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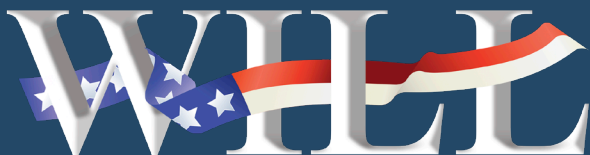


Keeping Score

**Act 10's Impact on
Student Achievement**

**Dr. Will Flanders
Research Director**

**Collin Roth
Director of Public Engagement and
Policy Analyst**



Executive Summary

For the better part of the last decade, no piece of legislation has loomed larger in public policy debates in Wisconsin than the collective bargaining reform law in 2011 (aka Act 10). The controversial budget repair bill, introduced by Governor Scott Walker in the first weeks of his first term, represented a fundamental break with the past and a new era for state and local governments in the Badger State. Public employee unions, long a force, had their wings clipped as collective bargaining rights were restricted. For the first time, public employees were required to contribute to healthcare and pension costs. Due to this and other cost savings tools, municipalities and school districts saved millions of dollars. Reaction from opponents was loud and swift, arguing that it has had a negative impact on teachers, classrooms, and students.

But even though Act 10 empowered school district superintendents at an unprecedented level – school leaders are implementing merit pay plans for teachers more than ever, no longer needing to get union bosses approval – very little research has been done about how Act 10 has impacted student learning. Only one study has looked directly at the relationship of Act 10 and student performance, and found a negative relationship. But this study has some important deficiencies which we note and attempt to address in our paper.

We attempt to fill that research vacuum, by analyzing the relationship between a school district's implementation of Act 10 and student learning on standardized tests and graduation rates. Because districts implemented Act 10 after it became law at varying times- due to extending the CBAs – we performed an open records request for all 424 school districts, asking for their last collective bargaining agreement. We were able to do a pre / post analysis for 7 years. Through economic methods, we can isolate the effect of the implementation of Act 10 by controlling for variables

such as enrollment trends and student make-up, students with disabilities and economic status. Prior to release it was peer-reviewed by an individual with a Ph.D. in Education Policy. The conclusions are as follow:

1. A school district's implementation of Act 10 is associated with an increase in math proficiency on average.
2. The positive impact of Act 10 on student outcomes is consistent across small town, rural, and suburban school districts. There was no relationship between implementation of Act 10 and academic outcomes in urban school districts.
3. A school district's implementation of Act 10 was found to have neither a negative nor a positive relationship to graduation rates observed in that district.

These findings run counter to widespread claims by opponents of Act 10 that the law is hurting students. Retirements and decreases in teacher take home pay, according to critics, was supposed to hurt student achievement. It clearly did not. Why? Because Act 10 wasn't just a budget savings bill. In fact, it served to fundamentally alter public education in Wisconsin by empowering decision makers to put the needs of students first. Superintendents were allowed to make staffing and budget decisions that best served students and schools. A marketplace emerged that rewarded quality teachers, replacing the antiquated system of seniority. Schools were also unshackled from the administrative handcuffs. Act 10 wasn't just a policy toolbox for budget savings. It was nothing short of a revolution. It is in this context that the law ought to be lauded.

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Introduction

Since its passage, no piece of legislation has loomed larger in public policy debates in Wisconsin than Act 10. The legislation, extremely controversial at the time of its passage, introduced by Governor Scott Walker in the first weeks of his first term, represented a fundamental break with the past and a new era for state and local governments in the Badger State. Public employee unions, long a force, had their wings clipped as collective bargaining rights were restricted. For the first time, public employees were required to contribute to healthcare and pension costs. Local governments—including school districts—were afforded some flexibility to economize in the face of budget cuts, such as the requirements that public employees begin contributing to their health benefits and pensions. But despite many protests and complaints—some of which are still ongoing on a daily basis¹—the law has remained in place.

Among the most common arguments against Act 10 still, is that the law has had a negative effect on education in the state. Anecdotes about budget cuts, teacher unhappiness, and crowded classrooms were used to argue that the law was not only hurting teachers but students too.

