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# **Massachusetts Teacher Preparation and Licensure Performance Review Program for Initial Licensure Study**

James Cowan  
Dan Goldhaber  
Roddy Theobald

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**January 2018**

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Dan Goldhaber  
Roddy Theobald**



AMERICAN INSTITUTES FOR RESEARCH®

1000 Thomas Jefferson Street NW  
Washington, DC 20007-3835  
202.403.5000

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## Executive Summary

The [Performance Review Program for Initial Licensure \(PRPIL\)](#) is a pathway to initial licensure for Massachusetts teachers who did not complete an educator preparation program before entering the classroom. Created in 2003, PRPIL was intended to open teacher licensure opportunities for mid-career individuals with prior work experience or content expertise by allowing them to demonstrate that they offer the same teaching competencies as other pre-professional license teachers without completing a preparation program.

Most teachers in Massachusetts begin their teaching careers with an initial license: the license offered to candidates who complete a teacher preparation program at an approved institution of higher education (IHE) or alternative program and which is valid for five years. However, about 22 percent of teachers in Massachusetts began teaching on a preliminary<sup>1</sup> license, offered to candidates who pass the state’s Massachusetts Tests for Educator Licensure (MTEL) and meet other eligibility criteria, but have not completed a preparation program. The preliminary license is only valid for five years, so in order to continue teaching in Massachusetts public schools, teachers on preliminary licenses must have their license “advanced” to an initial license. Most do so by completing an educator preparation program through an IHE, but teachers can also earn their initial teaching license through PRPIL or by completing an approved educator preparation program through an alternative provider outside an IHE.

At the time of the data on which this report is based, PRPIL was only available as a route to licensure for educators teaching in districts that did not offer their own approved preparation programs, and only for teachers in certain subjects and grades.<sup>2</sup> PRPIL requires teachers to document courses and experiences relevant to the Professional Standards for Teachers and complete the Massachusetts Candidate Assessment for Performance (CAP). Unlike other routes to initial licensure, teachers must have worked for three years in their licensure area under a preliminary license before they advance their license through PRPIL. As part of this route, teachers work with a mentor and instructional consultant to demonstrate their qualifications for an initial license. Following satisfactory completion of these requirements, a teacher candidate is recommended for initial licensure. PRPIL costs less than most other initial licensure programs, at \$2,500 plus any expenses for additional coursework, as needed.

In this study, we examine the credentials of teachers that receive their initial licenses through PRPIL and the characteristics of the districts and schools in which they serve. We also study their effectiveness using student achievement data and teacher evaluation ratings and estimate the costs to teachers of employing this route to initial licensure versus other alternative options. In each case, we compare outcomes and experiences of teachers who have advanced to an initial

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<sup>1</sup> In July 2017, the Massachusetts Board of Elementary and Secondary Education approved numerous changes to the teacher licensure regulations, one of which was changing the name of this type of license from preliminary to provisional. Our data precede this regulatory change, so we refer to preliminary licenses throughout this report.

<sup>2</sup> The aforementioned regulatory changes also expanded the eligibility for advancing a license through PRPIL. During the time period covered in this study, PRPIL did not advance elementary licenses and was only available to teachers working in locations without access to other alternative programs for mid-career teachers. These restrictions were removed in July 2017. We list the subject areas covered by PRPIL in the data considered in this study in Appendix A.

