THE EFFECTS OF TEACHERS UNIONS ON AMERICAN EDUCATION Andrew J. Coulson

Public school employee unions are politically partisan and polarizing institutions. Of the National Education Association's \$30 million in federal campaign contributions since 1990, 93 percent has gone to Democrats or the Democratic Party. Of the \$26 million in federal campaign contributions by the American Federation of Teachers, 99 percent has gone to Democrats or the Democratic Party (Center for Responsive Politics 2009). Perhaps not entirely coincidentally, conservatives and Republicans have often accused these unions of simultaneously raising the cost and lowering the quality of American public schools. Many advocates of charter schools, vouchers, and education tax credits have cited union political influence as the greatest impediment to their chosen reforms. But in academic circles, scholars have sometimes disagreed on the unions' impact on wages and educational productivity. The purpose of the present review is to summarize, and attempt to reconcile, the empirical research on the actual impact teachers unions have on American education.

To give structure to that effort, this article analyses the unions' effectiveness in pursuing five of their key objectives: (1) raising their members' wages, (2) growing their membership, (3) increasing the share of the public school labor force that they represent, (4) precluding pay based on performance or aptitude, and (5) minimizing competition from nonunion shops.

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The assertions that public school employee unions seek to grow and to raise their members' wages are entirely uncontroversial. It is also common knowledge that they consistently oppose "school choice" programs that would ease parents' access to competing nonunionized private and charter school alternatives. There could, however, be some question in the reader's mind around union opposition to pay based on performance or aptitude. Public statements by officials have sometimes appeared to leave open the possibility that the unions might accept "merit pay" under certain (usually unspecified) conditions (Sweet 2009).

A closer look at the details of the unions' positions indicates that they remain consistent in opposing pay based on teacher performance or aptitude. NEA Resolution F-8 stipulates that compensation plans for its members should "exclude any form of merit pay except in institutions of higher education where it has been bargained" (NEA 2007). The AFT has no comparable national document that so categorically excludes the possibility of merit pay, but it expressly does not mention performance or aptitude in its list of valid bases for differential salaries (AFT 2003: 29–30). Removing most of the remaining ambiguity,¹ it adds that

While the AFT is encouraging locals to explore various teacher compensation systems based on local conditions, it is not abandoning the traditional [credential- and seniority-based] salary schedule. Failed attempts to implement differentiated pay options, like merit pay systems, identified a few teachers as "outstanding" and paid them extra, rewarding teachers on the basis of supervisory ratings or student test scores. Nevertheless, these schemes have failed [AFT 2003: 32].

In this, U.S. public school employee unions are not alone. According to Victor Lavy (2007), "Teacher unions worldwide strongly oppose performance-based pay. Unions view wage differentiation on the basis of subject taught, as well as any sort of subjective

¹A recent AFT contract in New Haven, Connecticut, has been represented as a "model for the nation" that opens the way to merit pay (Sawchuk 2009), but the fine print undermines that interpretation. The contract in fact makes no provision for individual merit pay, only for school-wide performance bonuses. The union, moreover, retains the ability to veto work rules even when 100 percent of a school's staff supports them (Carroll 2009).

evaluation of teachers, as threats to their collective bargaining strategies and therefore reject them outright."²

Have They Succeeded?

To understand the unions' effects on American education, this section reviews their success in achieving the five goals enumerated above.

Wage Increases

There is no doubt that public school teachers' salaries have risen dramatically since the mid-1950s (Figure 1), or that they now greatly exceed the market-determined teacher salaries of the private sector. According to the latest *Schools and Staffing Survey* published by the National Center for Education Statistics, private school teachers received an average base salary of \$38,200 in 2007–08, while the comparable figure for teachers in traditional public schools was \$52,100 (Coopersmith 2009: Table 7). This understates the difference in compensation between the sectors, however, due to the superior retirement benefits enjoyed by public sector teachers.