To date, few studies have analyzed whether Act 10 has helped students. With a wealth of standardized test score and graduation rate data over the course of six years gathered through extensive open records requests to every district in the state, any correlation of the law on academic outcomes ought to be clear. This paper uses an econometric, longitudinal analysis to investigate just this question. Contrary to the claims of some opponents, our results suggest that Act 10 had a neutral to positive effect on student outcomes.

Existing Research on Act 10

Despite the significant amount of scholarly work

on this topic, to our knowledge only two studies have attempted to examine the direct impact of the legislation on the outcomes for students. Considering that the negative implications for students were a major source of opposition to the legislation, this lack of research is surprising. One exception is the work of Baron (2017).² Looking at several years of collective bargaining agreements before and after Act 10, Baron finds a negative impact on student achievement. The paper generated a number of media stories highlighting the negative implications for students that the study found.³

A second exception is a working paper by Roth⁴ who directly examined the relationship between teacher retirements in the aftermath of the legislation and student outcomes. Roth finds that student performance has actually improved:

“Nonetheless, this paper suggests that the exodus of a large number of experienced teachers following Act 10 was not as detrimental as the existing literature on teacher experience and turnover would suggest – these retirements either directly caused improvements in education quality, or schools were able to more than compensate for their departure with other changes (p. 22).”

These papers are limited in several ways that will be addressed in our work. First, Baron did not account for student disability rates. Obviously, disability rates can vary substantially from district to district and have a significant impact on student outcomes. Next, Baron only examined proficiency levels in Wisconsin high schools and excluded Milwaukee and Madison, two of the state’s largest school districts. This paper includes all grade levels, and accounts for district size via the inclusion of an enrollment variable. Additionally, none of the research to date examines factors outside of test scores, but recent research has found that test scores are not highly correlated with the better life outcomes that we normatively desire from improved education.⁵ To address this deficiency, we additionally examine student graduation rates. This paper represents an

attempt to take that look.

Other research on Act 10 has focused more on the teaching workforce. Biggs and Richwine (2012)⁶ compared the pension benefits of public employees in Wisconsin with those in the private sector after passage of the law. They found that public employee salaries in Wisconsin remained similar to those of private sector workers with similar levels of education, but that pension benefits remained far greater than those found in the private sector. Robert Costrell, an economist at the University of Arkansas, and Jeffery Dean⁷ (2013) examined changes in the costs of employer healthcare before and after Act 10. They found that costs declined by 13 to 19 percent for school districts as a result of the ability to choose lower cost health plans and the increase in employee contributions.

In 2016, Lueken, Flanders, and Szaflir examined public education and the teacher workforce in Wisconsin and that of neighboring states before and after the passage of Act 10. WILL found that Act 10 did not lead to the sort of dramatic negative outcomes that were often forecast by opponents. Student-teacher ratios remained similar to neighboring states, as did the gross salary and average experience level of teachers. While the study did reveal that teachers saw a reduction in fringe benefits, which is consistent with the purpose of the legislation that required employee contributions to pensions and healthcare, pensions were four times as valuable and healthcare benefits were about double those for Wisconsin public workers after Act 10 than benefits for comparable private sector workers, as demonstrated by the Biggs and Richwine study.⁸

Biasi (2017)⁹ examined how Act 10 impacted the market for teachers once districts were given new tools to hire, fire, and attract quality educators. Comparing districts who took advantage of the freedom to implement alternative, individualized salary structures under Act 10 with those that did not, the study found

that high-quality educators were more likely to move to districts that had implemented creative and attractive compensation packages. To the extent that such innovations are relatively common, this paper lends support to the notion that Act 10 implementation could have a positive impact on student outcomes.¹⁰

Public Support for Act 10

Since its passage, Act 10 has arguably been one of the most politically polarizing issues in the state. Support for the legislation is highly correlated with partisan identification—those who like Scott Walker and the Republicans responsible for the law tend to support the law while those who dislike said policymakers tend to oppose it. The Marquette University Law School Poll has regularly asked questions on Act 10 support over the years, and the level of support has remained relatively consistent around the 50% threshold, though declining slightly to 46% in the most recent edition of the poll to include the question.¹¹

Another poll conducted this year attempted to drill more deeply into the causes of light support. WILL's education poll¹² included a question asking whether Wisconsinites believed that Act 10 had a positive, negative, or neutral effect on students and teachers. While it may perhaps be less surprising that 50% of respondents believed the legislation had a negative effect on teachers given the changes to pension packages and pay structures, what was more surprising were the numbers for students.