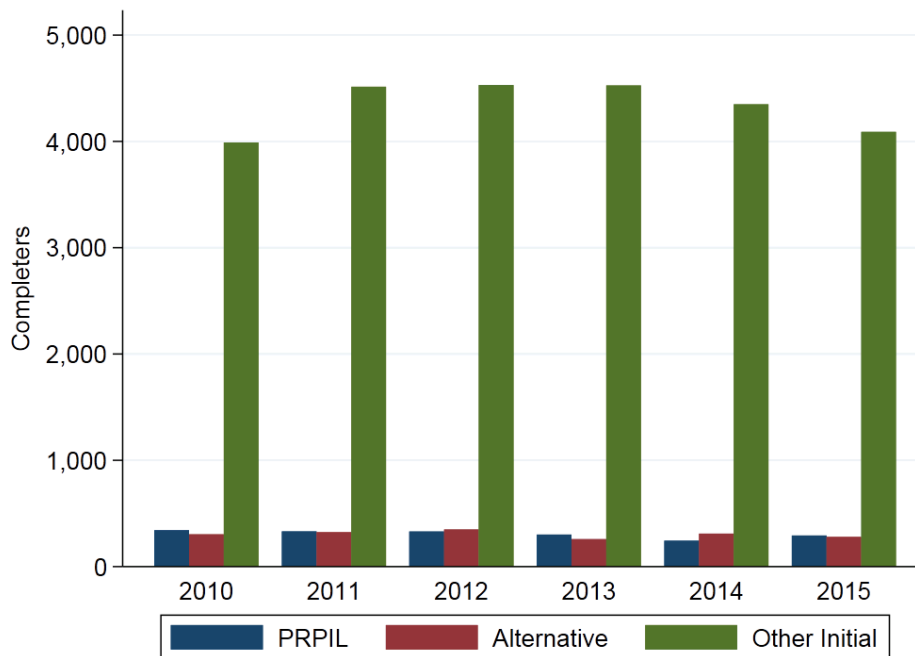
license through PRPIL to other teachers who have earned an initial license through one of Massachusetts’ other pathways.

### **Key Finding 1: PRPIL is the most commonly used non-traditional route to initial licensure in Massachusetts.**

Teachers on preliminary licenses have three options for advancing to an initial license: a traditional educator preparation program based at an institute of higher education, an alternative educator preparation program (usually based in a district or consortium of districts), or PRPIL. In any given year, PRPIL accounts for 5 to 8% of the program completions leading to an initial license.

We refer to alternative programs and PRPIL together as “non-traditional routes to initial licensure.” Figure ES.1 shows the number of individuals using the PRPIL and other alternative routes between 2010 and 2015. The number of teachers who advance their license from preliminary to initial through PRPIL is about equal to the total number of teachers who complete all alternative programs combined. However, in each year, the number of completers from traditional programs (which include some teachers who have preliminary licenses) is several times larger than the number from alternative pathways.

**Figure ES.1. PRPIL and Alternative Program Completers by Year**



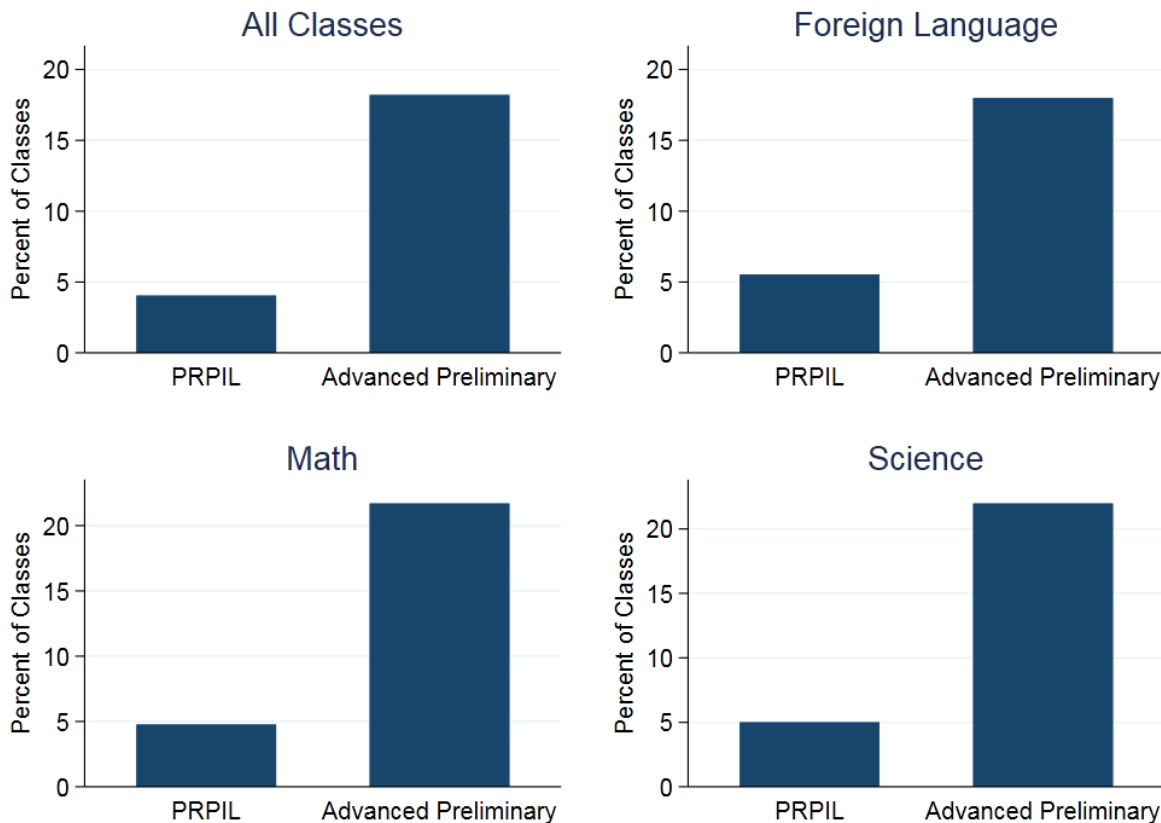
### **Key Finding 2: PRPIL teachers lead about 5 percent of high school classes in foreign languages, mathematics, and science.**