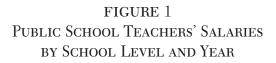
According to Robert Costrell and Michael Podgursky (2009), "The employer contribution rate for public K–12 teachers (14.6 percent) was 4.2 points higher than that for private-sector professionals (10.4 percent)," in the most recent quarter for which data are available (the one ending in September 2008). Plugging in these retirement benefit contributions, we have adjusted compensation figures of \$59,710 for public school teachers and \$42,170 for private school teachers. Public school teachers are thus paid roughly 42 percent more, on average, than their private sector counterparts.³

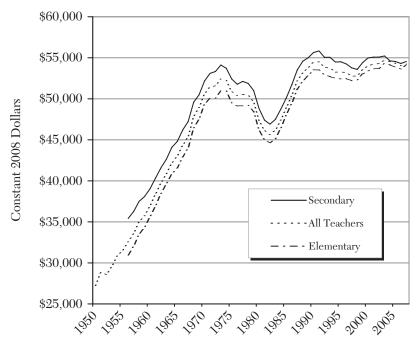
But to what extent can this generous compensation premium be credited to union activity? Figure 1 shows a significant rise in pay over time, but not one that closely follows the historical rise of public school unionization and collective bargaining.

 $^{^2\}mathrm{A}$ more detailed discussion of the union preference for a narrowly dispersed wage structure appears in Lucifora (1999).

³Even this likely understates the true compensation gap given that public school teachers presumably also enjoy more generous health benefits than those in the private sector.

Collective bargaining is the key mechanism by which unions conventionally seek higher wages. The AFT pioneered public school collective bargaining in the style of industrial unions in 1961, through its New York City affiliate, while the NEA followed suit only a decade later. So the most significant period of growth in public school unionization and collective bargaining in the United States stretched from the mid 1960s through the early 1970s. But a glance at Figure 1 reveals that by the time this period of intensive union action began, teachers' salaries had already been rising rapidly for well over a decade, and real wages actually declined for a solid decade just as unionization was reaching a peak (see Figure 2).





SOURCES: Snyder, Dillow, and Hoffman (2009: Table 78); Simon and Grant (1970: Table 53); Goldin (1999: Table A.7). Author's inflation adjustment using BLS inflation calculator.

Obviously, factors other than unionization were at play, most notably the economic recession of the mid-1970s. Nevertheless, the historical data seem at odds with common assumptions about the unions' impact on teacher salaries, and so we must explore the evidence more closely.

To do so, we can refer to the literature on the public school union wage premium. The most widely cited effort to investigate this issue is Caroline Hoxby's (1996), which used a large, nationwide sample and a panel regression model with instrumental variables to conclude that unionization raises a public school district's per pupil spending between 4.3 percent and 9 percent, relative to nonunionized districts. Wage data for her sample were unavailable, but Hoxby concluded that the union spending premium was chiefly allocated to higher salaries and smaller classes. Since smaller classes (i.e., higher teacher-student ratios) account for some of the increased spending, and since teachers' salaries are not the only item in district budgets, Hoxby's estimates suggest that the real union wage premium is somewhere between zero and 10 percent.

Looking at rural Pennsylvania districts, Robert Lemke (2004) put the public school union wage premium at 7.6 percent. While this is consistent with Hoxby's findings, the narrow sample calls into question the study's generalizability. Most recently, Michael Lovenheim (2009) looked at three Midwestern states using high-quality panel data and found no statistically significant union wage premium among public school districts. Generalizability is also a concern with the Lovenheim article, though the author makes a concerted effort to address it.

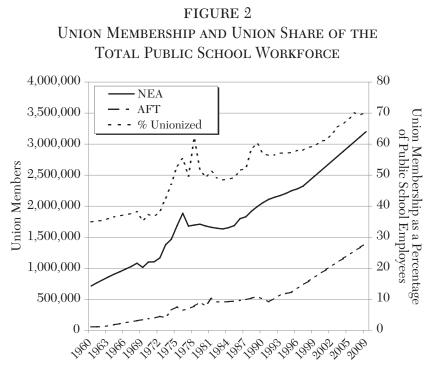
The discrepancy between Lovenheim's results and those of Hoxby and Lemke is certainly interesting, but it pales in comparison to the 42 percent compensation premium that divides public from private sector teachers. Even the high end of the Hoxby range amounts to less than a quarter of the intersectoral compensation gap. And there is a real possibility that the public school union wage premium is considerably smaller than that—and hence explains even less of the public-private gap.