A plurality of respondents—42.93%—believed the effect on students was negative compared to only 31.14% who believed the effect was positive. The intensity of negative beliefs was also found to be stronger than the intensity of positive beliefs. Perhaps most concerning for Act 10 proponents, negative beliefs exceeded positive beliefs not just among Democrats, but also among independents. It is possible that these beliefs are pervasive among the public because this is

the one area of Act 10 that has been little explored in a rigorous, statistical manner.

Hypothesis

There are a number of reasons to suspect that Act 10 may have a positive relationship to student outcomes. For example, Act 10 has allowed districts to move away from the “last hired, first fired” systems that existed previously, allowing more better educators, regardless of years of status, to retain their jobs.¹³ Additionally, many districts throughout the state have implemented systems of merit pay that allow districts to reward effective educators monetarily. Moreover, districts are better able to fill specific needs in their district by offering teachers better compensation packages, which high quality educators gravitate towards (Biasi 2017).

Data and Methods

Our level of analysis is the Wisconsin school district. In order to assess the relationship between Act 10 and student outcomes, we leveraged the variation that exists in the data of Act 10 implementation for districts around the state. To identify the year of implementation for each school district, we sent open records requests to every school district in the state requesting the collective bargaining agreement between the school district and the teacher’s union from 2008 to the present. After extensive follow-ups, we received responses from 372 of the 422 school districts throughout the state.¹⁴ This sample of districts represented a cross-section of the state that is very similar to the demographics and socio-economic data for missing districts. Table A3 depicts difference-of-means test comparing districts with which we received responses to those from which we did not. The only variable on which our sample differs is in the share of students with disabilities, which is approximately 1% higher in our sample than the state as a whole ($p < .01$).

We do not believe this difference substantively impacts our findings.

Prior to Act 10, nearly all districts paid 100% of employee healthcare and pension costs. Act 10 required that employees contribute 5.8% to pensions and at least 12.6% to health care. This provided a key demarcation point for us to look for in determining the year of Act 10’s implementation—when the contract between the district and teachers first implements Act 10. For example, we consider the law being implemented when the contract stated that employees must begin to contribute to their health insurance. Other districts stopped having formal agreements at the point of Act 10 implementation, and for those districts the end of the date of the last contract with the union was used as the transition point.

Our dependent variables are two measures of student outcomes over the last seven years in Wisconsin. These are the five-year graduation rates of students in each district, and the proficiency rate in mathematics for school districts on the state exam. DPI collects a four-year, five-year, and six-year graduation rate for every school and school district. Because some students generally graduate after four years, the five- and six- year rates always exceed the four year rates. We chose the middle measurement—the five year rate. Our results do not vary substantially based on this decision. While the name and style of the state exam has varied throughout the years, proficiency rates have remained relatively consistent in math over the time frame of analysis. That said, there are visible time trends in performance variation, we utilize a standardized version of proficiency that is more comparable across exams.¹⁵

A second subject area that is often included in assessments of student performance is Reading and Language Arts. There are at least two reasons we chose not to include this subject in our main text.

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First, Reading and Language Arts were separate subjects on the WKCE, but became one subject on the Forward Exam. This means we cannot be sure that test performance on the WKCE is directly comparable to that on the Forward. Secondly, there is a lot more variation in scores in these subjects over time depending on the test—we don't see a relatively consistent pattern. That said, when we run an analysis on reading on the WKCE and English/Language Arts on the Forward Exam, the relationship to Act 10 is similar to that observed for math. These results are included in appendix table A1, but should be interpreted with caution.

