therefore,

$$\rho_B \leq \rho_w \Leftrightarrow \Gamma \geq 1 \tag{A92}$$

with jointly strict inequalities.

Moreover $\partial\Gamma/\partial\phi < 0$ because $\partial\tau_W/\partial\phi = 0$ and $\partial\tau_R/\partial\phi > 0$. Finally

$$\frac{\partial\Gamma}{\partial\gamma} = -\frac{\rho_w - \rho_B}{\rho_w\rho_B}\frac{(1-\phi) q(1-q)}{\left[\gamma\left(\frac{1-q}{\rho_w} + \frac{\phi q}{\rho_B}\right) - (1-\gamma)(1-\phi) q\right]^2} < 0. \tag{A93}$$

A.8. Proof of Lemma 1 and Proposition 8

When compensation is set at the state level, the information probabilities for taxpayers become

$$\theta_w^T = 1 - (1-\theta_L)(1-\theta_S) \text{ and } \theta_B^T = 1 - (1-\pi\theta_L)(1-\pi\theta_S), \tag{A94}$$

while those for public-sector workers are

$$\theta_w^P = 1 - (1-\theta_L)(1-\theta_S)(1-\theta_U) \text{ and } \theta_B^P = 1 - (1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U). \tag{A95}$$

Then symmetry of wage information equals

$$\rho_w^S = \frac{1-(1-\theta_L)(1-\theta_S)}{1-(1-\theta_L)(1-\theta_S)(1-\theta_U)}, \tag{A96}$$

which increases when any news media provide more information:

$$\frac{\partial\rho_w^S}{\partial\theta_L} = \frac{(1-\theta_S)\theta_U}{[1-(1-\theta_L)(1-\theta_S)(1-\theta_U)]^2} > 0 \tag{A97}$$

and

$$\frac{\partial\rho_w^S}{\partial\theta_S} = \frac{(1-\theta_L)\theta_U}{[1-(1-\theta_L)(1-\theta_S)(1-\theta_U)]^2} > 0; \tag{A98}$$

while it decreases when public-sector unions provide more information:

$$\frac{\partial\rho_w^S}{\partial\theta_U} = -\frac{(1-\theta_L)(1-\theta_S)[1-(1-\theta_L)(1-\theta_S)]}{[1-(1-\theta_L)(1-\theta_S)(1-\theta_U)]^2} < 0. \tag{A99}$$

Symmetry of pension information equals

$$\rho_B^S = \frac{1-(1-\pi\theta_L)(1-\pi\theta_S)}{1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)}, \tag{A100}$$

which increases when any news media provide more information:

$$\frac{\partial\rho_B^S}{\partial\theta_L} = \frac{\pi^2(1-\pi\theta_S)\theta_U}{[1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)]^2} > 0; \tag{A101}$$

and

$$\frac{\partial\rho_B^S}{\partial\theta_S} = \frac{\pi^2(1-\pi\theta_L)\theta_U}{[1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)]^2} > 0; \tag{A102}$$

while it decreases when public-sector unions provide more information:

$$\frac{\partial\rho_B^S}{\partial\theta_U} = -\frac{\pi(1-\pi\theta_L)(1-\pi\theta_S)[1-(1-\pi\theta_L)(1-\pi\theta_S)]}{[1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)]^2} < 0. \tag{A103}$$

Finally, it increases when pensions are less shrouded:

$$\frac{\partial\rho_B^S}{\partial\pi} = \pi^2\theta_U\frac{\theta_L^2(1-\pi\theta_S)^2 + \theta_L\theta_S(1-\pi^2\theta_L\theta_S) + (1-\pi\theta_L)^2\theta_S^2}{[1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)]^2} > 0, \tag{A104}$$

which implies $\rho_B^S < \rho_w^S$ for all $\pi < 1$.

Since information asymmetry on either issue declines with statewide media coverage ($\partial\rho_w^S/\partial\theta_S > 0$ and $\partial\rho_B^S/\partial\theta_S > 0$), it follows that $\rho_w^S > \rho_w^L$ and $\rho_B^S > \rho_B^L$ for all $\theta_S > 0$.

The relative symmetry of information about pensions compared to wages is measured by the ratio

$$\frac{\rho_B^S}{\rho_w^S} = \frac{1-(1-\pi\theta_L)(1-\pi\theta_S)}{1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)} \frac{1-(1-\theta_L)(1-\theta_S)(1-\theta_U)}{1-(1-\theta_L)(1-\theta_S)}, \tag{A105}$$

which is higher when pensions are less shrouded: $\partial\left(\rho_B^S/\rho_w^S\right)/\partial\pi > 0$ because $\partial\rho_B^S/\partial\pi > 0$ while $\partial\rho_w^S/\partial\pi = 0$. It is lower when unions provide more information

$$\begin{aligned}\frac{\partial\left(\rho_B^S/\rho_w^S\right)}{\partial\theta_U} &= -\pi(1-\pi)\frac{1-(1-\pi\theta_L)(1-\pi\theta_S)}{1-(1-\theta_L)(1-\theta_S)} \\ &\cdot \frac{\theta_L^2(1-\theta_S)^2 + \theta_L\theta_S(1-\theta_L\theta_S) + \theta_S^2(1-\theta_L)^2 + (1-\pi)\theta_L\theta_S(\theta_L+\theta_S-\theta_L\theta_S)}{\left[1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)\right]^2} \\ &< 0. \end{aligned} \tag{A106}$$