Despite the fact that PRPIL teachers comprise only 2 percent of the teacher workforce, they are disproportionately likely to teach high school courses in high demand areas such as foreign



languages, mathematics, and science. These fields are consistently on Massachusetts’ annual lists of shortage areas (Cross, 2016). As shown in Figure ES.2, PRPIL teachers are responsible for 5.5 percent of all high school foreign language classes, 4.8 percent of all high school math classes, and 5.0 percent of high school science classes.

**Figure ES.2. Percentage of High School Classes Taught by PRPIL and Other Preliminary Teachers**



*Notes:* Percentage of high school level classrooms in each subject taught by teachers who have advanced their license through PRPIL and all teachers who have advanced from preliminary to initial licenses.

The disproportionate representation of PRPIL teachers in these courses partially reflects the fact that teachers that begin teaching with preliminary licenses are more likely to advance shortage area licenses in general.<sup>3</sup> Figure ES.2 also shows that teachers who have advanced from preliminary to initial licenses (through any route) teach about 20 percent of these classes at the high school level. Relative to their overall representation in the profession, the assignment patterns of PRPIL teachers are more similar to other teachers with preliminary licenses than to teachers who enter the profession with an initial license. As we show in the full report, PRPIL teachers are somewhat more likely to advance foreign language licenses and about equally likely

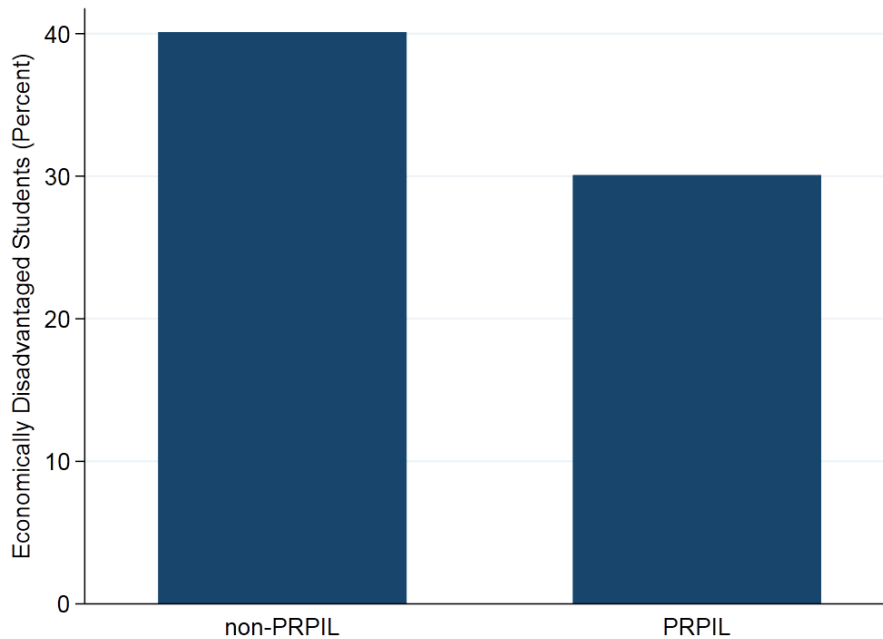
<sup>3</sup> We use the shortage areas reported to the U.S. Department of Education Office of Postsecondary Education for student financial aid programs (Cross, 2016). The list varies by year, but generally includes English as a Second Language, English/Language Arts, Mathematics, Foreign Languages, Science, and Special Education.