In other words, public school employee unions may succeed in fattening their members' paychecks to some extent, but the bulk of the wage premium enjoyed by public school teachers over their private sector peers cannot be credited to collective bargaining.

Union Growth and Share of the Public School Labor Force

In the past half century, public school union membership has sextupled, and the share of union members within the public school sector has doubled (Figure 2). Clearly, the past 40 years have been good to the unions on this front. Equally clearly, this is a dramatic departure from unionization levels in the private sector, which have fallen substantially since the 1960s, and now stand at barely 6 percent in the service sector.

Also of interest is the fact that the pupil-staff ratio has dropped precipitously over time: from roughly 18 to 1 in 1960 to an estimated 8 to 1 in 2009 (Snyder, Dillow, and Hoffman 2009: Tables 16, 80). So, not only has union membership grown substantially, the *labor intensity* of public sector schooling has more than doubled. That result is certainly consistent with union success in winning rents from



SOURCES: Snyder, Dillow, and Hoffman (2009: Table 80); Goldin (1999: Table A.16). Missing values linearly interpolated or extrapolated.

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the public school system by growing the labor force in order to grow its membership, but it is not conclusive.

As with the question of the union wage effect, unionization's impact on employment is somewhat debatable. Hoxby (1996), as already noted, finds that unions succeed in raising spending in part by shrinking the pupil-staff ratio. The magnitude of the effect, however, is fairly modest, since the spending premium Hoxby credits to the unions ranges from 4.3 to 9 percent above nonunionized districts. Lovenheim (2009), as with wages, finds no net effect of unionization on the pupil-staff ratio. Thus, if the actual union effect falls anywhere within the Lovenheim to Hoxby spectrum, that effect explains only a small fraction of the drop in the pupil-staff ratio of public schools. Once again, the unions have arrived at their goal, but they do not appear to have realized that success chiefly through collective bargaining.

Wage Compression

There is ample evidence that unions in general compress wages,⁴ and Victor Lavy (2007: 93) argues that teachers union lobbying in particular "has often halted efforts to legislate performance-based rewards." Derek Neal (2002) notes that public schools have more compressed wage structures than (overwhelmingly nonunion) private schools, even when the private schools nominally have similar pay schedules.

The impact of this wage compression is significant. Using an instrumental variables model, and taking into account alternative explanations, Hoxby and Leigh (2004: 239) conclude that between 1963 and 2000, "Pay compression increased the share of the lowest-aptitude female college graduates who became teachers by about 9 percentage points and decreased the share of the highest-aptitude female college graduates who become teachers by about 12 percentage points." To this, Neal (2002: 34) adds that, "The rigid wage structures among public schools also raise questions about teacher retention." In particular, he points to studies by Murnane and Olsen (1989, 1990) and Stinebrickner (2001), which examine separation rates for public school teachers, and concludes that "teachers with higher test scores and better college records leave their jobs at higher rates."

⁴A good summary of this research can be found in Vogel (2007)

But, once again, it is difficult to credit the greater degree of wage compression apparent in public schools exclusively or even chiefly to unionization. According to Hoxby (2002: 849), "Even in [public school] districts that are not unionized, salary scales that resemble union scales are the rule. Although salary compression is not complete, differences in pay among teachers with the same tenure and highest degree are very small."

Minimizing Competition

Since public schools already enjoy a monopoly on nearly \$600 billion in annual government education spending, the chief way in which the NEA and AFT minimize competition is by lobbying elected officials to maintain that monopoly—opposing policies such as charter schools, vouchers, and education tax credits that give families easier access to nonunion schooling. As noted in the introduction to this article, union political contributions at the federal level are substantial. In fact, if the NEA and AFT are taken together (not unreasonable, given that they overwhelmingly support the same party and pursue a similar agenda), they constitute the most generous source of federal political donations over the past 20 years. According to a ranking by the Center for Responsive Politics (2009), the NEA and AFT together have spent \$56 million on federal political contributions since 1989, roughly as much as Chevron, Exxon Mobil, the NRA, and Lockheed Martin combined.