Relative symmetry it is non-monotonic in the information provided by the news media. For local news,

$$\begin{aligned}\frac{\partial\left(\rho_B^S/\rho_w^S\right)}{\partial\theta_L} &= \frac{(1-\pi)\theta_U}{\left[1-(1-\pi\theta_L)(1-\pi\theta_S)(1-\pi\theta_U)\right]^2\left[1-(1-\theta_L)(1-\theta_S)\right]^2} \\ &\cdot \left\{\theta_S^3 - \theta_L(1-\theta_S)(1-\pi\theta_S)\left[2\theta_S\theta_U + \theta_L(\theta_S+\theta_U-\theta_S\theta_U-\pi\theta_S\theta_U)\right]\right\}. \end{aligned} \tag{A107}$$

The last line is a quadratic in θ_L with a negative coefficient on θ_L^2 and a positive value at zero. Thus

$$\frac{\partial\left(\rho_B^S/\rho_w^S\right)}{\partial\theta_L} > 0 \Leftrightarrow 0 < \theta_L < \hat{\theta}_L, \tag{A108}$$

which implies that symmetry is maximized at a value $\hat{\theta}_L$ that can be above one (e.g., as $\theta_S \to 1$ and $\theta_U \to 0$). Since the ratio ρ_B^S/ρ_w^S is symmetric in θ_L and θ_S, an analogous result applies to statewide news θ_S.

Centralization reduces the relative asymmetry in information about pensions compared to wages if and only if

$$\frac{\rho_B^L}{\rho_w^L} < \frac{\rho_B^S}{\rho_w^S} \Leftrightarrow \frac{\theta_L^2}{(1-\pi\theta_L)(1-\theta_L)} > \theta_S\theta_U \tag{A109}$$

and thus if and only if $\theta_L > \bar{\theta}_L$ for a threshold

$$\bar{\theta}_L \in (0, \max\{\theta_S, \theta_U\}) \text{ with } \frac{\partial\bar{\theta}_L}{\partial\theta_S} > 0, \frac{\partial\bar{\theta}_L}{\partial\theta_U} > 0, \text{ and } \frac{\partial\bar{\theta}_L}{\partial\pi} < 0. \tag{A110}$$

Back-loading is

$$\Gamma_L = \frac{\tau_W^L}{\tau_R^L} = \frac{\rho_w^L q\left[\gamma(1-h) - \rho_B^L(1-\gamma)h\right]}{\left[\gamma+\rho_B^L(1-\gamma)\right]\rho_w^L\phi q^2 + \left[\gamma(1-q) - \rho_w^L(1-\gamma)q\right]\rho_B^L(\phi q + h)} \tag{A111}$$

with $\partial \Gamma_L / \partial \gamma < 0$ and thus

$$\Gamma_L \leq \frac{q(1-h)}{\phi q^2 + (\rho_B^L/\rho_w^L)(1-q)(\phi q + h)}, \tag{A112}$$

while

$$\Gamma_S = \frac{\tau_W^S}{\tau_R^S} = \frac{q(1-h)}{\phi q^2 + (\rho_B^S/\rho_w^S)(1-q)(\phi q + h)}. \tag{A113}$$

Therefore

$$\theta_L > \bar{\theta}_L \Leftrightarrow \frac{\rho_B^L}{\rho_w^L} < \frac{\rho_B^S}{\rho_w^S} \Rightarrow \Gamma_L > \Gamma_S. \tag{A114}$$

A.9. Proof of Proposition 5

Centralization reduces public employees' wages and their consumption when working if and only if

$$\tau_W^L = \frac{\rho_w^L (1-q)}{\gamma(1-q) - (1-\gamma)\rho_w^L q} < \tau_W^S = \rho_w^S, \tag{A115}$$

namely if and only if

$$\gamma > \bar{\gamma}_w \equiv \frac{\rho_w^L \left(1 - q + \rho_w^S q\right)}{(1 - q + \rho_w^L q)\,\rho_w^S} \tag{A116}$$

such that

$$\frac{\partial \bar{\gamma}_w}{\partial q} = \frac{\rho_w^L \left(\rho_w^S - \rho_w^L\right)}{\rho_w^S \left(1 - q + \rho_w^L q\right)^2} > 0, \tag{A117}$$

while for any other parameter z,

$$\frac{\partial \bar{\gamma}_w}{\partial z} = \frac{1-q}{\left[(1 - q + \rho_w^L q)\,\rho_w^S\right]^2} \left(\frac{\partial \rho_w^L}{\partial z} - \frac{\partial \rho_w^S}{\partial z}\right). \tag{A118}$$