Additionally, we include several urbanicity indicator variables available from DPI to access the development level of the school district.¹⁶ Extensive demographic controls were also gathered, including the annual enrollment of the district, the share of students who were economically disadvantaged in the district, the racial makeup of the district, and the share of students in the district with disabilities. To account for any important time-invariant differences between school districts that are not captured by the included variables, we also include fixed effects for each of the 422 school districts in our model.¹⁷

Table 1. Summary Statistics for Key Variables

	Before Act 10	After Act 10
Enrollment	2,045.31	1,927.38
Non-White	0.1228	0.1483
Economically Disadvantaged	0.3701	0.3773
Disabilities Status	0.1384	0.1352
English Learner	0.0262	0.0266
Urban	0.0450	0.0427
Rural	0.5767	0.5573
Suburb	0.1800	0.1843
Small Town	0.2157	0.2118

Table 1 lists the summary statistics for the key variables in our analysis before and after the implementation of Act 10. Because the legislation was implemented within the span of a few years in most districts, we

do not observe substantively meaningful differences in the pre- and post- implementation sample.

For each district d in year y , we conducted the following analyses using models that explicitly account for the panel structure of the data¹⁸:

$$Proficiency_{dy} = \alpha + \beta_{1dy}(Act\ 10) + \beta_{2dy}(Controls) \quad (eq. 1)$$

$$GraduationRate_{dy} = \alpha + \beta_{1dy}(Act10) + \beta_{2dy}(Controls) \quad (eq. 2)$$

A positive coefficient on β_1 in each equation would indicate a positive relationship between the dependent variable in question and the passage of Act 10. A negative coefficient would indicate a negative relationship between that variable in the passage of Act 10.

Results

Math

Table 2 depicts the relationship between proficiency in mathematics and the implementation of Act 10 using the analysis technique outlined in equation (1) above. As can be seen in the table, some variables work in a manner consistent with what we observe in other studies of Wisconsin data. The number of economically-disadvantaged students is significantly related to proficiency. Similarly, going from the omitted small town baseline group to a suburban school would be expected to result in an increase of proficiency of 23.3%.

For our purposes, the most important coefficient is on the **Act 10** Variable, and it is positive and significant ($p < .05$). Across Wisconsin, Act 10 implementation is associated with a 1.67 standard deviation increase in math proficiency on average, holding all other variables constant.

Table 2. Relationship between Act 10 and Math Proficiency

VARIABLES	(1) Math
Act 10	1.657*** (0.323)
Enrollment	-0.000132*** (4.36e-05)
Non-White	-0.422 (1.600)
Students with Disabilities	-4.195 (4.983)
Economically Disadvantaged Students	-14.43*** (1.226)
English Language Learners	-2.068 (4.875)
Year Count	-1.109*** (0.0752)
Urban	-4.458 (3.515)
Rural	-0.406 (0.366)
Small Town	-3.517* (1.843)
Constant	9.797*** (1.843)
Observations	2,560
Number of Districts	423
R-squared	0.208

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Another important question is whether the positive correlation of Act 10 with student results varies depending on the characteristics of the district. To help answer that question, we conducted the same analysis as above in each category of urbanicity available from DPI: Urban, Suburban, Small Town and rural. These results are depicted in Table 3.