But threats to the public school monopoly are few and modest at the federal level. The real fora in which the prospects for educational competition are decided are state legislatures. Not surprisingly, it is in this area that teachers unions' political power is particularly striking. In 2008 alone, New York's United Federation of Teachers and its parent, New York State United Teachers, spent \$6.6 million on political activities (Scott 2009). During the 2006–07 school year, the NYSUT spent \$571,012 at a single luxury hotel, the Desmond, in the state capital of Albany (Brooks 2009).

The aim of these generous lobbying expenditures is frequently to minimize competition. In early 2009, for example, the NYSUT lobbied for the elimination from the state budget of a planned \$51 million increase in charter school funding, and for the inclusion of a significant increase in funding for traditional public school districts. The legislature followed this recommendation, freezing charter school spending at the previous year's level and hiking district funding by \$400 million, though a portion of the planned charter school increase was later returned to the budget (Green 2009, O'Brien 2009, Murphy 2009).

In 2005, the California Teachers' Association spent \$58 million on state ballot initiative campaigns alone, successfully defeating Governor Schwarzenegger's "Year of Reform" initiatives that included a "paycheck protection" bill (Ballotpedia 2009). In just the first five months of 2009, teachers unions spent \$14.2 million on California ballot initiative campaigns—accounting for nearly half the state's total initiative campaign expenditures (Lawrence 2009).

Around the nation, teachers unions are typically among the most influential lobby groups at the state level. James Cibulka briefly chronicles the unions' rise to political power in the book *Conflicting Missions? Teachers Unions and Educational Reform*, writing

Teachers unions became an institutional player in public education with the advent of mandated collective bargaining throughout much of the United States in the 1960s and 1970s. Through this process they acquired considerable influence not only over wages, benefits, and conditions of employment but over the educational program of school districts as well. Their financial and organizational resources permitted them to influence the election of sympathetic school board members and members of state legislatures. In some states they gained political influence over the election of the governor or appointment/election of the state superintendent or commissioner of education. At the national level they became active and influential supporters of Democratic presidential candidates and became an influential voice on education bills being considered by Congress [Cibulka 2000: 159].

In the vast majority of states, unions are free to use members' dues for any political activity so long as the member has not submitted a formal request asking not to have their contributions used for that purpose. Not surprisingly, unions sometimes make this opting-out process difficult—such as by limiting the period during which members may opt out to just 30 days of the year, or even refusing to honor such requests unless workers file charges with the National Labor Relations Board (Sherk 2006: 4).

Five states (Washington, Michigan, Wyoming, Idaho, and Utah) have reversed this burden with so called "paycheck protection" laws,

requiring the union to obtain members' approval *before* making socalled hard-money donations to politicians or political campaigns. According to Reitz (2006), that change had a significant result: "In states with paycheck protection laws, 90 to 95 percent of union members opt out of political spending." For example, in the state of Washington, the share of members making contributions to the union for political activity fell from 82 percent (when the onus was on members to opt out) to 6.1 percent (when the onus was on the union to obtain member approval). A panel regression of the effect of paycheck protection laws suggests that, overall, they reduce union hard-money contributions by roughly 50 percent (Sherk 2006).

But paycheck protection laws do not seem to reduce total political contributions by unions. Instead, they appear merely to move political contributions from "hard" to "soft" (e.g., issue advertising) activities. For example, when members' political contributions to the Washington Education Association dried up in the mid 1990s after passage of that state's paycheck protection law, the union simply created a new entity (the Community Outreach Program), funded it by assessing \$2.6 million in new mandatory dues, and then used those funds, according to Reitz (2006: 4), "for essentially political activities."