Immediately,

$$\frac{\partial \rho_w^S}{\partial \theta_S} > 0 = \frac{\partial \rho_w^L}{\partial \theta_S} \Rightarrow \frac{\partial \bar{\gamma}_w}{\partial \theta_S} < 0. \tag{A119}$$

Moreover

$$\frac{\partial^2 \rho_w^S}{\partial \theta_L \partial \theta_S} = -\frac{\left[1 + (1-\theta_L)(1-\theta_S)(1-\theta_U)\right]\theta_U}{\left[1 - (1-\theta_L)(1-\theta_S)(1-\theta_U)\right]^3} < 0 \Rightarrow \frac{\partial \rho_w^L}{\partial \theta_L} > \frac{\partial \rho_w^S}{\partial \theta_L} \Rightarrow \frac{\partial \bar{\gamma}_w}{\partial \theta_L} > 0 \tag{A120}$$

and

$$\frac{\partial^2 \rho_w^S}{\partial \theta_S \partial \theta_U} = \frac{(1-\theta_L)}{\left[1 - (1-\theta_L)(1-\theta_S)(1-\theta_U)\right]^2} > 0 \Rightarrow \frac{\partial \rho_w^L}{\partial \theta_U} < \frac{\partial \rho_w^S}{\partial \theta_U} \Rightarrow \frac{\partial \bar{\gamma}_w}{\partial \theta_U} < 0. \tag{A121}$$

Centralization reduces public employees' pensions and their consumption while retired if and only if

$$\tau_R^L < \tau_R^S = \frac{\rho_w^S \phi q^2 + \rho_B^S (1-q)(\phi q + h)}{q(1-h)}. \tag{A122}$$

By Proposition 4, $\partial \tau_R^L / \partial \gamma < 0$. For $\gamma = 1$,

$$\tau_R^L = \frac{\rho_w^L \phi q^2 + (1-q)\,\rho_B^L\,(\phi q + h)}{q\,(1-h)} < \tau_R^S \tag{A123}$$

because $\rho_w^L < \rho_w^S$ and $\rho_B^L < \rho_B^S$. Conversely

$$\lim_{\gamma \to \rho_w^L q/(1-q+\rho_w^L q)} \tau_R^L = \infty > \tau_R^S. \tag{A124}$$

Thus there exists a unique value

$$\bar{\gamma}_B \in \left(\frac{\rho_w^L q}{1-q+\rho_w^L q}, 1 \right) \text{ such that } \tau_R^L\,(\bar{\gamma}_B) = \tau_R^S \tag{A125}$$

and that $B_{ss}^L > B_{ss}^S$ if and only if $\gamma > \bar{\gamma}_B$. By the implicit-function theorem,

$$\frac{\partial \tau_R^S}{\partial \theta_S} > 0 = \frac{\partial \tau_R^L}{\partial \theta_S} \Rightarrow \frac{\partial \bar{\gamma}_B}{\partial \theta_S} < 0. \tag{A126}$$

Moreover, if (but not only if) $\theta_L > \bar{\theta}_L$, then $\tau_W^L < \tau_W^S \Rightarrow \tau_R^L < \tau_R^S$, which means that $\bar{\gamma}_B < \bar{\gamma}_w$.

A.10. Proof of Proposition 6

Centralization increases house prices if and only if

$$\begin{aligned} \frac{1}{\tau_W^L} + [1+(1-\phi)\,r]\,\frac{\beta}{\tau_R^L} &> \frac{1}{\tau_W^S} + [1+(1-\phi)\,r]\,\frac{\beta}{\tau_R^S} \\ &= \frac{1}{\rho_w^S} + \beta\,[1+(1-\phi)\,r]\,\frac{q\,(1-h)}{\rho_w^S \phi q^2 + \rho_B^S\,(1-q)\,(\phi q + h)}. \end{aligned} \tag{A127}$$