to advance math and science licenses as teachers who advance preliminary licenses and work in the same schools.

### **Key Finding 3: PRPIL teachers serve higher achieving, higher income students and work in higher performing districts and schools.**

PRPIL teachers work in significantly different classroom settings than other teachers in Massachusetts. In classrooms taught by teachers who have advanced their license through PRPIL, about 30 percent of students are economically disadvantaged (Figure ES.3). For other teachers who have advanced their preliminary licenses to an initial licensure, about 40 percent of students – or about one third more – are economically disadvantaged. However, much of this difference is explained by the sorting of PRPIL teachers across school districts. Comparing PRPIL teachers to non-PRPIL teachers who work in the same school district, the gap in economic disadvantage is only about one quarter as large.

**Figure ES.3. Average Classroom Economic Disadvantage by PRPIL Status**



*Notes:* Student economic disadvantage by PRPIL status. PRPIL teachers are those who have advanced their license via the PRPIL pathway. Non-PRPIL teachers include all those who have advanced a preliminary license to an initial licensure through some other pathway.

Students of PRPIL teachers also have higher prior scores on standardized tests. Again, most of the variation in the classroom composition between PRPIL and non-PRPIL teachers can be explained by the districts in which they teach, although they are also more likely to teach subjects, such as foreign languages, where average student achievement is higher.

## **Key Finding 4: PRPIL teachers earn similar performance ratings as other teachers with initial or professional licenses.**

We use teacher performance on the Massachusetts educator evaluation framework to compare the effectiveness of PRPIL teachers to other teachers. Because all teachers in Massachusetts are evaluated, these performance measures are available for a much wider set of teachers than achievement based measures (such as teacher value-added) that are commonly used in studies of teacher credentials.<sup>4</sup> Teachers who were advanced to initial by PRPIL perform similarly on their performance evaluations as teachers who have earned an initial license either by completing a traditional educator preparation program or through some other alternative pathway. Their performance is also quite close to other teachers who have advanced a preliminary license.

## **Key Finding 5: In the short run, the PRPIL pathway is significantly less expensive than other methods of obtaining initial licensure.**

Because it is not a formal educator preparation program, the PRPIL pathway has the lowest tuition of any method of advancing to initial licensure in Massachusetts. This makes it less costly to teachers than other alternative programs where teachers also work in public schools while meeting the requirements for initial licensure. The costs of traditional programs – where candidates may study fulltime – may be substantially higher if candidates do not work while they prepare for licensure. Because teachers progressing through the PRPIL pathway work fulltime while completing their licensure requirements, they do not forego earnings while they study. This makes PRPIL less costly in the short run than fulltime post-baccalaureate programs, although completing these programs leads to higher pay over time because districts pay higher salaries to teachers with advanced degrees. However, if teachers work fulltime while they complete post-baccalaureate programs, the additional pay may make their costs comparable to earning licensure through PRPIL within 6 years of graduation.