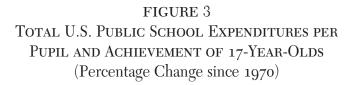
Moreover, the national parent organizations of the state teachers union affiliates often invest heavily in state political campaigns, no doubt in the belief that precedents set in one state could easily migrate to others. As a result, millions of dollars in national union dues are deployed to protect the monopoly school system from competition if a particular state affiliate is deemed to have insufficient lobbying resources of its own. In 2007, for instance, virtually all of the \$3.2 million in funding to successfully overturn Utah's as-yet-unimplemented school voucher program came from the NEA—the national parent of the Utah Education Association (Bernick, Erickson, and Davidson 2007).

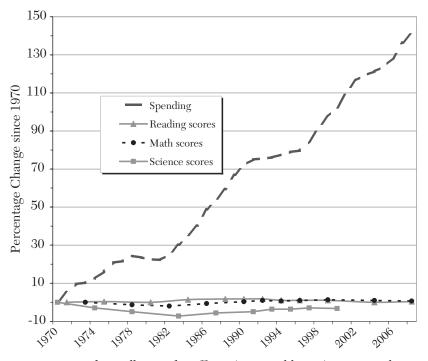
The extent of political activity by public school employee unions is documented in detail in Myron Lieberman's book *The Teacher Unions*. Lieberman (1997: 67) sums up by saying: "In short, the NEA/AFT are geared to political action, not as a supplement [to collective bargaining] but as a primary focus of union activity."

Assessing the Unions' Impact

Conservatives, Republicans, and school choice supporters of all stripes often blame unions for driving up the cost of public schooling and holding back improvements in educational quality. Economists, meanwhile, have disagreed on the exact size of the union effect within the public school sector.

It is certainly true that costs have risen dramatically over the past 40 years while achievement has languished (Figure 3), and the graduation rate has drifted downward (Heckman and LaFontaine 2007). But the simple picture of collective bargaining as the culprit in this productivity collapse is not well supported by the empirical evidence. Salary hikes, wage compression, and dramatic increases in the staff to student ratio have all undeniably occurred, but they have occurred in both unionized and nonunionized public school districts.





SOURCES: Snyder, Dillow, and Hoffman (2009: Table 181), missing values linearly interpolated or extrapolated; Rampey, Dion, and Donahue (2009: 3); and Campbell, Hombo, and Mazzeo (2000: 37).

Union members reading this may begin to wonder exactly why they pay \$600 or so in yearly dues. But they do appear to be getting their money's worth. While collective bargaining appears to offer minimal returns within the public school sector, unions nevertheless provide a valuable service to their members: protecting them from having to compete in the educational marketplace.

The NEA and AFT spend large sums on political lobbying so that public school districts maintain their monopoly control of more than half a trillion dollars in annual U.S. K-12 education spending. That monopoly, in turn, offers a more than 40 percent average compensation premium over the private sector, along with greater job security. And since both the U.S. and international research indicate that achievement and efficiency are generally higher in private sector and particularly *competitive market*—education systems, the public school monopoly imposes an enormous cost on American children and taxpayers (Coulson 2009). We are paying dearly for the union label, but mainly due to union lobbying to preserve the government school monopoly rather than to collective bargaining.

References

- American Federation of Teachers (2003) Where We Stand: Teacher Quality. Available at www.aft.org/pubs-reports/downloads/teachers/ TQres.pdf.
- Ballotpedia (2009) "California Teachers Association." Available at http://ballotpedia.org/wiki/index.php/California_Teachers_Associa tion.
- Bernick, B.; Erickson, T; and Davidson, L. (2007) "Financing Voucher Fight." *The Deseret Morning News* (1 November). Available at www.deseretnews.com/article/1,5143,695223711, 00.html?pg=2.
- Brooks, B. J. (2009) "Report Shows Teacher Union's Extravagant Spending." Policy Points Memorandum, Foundation for Education Reform and Accountability. Available at www.nyfera .org/originals/3.30.09/FERA_PolicyPointsMemo_2009-04-01.pdf.
- Campbell, J. R.; Hombo, C. M.; and Mazzeo, J. (2000) NAEP 1999 Trends in Academic Progress: Three Decades of Student Performance. NCES 2000-469. Washington: Office of Educational Research and Improvement, U.S. Department of Education.