On the left-hand side, $\partial \tau_W^L / \partial \gamma < 0$ and $\partial \tau_R^L / \partial \gamma < 0$. For $\gamma = 1$,

$$\begin{aligned} &\frac{1}{\tau_W^L} + [1+(1-\phi)\,r]\,\frac{\beta}{\tau_R^L} = \\ &\qquad \frac{1}{\rho_w^L} + \beta\,[1+(1-\phi)\,r]\,\frac{q\,(1-h)}{\rho_w^L \phi q^2 + \rho_B^L\,(1-q)\,(\phi q + h)} \\ &\qquad\qquad > \frac{1}{\tau_W^S} + [1+(1-\phi)\,r]\,\frac{\beta}{\tau_R^S}. \end{aligned} \tag{A128}$$

because $\rho_w^L < \rho_w^S$ and $\rho_B^L < \rho_B^S$. Conversely

$$\lim_{\gamma \to \rho_w^L q/(1-q+\rho_w^L q)} \left\{ \frac{1}{\tau_W^L} + [1+(1-\phi)\,r]\,\frac{\beta}{\tau_R^L} \right\} = 0 < \frac{1}{\tau_W^S} + [1+(1-\phi)\,r]\,\frac{\beta}{\tau_R^S}. \tag{A129}$$

Thus there exists a unique value

$$\bar{\gamma}_H \in \left(\frac{\rho_w^L q}{1-q+\rho_w^L q}, 1 \right) \tag{A130}$$

such that

$$\frac{1}{\tau_W^L(\bar{\gamma}_H)} + \beta\frac{1+(1-\phi)\,r}{\tau_R^L(\bar{\gamma}_H)} = \frac{1}{\tau_W^S} + \beta\frac{1+(1-\phi)\,r}{\tau_R^S} \tag{A131}$$

and that $H_{ss}^L < H_{ss}^S$ if and only if $\gamma > \bar{\gamma}_H$. By the implicit-function theorem,

$$\frac{\partial\tau_R^S}{\partial\theta_S} > 0 = \frac{\partial\tau_R^L}{\partial\theta_S} \wedge \frac{\partial\tau_W^S}{\partial\theta_S} > 0 = \frac{\partial\tau_W^L}{\partial\theta_S} \Rightarrow \frac{\partial\bar{\gamma}_H}{\partial\theta_S} < 0. \tag{A132}$$

Recalling that

$$\theta_L > \bar{\theta}_L \Leftrightarrow \frac{\rho_B^L}{\rho_w^L} < \frac{\rho_B^S}{\rho_w^S} \Rightarrow \Gamma_L > \Gamma_S, \tag{A133}$$

if (but not only if) $\theta_L > \bar{\theta}_L$, then

$$\tau_W^L < \tau_W^S \Rightarrow \frac{1}{\tau_W^L}\left\{1+\beta\left[1+(1-\phi)\,r\right]\Gamma_L\right\} > \frac{1}{\tau_W^S}\left\{1+\beta\left[1+(1-\phi)\,r\right]\Gamma_S\right\}, \tag{A134}$$

which means that $\bar{\gamma}_H < \bar{\gamma}_w$; moreover

$$\left\{\frac{1}{\beta\left[1+(1-\phi)\,r\right]\Gamma_L}+1\right\}\frac{1}{\tau_R^L} > \left\{\frac{1}{\beta\left[1+(1-\phi)\,r\right]\Gamma_S}+1\right\}\frac{1}{\tau_R^S} \Rightarrow \tau_R^L < \tau_R^S, \tag{A135}$$

which means that $\bar{\gamma}_H > \bar{\gamma}_B$.

A.11. Proof of Proposition 7

Centralization reduces public employees' lifetime welfare if and only if

$$\log\tau_W^L + \beta\log\tau_R^L < \log\tau_W^S + \beta\log\tau_R^S = \log\rho_w^S + \beta\log\left[\rho_w^S\phi q + \rho_B^S(1-q)\right] + \beta\log q. \tag{A136}$$

On the left-hand side, $\partial\tau_W^L/\partial\gamma < 0$ and $\partial\tau_R^L/\partial\gamma < 0$. For $\gamma = 1$,

$$\log\tau_W^L + \beta\log\tau_R^L = \log\rho_w^L + \beta\log\left[\rho_w^L\phi q + \rho_B^L(1-q)\right] + \beta\log q < \log\tau_W^S + \beta\log\tau_R^S \tag{A137}$$

because $\rho_w^L < \rho_w^S$ and $\rho_B^L < \rho_B^S$. Conversely

$$\lim_{\gamma\to\rho_w^L q/(1-q+\rho_w^L q)}\left\{\log\tau_W^L + \beta\log\tau_R^L\right\} = \infty > \log\tau_W^S + \beta\log\tau_R^S. \tag{A138}$$

Thus there exists a unique value

$$\bar{\gamma}_U \in \left(\frac{\rho_w^L q}{1-q+\rho_w^L q}, 1\right) \text{ such that } \log\tau_W^L(\bar{\gamma}_H) + \beta\log\tau_R^L(\bar{\gamma}_H) = \log\tau_W^S + \beta\log\tau_R^S \tag{A139}$$

and that $U_L^P > U_S^P$ if and only if $\gamma > \bar{\gamma}_U$. By the implicit-function theorem,

$$\frac{\partial\tau_R^S}{\partial\theta_S} > 0 = \frac{\partial\tau_R^L}{\partial\theta_S} \wedge \frac{\partial\tau_W^S}{\partial\theta_S} > 0 = \frac{\partial\tau_W^L}{\partial\theta_S} \Rightarrow \frac{\partial\bar{\gamma}_U}{\partial\theta_S} < 0. \tag{A140}$$