Table 3. Relationship between Act 10 and Student Performance by Urbanicity

VARIABLES	Urban Math	Suburban Math	Rural Math	Small Town Math
<i>Act 10</i>	2.036 (1.401)	2.238*** (0.793)	1.026* (0.597)	1.584*** (0.449)
<i>Enrollment</i>	0.000130 (0.000164)	-0.000218 (0.000151)	-0.000180 (0.000217)	-0.000130*** (6.03e-05)
<i>Non-White</i>	11.57 (14.08)	-13.43*** (4.621)	1.575 (3.283)	2.598 (2.046)
<i>Disabilities</i>	28.52 (20.59)	20.22 (15.96)	12.61 (11.23)	-14.45*** (6.298)
<i>Economic Disadvantage</i>	-29.77*** (6.941)	-22.12*** (3.174)	-9.933*** (2.982)	-12.34*** (1.595)
<i>English Language Learners</i>	16.77 (20.88)	-24.38 (16.70)	1.185 (8.775)	3.324 (6.458)
<i>Year Count</i>	-1.325*** (0.357)	-1.062*** (0.193)	-0.892*** (0.138)	-1.228*** (0.104)
Constant	-1.437 (13.33)	21.50*** (4.963)	2.445 (3.772)	6.062*** (2.262)
Observations	109	462	552	1,424
R-squared	0.477	0.179	0.184	0.234
Number of Districts	20	78	93	237

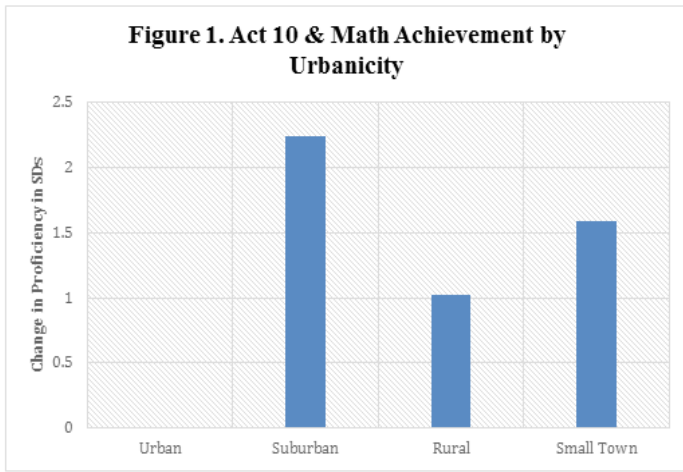
Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

It appears the positive effects of Act 10 on student outcomes is consistent across small town, rural, and suburban school districts. The effects are strongest (p<.01) in suburban and small town districts, and somewhat weaker (p<.1) in rural ones. However, we do not observe a positive relationship with Act 10 in urban school districts. There are a few possible reasons for this. First, urban districts represent the smallest subset of our sample, and we may simply lack the observations to draw conclusions. But it is also the case that several urban districts, such as Madison, fought implementation of Act 10 the hardest. It is possible that this means the districts have not

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been able to enjoy the full benefits of districts that have implemented more willingly. These findings are illustrated in Figure 1 below.



Graduation

Next, we apply the same model as the previous section to graduation rates by school district. Note that some school districts in Wisconsin do not have high schools, which shrinks the number of observations we have per year slightly. Again, other variables work in a manner that we might expect. Rural school districts and districts with higher enrollment have lower graduation rate. On our main variable of interest, we find that Act 10 implementation has no relationship with graduation rates. This means that while it may not be possible to say that the implementation of Act 10 has improved graduation rates, neither can it be said to have harmed them.

Table 4. Relationship between Act 10 and Graduation Rates

VARIABLES	Graduation Rates
Act 10	0.00247 (0.00267)
Non-White	-0.0312** (.0137)
Economically Disadvantaged	-0.00609

	(.0102)
Students with Disabilities	-0.0523 (0.0415)
English Language Learners	-0.105*** (0.0404)
Enrollment	-6.76e-07 (3.52e-07)
Year Count	0.00332*** (0.000616)
Urban	-0.0239 (0.0280)
Rural	-0.0102*** (0.00287)
Town	-0.00676 (0.0177)
Constant	0.975*** (0.0157)
Observations	2,332
Number of Districts	376
R-squared	0.074

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Limitations

As with every study, a few limitations warrant mentioning. First, although we believe we have a representative sample of Wisconsin school districts given the similarity of the sample to the districts as a whole,¹⁹ we cannot preclude the possibility that results might differ had we been able to include the remaining districts. Given the significant effort put forth to garner responses from 89% of Wisconsin school districts, it seems unlikely that another researcher would be able to gather a larger share, however the possibility should not be dismissed. Additionally, we are not able to account for the individual teacher characteristics that are part of the Biasi study. Our goal here was to look at the effects of Act 10 more broadly—encompassing potential impacts beyond teachers themselves. That said, it limits our ability to isolate the potential role that

improved teaching might have played in the improved performance that we found. Finally, while we account for changes in the state exam through standardization of proficiency rates, there is the potential that differences in the state test are more of a driver of performance than our analysis has found.