## **Implications**

This study provides a descriptive overview of where PRPIL teachers work, the students they serve, and the skills they bring to the workforce. But it does not directly assess how authorizing the PRPIL pathway affects the educator workforce in Massachusetts or the distribution of full licensed, effective teachers across the state. These comparisons are important for assessing whether teachers advanced through this pathway perform similarly as other teachers in Massachusetts. However, merely offering the PRPIL pathway may change the career decisions of current or prospective teachers. There is very little evidence on how state licensure requirements shape the career choices of prospective teachers, but researchers have found suggestive evidence that testing and other requirements affect the composition of the teacher workforce (Angrist & Guryan, 2008; Larsen, 2015). Thus, an examination of the experiences of only those who complete PRPIL may miss some of the broader effects of the pathway on the teaching profession.

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<sup>4</sup> We also evaluate PRPIL teachers by their value added, although small samples of PRPIL teachers in tested grades and subjects limits the precision and generalizability of the results. We discuss these findings in the main text.

Although PRPIL teachers are more likely than other new entrants to the profession to specialize in and teach in high needs subjects, this descriptive study leaves a number of important questions about how the pathway affects the teacher workforce in Massachusetts:

- **PRPIL teachers are more likely than other teachers on initial or professional licenses to teach in high-need subjects, but this study does not address whether the existence of the PRPIL pathway increases the overall supply of these teachers.** Some may have chosen to enter the profession through other routes, potentially at higher cost, although some may not have. Two key factors to consider are the sensitivity of prospective teachers in high need subject areas to the cost of obtaining licensure and the capacity of other programs to train the teachers currently enrolled in PRPIL. If prospective teachers are not sensitive to cost, or if other programs can expand to enroll PRPIL teachers, then the pathway may not significantly influence the supply of teachers. Otherwise, it is likely that PRPIL has some effect on the supply of teachers.
- **PRPIL teachers work with higher income and higher achieving students, but we do not know whether this reflects a preference of teachers or the resources of schools.** Although it is plausible that the differences in the characteristics of students taught by PRPIL teachers reflect the preferences of individual teachers, it may also be that high income school districts have the resources to offer more advanced coursework and thus hire PRPIL teachers because they are disproportionately licensed in these subject areas. The current distribution of PRPIL teachers may also reflect eligibility restrictions or recruitment choices by the current vendor, and these are likely to change under new regulations.
- **This study focuses on teachers credentialed through PRPIL, but does not consider teachers who may have considered the pathway and dropped out before completing it.** The PRPIL pathway may encourage more teachers to enter the profession. However, teacher attrition from the profession is highest during the first few years in the classroom, and in prior work, we found that it is disproportionately high for teachers who enter with preliminary licenses. It is possible that the PRPIL pathway increases the number of inexperienced teachers in the workforce by encouraging more teachers to enter the profession through the preliminary route. Similarly, PRPIL may encourage some teachers who would have completed an educator preparation program to forego this training and earn initial licensure by PRPIL instead. Either of these possibilities may lower the effectiveness of the teacher workforce in ways that we do not consider in this study. However, given that PRPIL teachers are a relatively small subset of the total teaching profession, it is unlikely that reduced teaching experience has a significant effect on average teacher effectiveness.
- **The current study finds little evidence of differences in the effectiveness of PRPIL teachers and teachers who advance to initial licensure through other routes, but this finding may depend on program features specific to the current vendor.** Currently, there is only one vendor, Class Measures, executing the PRPIL option for candidates. The regulations provide for relative flexibility in terms of how Class Measures operationalizes PRPIL and the results of this study may be sensitive to some of those decisions. In particular, recent research has linked the quality of mentorship during the student

teaching internship to future effectiveness in the workforce (Goldhaber et al., 2016; Ronfeldt 2012, 2015). If teachers accrue some benefit by participating in the PRPIL process, it may be difficult to predict how teachers prepared through other similar pathways sponsored by other providers would fare in the workplace.

Understanding these issues, particularly how the PRPIL pathway affects the overall supply and distribution of teachers, will be important for assessing the effects of potential changes to the licensure regulations. The recent regulatory changes in Massachusetts may provide opportunities to answer some of these questions and assess how the pathway operates in other settings.