Recalling that

$$\theta_L > \bar{\theta}_L \Leftrightarrow \frac{\rho_B^L}{\rho_w^L} < \frac{\rho_B^S}{\rho_w^S} \Rightarrow \Gamma_L > \Gamma_S, \tag{A141}$$

if (but not only if) $\theta_L > \bar{\theta}_L$, then

$$\tau_W^L < \tau_W^S \Rightarrow (1+\beta)\log\tau_W^L - \beta\log\Gamma_L < (1+\beta)\log\tau_W^S - \beta\log\Gamma_S, \tag{A142}$$

which means that $\bar{\gamma}_U < \bar{\gamma}_w$.

Centralization increases the present value of developers' profits if and only if

$$\frac{1}{\tau_W^L} + \frac{\beta}{\tau_R^L} > \frac{1}{\tau_W^S} + \frac{\beta}{\tau_R^S} = \frac{1}{\rho_w^S} + \beta\frac{1-(1-\phi)\,q}{\rho_w^S\phi q + \rho_B^S(1-q)}. \tag{A143}$$

On the left-hand side, $\partial\tau_W^L/\partial\gamma < 0$ and $\partial\tau_R^L/\partial\gamma < 0$. For $\gamma = 1$,

$$\frac{1}{\tau_W^L} + \frac{\beta}{\tau_R^L} = \frac{1}{\rho_w^L} + \beta\frac{1-(1-\phi)\,q}{\rho_w^L\phi q + \rho_B^L(1-q)} > \frac{1}{\tau_W^S} + \frac{\beta}{\tau_R^S}. \tag{A144}$$

because $\rho_w^L < \rho_w^S$ and $\rho_B^L < \rho_B^S$. Conversely

$$\lim_{\gamma\to\rho_w^L q/(1-q+\rho_w^L q)}\left\{\frac{1}{\tau_W^L} + \frac{\beta}{\tau_R^L}\right\} = 0 < \frac{1}{\tau_W^S} + \frac{\beta}{\tau_R^S}. \tag{A145}$$

Thus there exists a unique value

$$\bar{\gamma}_\Pi \in \left(\frac{\rho_w^L q}{1-q+\rho_w^L q}, 1\right) \text{ such that } \frac{1}{\tau_W^L(\bar{\gamma}_\Pi)} + \frac{\beta}{\tau_R^L(\bar{\gamma}_\Pi)} = \frac{1}{\tau_W^S} + \frac{\beta}{\tau_R^S} \tag{A146}$$

and that $\Pi_L < \Pi_S$ if and only if $\gamma > \bar{\gamma}_\Pi$. By the implicit-function theorem,

$$\frac{\partial\tau_R^S}{\partial\theta_S} > 0 = \frac{\partial\tau_R^L}{\partial\theta_S} \wedge \frac{\partial\tau_W^S}{\partial\theta_S} > 0 = \frac{\partial\tau_W^L}{\partial\theta_S} \Rightarrow \frac{\partial\bar{\gamma}_\Pi}{\partial\theta_S} < 0. \tag{A147}$$

If (but not only if) $\theta_L > \bar{\theta}_L$, then

$$\frac{1+\beta\Gamma_L}{\tau_W^L} > \frac{1+\beta\Gamma_S}{\tau_W^S} \Rightarrow \frac{1+[1+(1-\phi)\,r]\,\beta\Gamma_L}{\tau_W^L} > \frac{1+[1+(1-\phi)\,r]\,\beta\Gamma_S}{\tau_W^S} \tag{A148}$$

because

$$\Gamma_L > \Gamma_S \Rightarrow \frac{1+\beta\Gamma_L}{1+\beta\Gamma_S} < \frac{1+[1+(1-\phi)\,r]\,\beta\Gamma_L}{1+[1+(1-\phi)\,r]\,\beta\Gamma_S} \tag{A149}$$

since

$$\frac{\partial}{\partial\Gamma}\frac{1+[1+(1-\phi)\,r]\,\beta\Gamma}{1+\beta\Gamma} = \frac{\beta(1-\phi)\,r}{(1+\beta\Gamma)^2} > 0. \tag{A150}$$

This implies that $\bar{\gamma}_\Pi > \bar{\gamma}_H$.