Conclusions

It has been long evident that Act 10 is a winner for taxpayers and local government. But the claim that these savings occurred at the expense of students has persisted. That myth can now be put to rest. Wisconsin students actually saw an increase in math proficiency after the passage of Act 10, and the law had no effect on graduation rates. While this paper cannot reveal the exact reasons that this relationship exists, we can offer some reasonable speculation. Act 10 incorporated market forces into the teaching workforce for the first time in Wisconsin. This has allowed good teachers to be rewarded in their district, as well as to seek out opportunities in other parts of the state that would not have been possible under the old “steps and ladders” system (Flanders and Tunney 2018). These results are observed across a variety of Wisconsin school districts, though less so in urban areas than others.

Wisconsin deserves to have sincere and honest debates about education and education policy. These findings, in combination with education spending in Wisconsin reaching records levels in 2017, ought to serve to close the chapter on the so-called ill-effects of the law on students.

Endnotes

- 1 Beck, Molly. 2017 "The Protest that wouldn't end: Act 10." Wisconsin State Journal.
- 2 Baron, E Jason. 2017. "The Effect of Teachers' Unions on Student Achievement: Evidence from Wisconsin's Act 10." *Unpublished Manuscript*.
- 3 Barnum, Matt 2017. "Gutting Wisconsin's Teachers Union Hurt Kids, Study Finds." *Chalkbeat*.
- 4 Roth, Jonathan. 2017. "Union Reform and Teacher Turnover: Evidence from Wisconsin's Act 10" *Working Paper*
- 5 Greene, Jay P. 2016. "Evidence for the Disconnect between Changing Test Scores and Changing Later Life Outcomes." *Education Next*.
- 6 Biggs, Andrew and Jason Richwine. 2012. "The Impact of Act 10 on Public Sector Compensation in Wisconsin." *American Enterprise Institute Paper*.
- 7 Costrell, Robert and Jeffrey Dean. 2013. "The Rising Cost of Teachers' Healthcare." *Education Next* 13
- 8 Lueken, Marty, Will Flanders and CJ Szafir. 2016. "The Impact of Act 10 on Wisconsin's Education Workforce A comprehensive statewide analysis of Act 10's effect on students per teacher and teacher experience, salary, and benefits." *Wisconsin Institute for Law & Liberty Policy Report*.
- 9 Biasi, Barbara. 2017. "Unions, Salaries, and the Market for Teachers: Evidence from Wisconsin." *Unpublished manuscript*.
- 10 A summary of all these studies is found in Appendix Table A4.
- 11 Marquette Law School Poll. <https://law.marquette.edu/poll/> Accessed 8/31/2018.
- 12 Flanders, Will. "Message Matters: How Effective Messages on Education Reform Shape Opinions." *WILL Policy Report*
- 13 Flanders, Will and Lauren Tunney. 2018. Silent Successes: The (Still) Undertold Stories of School Districts using Act 10. *WILL Policy Brief*
- 14 For Milwaukee Public Schools, independent sources were used to verify the year of implementation Zeehandelaar, Dara and Amber Winker. 2013. THE BIG SQUEEZE: Retirement Costs and School District Budgets *Thomas Fordham Institute Summary Report*.
- 15 The mean of proficiency for each year is subtracted from the value in each district, divided by the standard deviation in that year. Formally, for each district d in year y :
- 16 DPI reports urbanicity at the school level. We aggregate these up to the district level and count the number of schools in each of the four categories. Ties are randomly assigned to one category based on a random number generator. The decisions made by the random assignment (only a few districts) do not substantively alter the outcomes observed.
- 17 This model does not account for time-varying factors at the district level that are unaccounted for in the model.
- 18 Xtrege-Fixed-, between-, and random-effects and population-averaged linear models. *Stata Corp*.
- 19 See Table A3.