Available at http://nces.ed.gov/pubSearch/pubsinfo.asp?pubid= 2000469.

- Carroll, T. W. (2009) "Randi's Red Herring." New York Post (26 October).
- Center for Responsive Politics (2009) "National Education Assn: Summary." OpenSecrets.org. Available at www.opensecrets.org/ orgs/summary.php?id=D000000064.
- Cibulka, J. G. (2000) "The NEA and School Choice." In T. Loveless (ed.) Conflicting Missions? Teachers Unions and Educational Reform, 150–93. Washington: Brookings Institution Press.
- Coopersmith, J. (2009) Characteristics of Public, Private, and Bureau of Indian Education Elementary and Secondary School Teachers in the United States: Results from the 2007–08 Schools and Staffing Survey. NCES 2009–324. Washington: Institute of Education Sciences, National Center for Education Statistics, U.S. Department of Education. Available at http://nces.ed.gov/ pubs2009/2009324.pdf.
- Costrell, R. M., and Podgursky, M. (2009) "Teacher Retirement Benefits." *Education Next* 9: 2. Available at http://educationnext .org/teacher-retirement-benefits.
- Coulson, A. (2009) "Comparing Public, Private and Market Schools: The International Evidence." *Journal of School Choice* 3 (1): 31–54.
- Goldin, C. (1999) "A Brief History of Education in the United States." NBER Working Paper No. H0119. Available at www .nber.org/papers/h0119.
- Green, E. (2009) "Charter Schools Will Get \$30M in One-Shot Plan to Counter Freeze." Gotham Schools (23 April). Available at http://gothamschools.org/2009/04/23/charter-schools-will-get-30m-in-one-shot-plan-to-counter-freeze.
- Heckman, J. J., and LaFontaine, P. A. (2007) "The American High School Graduation Rate: Trends and Levels." NBER Working Paper No. 13670. Available at www.nber.org/papers/W13670.pdf.
- Hoxby, C. M. (1996) "How Teachers' Unions Affect Education Production." *The Quarterly Journal of Economics* 111 (3): 671–718.
 (2002) "Would School Choice Change the Teaching

Hoxby, C. M., and Leigh, A. (2004) "Pulled Away or Pushed Out? Explaining the Decline of Teacher Aptitude in the United States." *AEA Papers and Proceedings* 49 (2): 236–40.

Profession?" Journal of Human Resources 37 (4): 846–91.

CATO JOURNAL

- Lavy, V. (2007) "Using Performance-Based Pay to Improve the Quality of Teachers." *The Future of Children* 17 (1). Available at www.princeton.edu/futureofchildren/publications/docs/17_01_05 .pdf.
- Lawrence, S. (2009) "Groups Raise \$31.5 Million for Calif. Ballot Fight." Associated Press (17 May). Available at www.sfgate.com/ cgi-bin/article.cgi?f=/n/a/2009/05/17/ state/n140900D07.DTL.
- Lemke, R. J. (2004) "Estimating the Union Wage Effect for Public School Teachers When All Teachers Are Unionized." *Eastern Economic Journal* 30 (2): 273–91.
- Lieberman, M. (1997) *The Teacher Unions*. New York: The Free Press.
- Lovenheim, M. F. (2009) "The Effect of Teachers' Unions on Education Production: Evidence from Union Election Certifications in Three Midwestern States." Working Paper, Stanford Institute for Economic Policy Research, Stanford University. Available at www.stanford.edu/~mlovenhe/Union .pdf.
- Lucifora, C. (1999) "Wage Inequalities and Low Pay: The Role of Labour Market Institutions." Working Paper No. 13.99, Fondazione Eni Enrico Mattei. Available at http://papers.ssrn .com/sol3/papers.cfm?abstract_id=158791.
- Murnane, R. J., and Olson, R. (1989) "The Effects of Salaries and Opportunity Costs on Duration in Teaching: Evidence from Michigan." *Review of Economics and Statistics* 71 (2): 347–52.