Moreover, if (but not only if) $\theta_L > \bar{\theta}_L$, then

$$(1+\beta)\log\tau_W^L - \beta\log\Gamma_L < (1+\beta)\log\tau_W^S - \beta\log\Gamma_S \Rightarrow \frac{1+\beta\Gamma_L}{\tau_W^L} > \frac{1+\beta\Gamma_S}{\tau_W^S} \tag{A151}$$

because

$$\Gamma_L > \Gamma_S \Rightarrow \left(\frac{\Gamma_L}{\Gamma_S}\right)^{\frac{\beta}{1+\beta}} < \frac{1+\beta\Gamma_L}{1+\beta\Gamma_S} \tag{A152}$$

since

$$\frac{\partial}{\partial\Gamma}\left[\left(1+\beta\Gamma\right)\Gamma^{-\frac{\beta}{1+\beta}}\right] = \frac{\beta\left(\Gamma-1\right)}{1+\beta}\Gamma^{-\frac{1}{1+\beta}} > 0 \text{ for all } \Gamma > 1. \tag{A153}$$

This implies that $\bar{\gamma}_\Pi < \bar{\gamma}_U$.

References

[1] Acemoglu, Daron, Michael Golosov, and Aleh Tsyvinski. 2008. "Political Economy of Mechanisms." *Econometrica* 76(3): 619–41.

[2] Acemoglu, Daron, and James A. Robinson. 2001. "Inefficient Redistribution." *American Political Science Review* 95(3): 649–61.

[3] Adserà, Alícia, Carles Boix, and Mark Payne. 2003. "Are You Being Served? Political Accountability and the Quality of Government." *Journal of Law, Economics, and Organization* 19(2): 445–90.

[4] Arnott, Richard J. and Joseph E. Stiglitz. 1979. "Aggregate Land Rents, Expenditure on Public Goods, and Optimal City Size." *Quarterly Journal of Economics* 93 (4): 471–500.

[5] Banzhaf, H. Spencer, and Wallace E. Oates. 2012. "On Fiscal Illusion and Ricardian Equivalence in Local Public Finance." NBER Working Paper 18040.

[6] Battaglini, Marco, and Stephen Coate. 2008. "A Dynamic Theory of Public Spending, Taxation, and Debt." *American Economic Review* 98(1): 201–36.

[7] Becker, Gary S. 1983. "A Theory of Competition among Pressure Groups for Political Influence." *Quarterly Journal of Economics* 98(3): 371–400.

[8] Besley, Timothy, and Robin Burgess. 2002. "The Political Economy of Government Responsiveness: Theory and Evidence from India." *Quarterly Journal of Economics* 117(4): 1415–51.

[9] Besley, Timothy, and Stephen Coate. 1998. "Sources of Inefficiency in a Representative Democracy: A Dynamic Analysis." *American Economic Review* 88(1): 139–56.

[10] Boffa, Federico, Amedeo Piolatto, and Giacomo A. M. Ponzetto. 2013. "Centralization and Accountability: Theory and Evidence from the Clear Air Act." CEPR Discussion Paper No. 9514.

[11] Bullock, David S. 1995. "Are Government Transfers Efficient? An Alternative Test of the Efficient Redistribution Hypothesis." *Journal of Political Economy* 103(6): 1236–74.

[12] Clark, Robert, Craig, Lee and Jack Wilson. 2003. *A History of Public Pensions in the United States*. Philadelphia: University of Pennsylvania Press.

[13] Coate, Stephen, and Stephen Morris. 1995. "On the Form of Transfers to Special Interests." *Journal of Political Economy* 103(6): 1210–35.

[14] Daly, George G. 1969. "The Burden of the Debt and Future Generations in Local Finance." *Southern Economic Journal* 36: 44-51.

[15] Drazen, Allan, and Nuno Limão. 2008. "A Bargaining Theory of Inefficient Redistribution Policies." *International Economic Review* 49(2): 621–57.

[16] Epple, Dennis, and Katherine Schipper. 1981. "Municipal Pension Funding: A Theory and Some Evidence." *Public Choice* 37(1): 141–78.

[17] Ferraz, Claudio, and Frederico Finan. 2008. "Exposing Corrupt Politicians: The Effects of Brazil's Publicly Released Audits on Electoral Outcomes." *Quarterly Journal of Economics* 123(2): 703–45.

[18] Fitzpatrick, Maria. 2012. "How Much Do Public School Teachers Value Their Retirement Benefits?" Cornell University Working Paper.

[19] Freeman, Richard B. 1986. "Unionism Comes to the Public Sector." *Journal of Economic Literature*, 24(3): 41–86.

[20] Gabaix, Xavier and David Laibson. 2006. "Shrouded Attributes, Consumer Myopia, and Information Suppression in Competitive Markets." *Quarterly Journal of Economics* 121 (2): 505–40.

[21] Gentzkow, Matthew. 2006. "Television and voter turnout." *Quarterly Journal of Economics* 121 (3): 931–72.

[22] Glaeser, Edward L., Giacomo A. M. Ponzetto, and Jesse M. Shapiro. 2005. "Strategic Extremism: Why Republicans and Democrats Divide on Religious Values." *Quarterly Journal of Economics* 120 (4): 1283–330.