Appendix

Table A1 utilizes “Reading” scores from the WKCE and English/Language Arts scores from the Forward Exam. These subjects are not the same, thus meaning that the results in this table should be primarily for informational purposes.

Table A1. Relationship between Act 10 and ELA Proficiency

VARIABLES	ELA Proficiency	(2) Standardized ELA Proficiency
Act 10	0.166*** (0.0107)	-0.0110 (0.0540)
Enrollment	1.88e-06 (1.28e-05)	0.000134** (6.40e-05)
Non-White	6.37e-06 (8.12e-06)	4.20e-06 (4.04e-05)
Disabilities Status	-2.96e-06 (5.12e-05)	-0.000618** (0.000257)
English Language Learners	-3.80e-05 (3.22e-05)	-0.000375** (0.000161)
Year	-0.0546*** (0.00249)	0.00125 (0.0124)
Urban	0.135 (0.113)	1.190** (0.572)
Rural	0.000651 (0.0121)	-0.0154 (0.0612)
Suburb	-0.166 (0.114)	-1.360** (0.571)
Constant	0.659*** (0.0242)	0.138 (0.122)
Observations	2,567	2,636
R-squared	0.193	0.019
Number of Districts	423	423

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A2. Difference in Sample Means—Act 10 Data Present or Missing (T-Tests)

Variable	Data Present	Data Missing	Difference
Urban	0.0434	0.05607	-0.0126
Suburban	0.1828	0.1931	-0.0103
Rural	0.5389	0.5637	-0.0247
Small Town	0.2087	0.2131	-0.0044
White Share	0.8602	0.8670	0.0068
Economically Disadvantaged Share	0.3749	0.3626	0.0122
Students with Disabilities Share	0.1362	0.1279	-0.0083***
English Language Learners Share	0.0264	0.0288	-0.0023
Enrollment	2,018.695	1,966.051	52.64
Sample size	2,644	321	

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A3. Relationship between Act 10 and Math Proficiency, Non-Standardized

VARIABLES	Math Proficiency
Act 10	0.0221*** (0.00574)
Enrollment	1.74e-05** (6.80e-06)
Non-White	1.80e-06 (4.29e-06)
Disabilities Status	-6.20e-05** (2.73e-05)
English Language Learners	-7.57e-05*** (1.72e-05)
Year	-0.0181*** (0.00132)
Urban	-0.0556 (0.0606)
Rural	-0.00326 (0.00649)
Suburb	0.241*** (0.0855)
Constant	0.482*** (0.0167)
Observations	2,585
Number of Districts	422
R-squared	0.149

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table A4. Synopses of Existing Act 10 Research

Title	Author(s)	Years Covered	Main Findings
Union Reform and Teacher Turnover: Evidence from Wisconsin's Act 10	Roth	2006-2013	Teacher attrition following Act 10 led to better student outcomes
Unions, Salaries, and the Market for Teachers: Evidence from Wisconsin	Biasi	2007-2014	Effective teachers are more likely to move to districts that offer better benefits after Act 10
The Effect of Teachers' Unions on Student Achievement: Evidence from Wisconsin's Act 10	Baron	2008-2014	Act 10 reduced student achievement, particularly among low-achieving students
The Impact of Act 10 on Public Sector Compensation in Wisconsin	Biggs & Richwine	2011-2012	Healthcare benefits & pensions still exceed those of general population
The Rising Cost of Teacher Healthcare	Costrell and Dean	2011-2012	Act 10 enabled districts to choose lower costs healthcare plans, cutting costs 13-19%.
The Impact of Act 10 on Wisconsin's Education Workforce	Lueken, Flanders & Szafir	2011-2016	Class size remains similar to before Act 10; teacher pay has stayed steady while benefits have declined