(1990) "The Effects of Salaries and Opportunity Costs on Length of Stay in Teaching: Evidence from North Carolina." *Journal of Human Resources* 25 (1): 106–24.

- Murphy, P. (2009) "UFT's 'Open Letter' to Charters: Believe It, or Your Lyin' Eyes." *The Chalkboard* (31 March). Available at www.nycsa.org/blog/2009/03/ufts-open-letter-to-charters-believeit.html.
- National Education Association (2007) "Democracy in Action: New NEA Resolutions and Resolutions Amended at the 2007 Representative Assembly." *NEA Today*. Available at http://find articles.com/p/articles/mi_qa3617/is_200709/ai_n21099694/pg_18.
- Neal, D. (2002) "How Vouchers Could Change the Market for Education." *Journal of Economic Perspectives* 16 (4): 25–44.
- O'Brien, B. (2009) "Charter School Teachers Say Union Is Against Them: Pickets Feel NYSUT Short-Changes Their Schools." *The*

Buffalo News (19 May). Available at www.buffalonews.com/city region/story/675925.html.

- Rampey, B. D.; Dion, G. S.; and Donahue, P. L. (2009) NAEP 2008 Trends in Academic Progress. NCES 2009–479. Washington: Institute of Education Sciences, National Center for Education Statistics, U.S. Department of Education. Available at http://nces .ed.gov/nationsreportcard/pubs/main2008/2009479.asp.
- Reitz, Michael (2006) "Paychecks Unprotected: Lessons Learned in California and Other States." Capital Research Center. Available at www.capitalresearch.org/pubs/pdf/LW0106.pdf.
- Sawchuk, S. (2009) "Teacher Contract Called Potential Model for Nation." *Education Week* (26 October). Available at www.edweek .org/ew/articles/2009/10/21/09union.h29.html?tkn=TSNFfeKVW cZC9LQ3D%2F1VrWA9apYtP0dZPzCY.
- Scott, B. (2009) "Teach Unions a \$6.6M Lobby." New York Post (8 May). Available at www.nypost.com/p/news/regional/teach_ unions_lobby_UpTQtQYouV11xYVfhAs8GP.
- Sherk, J. (2006) "What Do Union Members Want? What Paycheck Protection Laws Show about How Well Unions Reflect Their Members' Priorities." CDA 06–08. Center for Data Analysis, Heritage Foundation. Available at www.heritage.org/research/ labor/cda06-08.cfm.
- Simon, K. A., and Grant, W. V. (1969) *Digest of Education Statistics*, 1969 *Edition*. Washington: National Center for Educational Statistics, U.S. Department of Health, Education, and Welfare. Available at www.eric.ed.gov/ERICWebPortal/custom/portlets/ recordDetails/detailmini.jsp?_nfpb=true&_&ERICExtSearch_SearchValue_0=ED035996&ERICExtSearch_SearchType_0=no &accno=ED035996.
- Snyder, T. D.; Dillow, S. A.; and Hoffman, C. M. (2009) Digest of Education Statistics 2008. NCES 2009-020. Washington: Institute of Education Sciences, National Center for Education Statistics, U.S. Department of Education. Available at http://nces.ed.gov/ pubs2009/2009020.pdf.
- Stinebrickner, T. (2001) "A Dynamic Model of Teacher Labor Supply." Journal of Labor Economics 19 (1): 196–230.
- Sweet, L. (2009) "Cautious Response from Teachers Union on Obama Merit Pay Plan." Lynn Sweet's blog, *Chicago Sun-Times* online. Available at http://blogs.suntimes.com/sweet/2009/03/cau tious_response_from_teacher.html.

Vogel, T. (2007) "Union Wage Compression in a Right-to-Manage Model." SFB 649 Discussion Paper 2007–009. School of Business and Economics, Humboldt University of Berlin. Available at http://sfb649.wiwi.hu-berlin.de/papers/pdf/SFB649DP2007-009.pdf.