[23] Graebner, William. 1978. "Retirement in Education: The Economic and Social Functions of the Teachers' Pension." *History of Education Quarterly* 18 (4): 397–417.

[24] Gyourko, Joseph and Joseph Tracy. 1989. "Local Public Sector Rent-Seeking and its Impact on Local Land Values." *Regional Science and Urban Economics* 19(3): 493–516.

[25] Kovenock, Dan, and Brian Roberson. 2009. "Inefficient Redistribution and Inefficient Redistributive Politics." *Public Choice* 139(3/4): 263–72.

[26] Krusell, Per, and José-Victor Ríos-Rull. 1999. "On the Size of U.S. Government: Political Economy in the Neoclassical Growth Model." *American Economic Review* 89(5): 1156–81.

[27] Lindbeck, A. and J. Weibull. 1987. "Balanced budget redistribution and the outcome of political competition." *Public Choice* 52 (3): 273–97.

[28] Leeds, Michael. 1985. "Property values and pension underfunding in the local public sector." *Journal of Urban Economics* 18(1): 34–46.

[29] MacKay, Robert C. 2011. "The Effect of Unfunded Pension Liabilities on Local Housing Prices." U.C. San Diego Working Paper.

[30] Mitchell, Olivia S. and David McCarthy. 1999. "The Structure and Performance of State and Local Pension Plans." Pension Research Council, The Wharton School, Philadelphia.

[31] Monahan, Amy B. 2012. "Statutes as Contracts? The 'California Rule' and Its Impact on Public Pension Reform." *Iowa Law Review* 97: 1029–83.

[32] Novy-Marx, Robert and Joshua D. Rauh. 2009. "The Liabilities and Risks of State-Sponsored Pension Plans." *Journal of Economic Perspectives* 23 (4): 191–210.

[33] ——. 2011. "Public Pension Promises: How Big Are They and What Are They Worth?." *Journal of Finance*, 66: 1211–49.

[34] Persson, Torsten, and Lars E. O. Svensson. 1989. "Why a Stubborn Conservative would Run a Deficit: Policy with Time- Inconsistent Preferences." *Quarterly Journal of Economics* 104(2): 325–45.

[35] Ponzetto, Giacomo A. M. 2011. "Heterogeneous Information and Trade Policy." CEPR Discussion Paper 8726.

[36] Poterba, James, Venti, Steven and David Wise. 2007. "The Changing Landscape of Pensions in the United States." NBER Working Paper 13381.

[37] Smith, Robert Stewart. 1981. "Compensating Differentials for Pensions and Underfunding in the Public Sector." *Review of Economics and Statistics* 63 (3): 463–68

[38] Snyder, James M., and David Strömberg. 2010. "Press Coverage and Political Accountability." *Journal of Political Economy* 118 (2): 335–408.

[39] Stadelmann, David, and Reiner Eichenberger. 2012. "Consequences of Debt Capitalization: Property Ownership and Debt versus Tax Choice." *Southern Economic Journal* 78(3): 976–98.

[40] Stigler, George J. 1982. "Economists and Public Policy." *Regulation* 6: 13–17.

[41] Strömberg, David. 2004. "Radio's Impact on Public Spending." *Quarterly Journal of Economics* 99: 189–221.

Table 1 – *Parameters of the Model*

Parameter	Range	Interpretation
β	$(0,1]$	Discount factor
r	$(0,\infty)$	Market interest rate
Y	$(0,\infty)$	Gross income of a private-sector worker in the city
R	$(0,\infty)$	Cost of housing in the retirement locale
$\bar{U}$	$(-\infty,\infty)$	Lifetime utility in the reservation locale
$\bar{A}$	$(0,\infty)$	$=(1+\beta)\left[\beta(1+r)\right]^{-\beta/(1+\beta)}\exp\left[\bar{U}/(1+\beta)\right]:$ Reservation income
$\bar{C}_W$	$(0,\infty)$	$=\bar{A}/(1+\beta):$ Reservation consumption for young workers
$\bar{C}_R$	$(0,\infty)$	$=\bar{A}(1+r)\beta/(1+\beta):$ Reservation consumption for old workers
q	$(0,1/2)$	Number of local government employees relative to city population
ϕ	$[0,1]$	Share of public-sector pensions promises that are pre-funded
θ_B^P	$(0,1]$	Pr. that a public-sector employee is informed of all proposals
θ_w^P	$\left[\theta_B^P,1\right]$	Pr. that a public-sector employee is informed of wage proposals
θ_B^T	$\left(0,\theta_B^P\right]$	Pr. that a private-sector employee is informed of all proposals
θ_w^T	$\left[\theta_B^T,\theta_w^P\right]$	Pr. that a private-sector employee is informed of wage proposals
ρ_B	$(0,1]$	$=\theta_B^T/\theta_B^P$: Symmetry of information about pension proposals
ρ_w	$[\rho_B,1]$	$=\theta_w^T/\theta_w^P$: Symmetry of information about wage proposals
N	$\mathbb{N}$	Number of identical cities in the state
ψ	$[0,\infty)$	Hedonic cost of commuting across cities
γ	$[1/N,1]$	$=\left[1+(1-N)F(\psi)\right]/N:$ Share of public-sector employees who live in the city where they work in a symmetric equilibrium
θ_L	$(0,1]$	Probability that a voter is informed by local news media
θ_S	$(0,1]$	Probability that a voter is informed by statewide news media
θ_U	$[0,1]$	Probability that a public-sector employee is informed by the union
π	$[0,1)$	Conditional probability that an informed agent has acquired knowledge of pension proposals

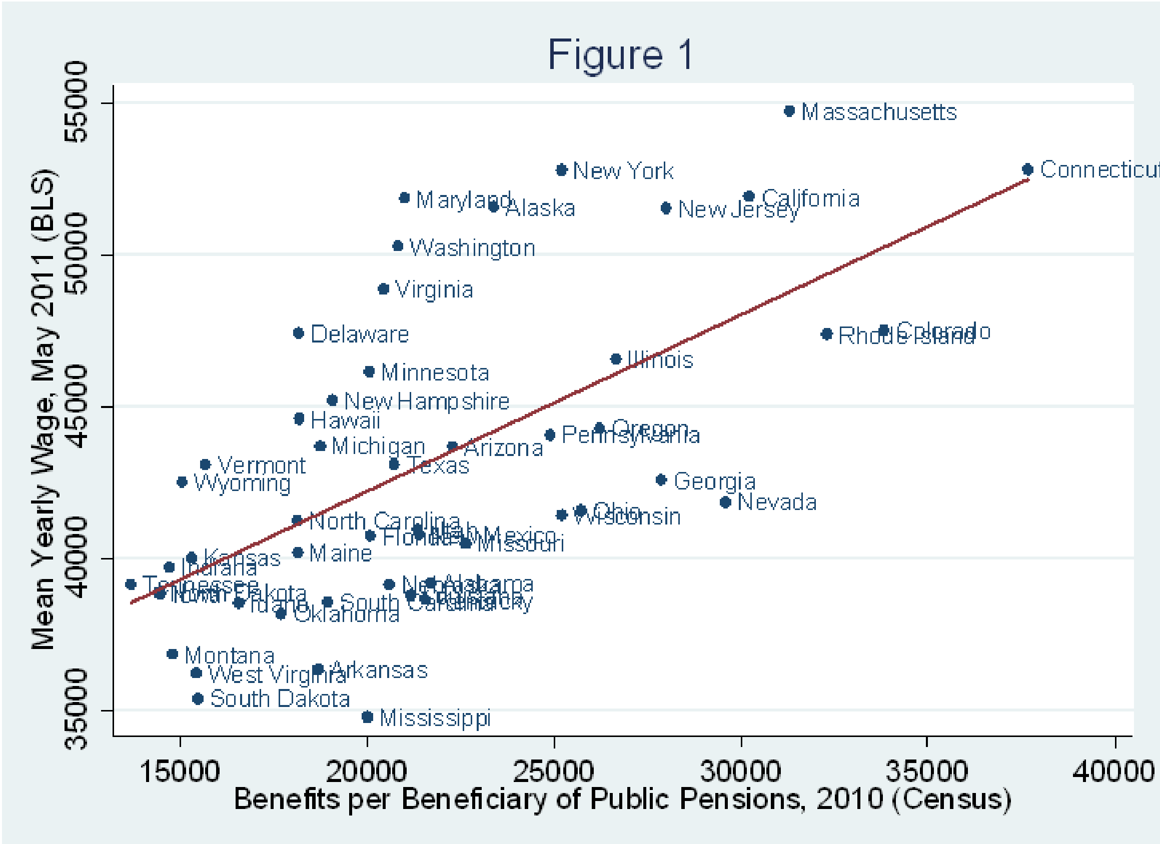
Mean Yearly Wage, May 2011 (BLS)
35000
40000
45000
50000
55000
15000
20000
25000
30000
35000
40000
Benefits per Beneficiary of Public Pensions, 2010 (Census)
Massachusetts
Connecticut
New York
Maryland
Alaska
New Jersey
California
Washington
Virginia
Delaware
Rhode Island
Colorado
Illinois
Minnesota
New Hampshire
Hawaii
Pennsylvania
Oregon
Michigan
Arizona
Vermont
Texas
Wyoming
Georgia
Nevada
Wisconsin
Ohio
North Carolina
Florida
Missouri
Kansas
Indiana
Maine
Tennessee
Oklahoma
South Carolina
Alabama
Kentucky
Montana
West Virginia
Arkansas
South Dakota
Mississippi

Figure 1