# Introduction

The [Performance Review Program for Initial Licensure \(PRPIL\)](#) is a pathway to initial teacher licensure for Massachusetts teachers who did not complete an educator preparation program before entering the classroom. Created in 2003, PRPIL was intended to open teacher licensure opportunities for mid-career individuals with prior work experience or content expertise by allowing them to demonstrate that they offer the same teaching competencies as other pre-professional license teachers, without completing a preparation program.

Most teachers in Massachusetts begin their teaching careers with an initial license: the license offered to candidates who complete a teacher preparation program at an approved institution of higher education (IHE) or alternative program, valid for five years (see Table 1 below for an overview of licensure pathways in Massachusetts). However, about 22 percent of teachers working in Massachusetts schools began teaching on a preliminary<sup>1</sup> license, offered to candidates who pass the state’s Massachusetts Tests for Educator Licensure (MTEL) and meet other eligibility criteria but have not completed a preparation program. The preliminary license is only valid for five years, so in order to continue teaching in Massachusetts public schools, teachers on preliminary licenses must have their license “advanced” to an initial license. Most do so by completing an educator preparation program through an IHE, but teachers can also earn their initial teaching license through PRPIL or by completing an approved educator preparation program through an alternative provider outside an IHE.

**Exhibit 1. Licensure Pathways in Massachusetts**

License Type	Provisions
<b>Initial</b>	<ul style="list-style-type: none"><li>• Candidate has completed an approved preparation program (or alternative, such as PRPIL) and state licensure testing requirements</li><li>• Valid for 5 years</li></ul>
<b>Preliminary</b>	<ul style="list-style-type: none"><li>• Candidate <i>has not</i> completed an approved preparation program</li><li>• Candidate has passed all state licensure testing requirements</li><li>• Candidate has met other requirements as needed for the specific license</li><li>• Valid for 5 years</li></ul>
<b>Temporary</b>	<ul style="list-style-type: none"><li>• Candidate is licensed and has taught in another state for at least 3 years</li><li>• Candidate has not passed all of the state licensure testing requirements</li><li>• Valid for 1 year</li></ul>

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<sup>1</sup> In July 2017, the Massachusetts Board of Elementary and Secondary Education approved numerous changes to the teacher licensure regulations, one of which was changing the name of this type of license from preliminary to provisional. Our data precede this regulatory change, so we refer to preliminary licenses throughout this report.

At the time of the data on which this report was based, PRPIL was only available as a route to licensure for educators teaching in districts that did not offer their own approved preparation programs, and only for teachers in certain subjects and grades.<sup>2</sup> In order to demonstrate their effectiveness as classroom teachers, PRPIL requires teachers to document courses and experience relevant to the Professional Standards for Teachers and complete the Massachusetts Candidate Assessment for Performance (CAP). Unlike other routes to initial licensure, candidates for PRPIL must have worked for three years in their licensure area under a preliminary license in order to be eligible to advance. As part of this route, teachers work with a mentor and instructional consultant to demonstrate their qualifications for an initial license. Following satisfactory completion of these requirements, a teacher candidate is recommended for initial licensure. PRPIL costs less than most other initial licensure programs, at \$2,500 plus any expenses for additional coursework, as needed.

In this study, we examine the credentials of teachers that receive their initial licenses through PRPIL and the characteristics of students they serve. We also study their effectiveness using student achievement data and teacher performance ratings and estimate the costs and benefits to teachers of employing this route to initial licensure versus other alternative options. In a prior report, we considered the effectiveness of teachers from different educator preparation program pathways in Massachusetts (Cowan et al., 2017). This analysis included teachers from teacher of record or apprenticeship programs, such as those offered by the Collaborative for Education Services, Boston Teacher Residency, and Teach for America, where teachers work in the classroom while they complete the requirements for an initial teaching license. We found that teachers completing such programs earned higher teacher performance ratings, but had similar value-added to state tests, than teachers completing traditional, university-based programs. However, the prior analysis did not include teachers who earned initial licensure through PRPIL, as it is not a preparation program, but rather a route to licensure. As we describe below, PRPIL differs substantially from the options considered in the prior report. In this report, we extend the prior analyses and consider teachers earning initial licenses through this option.

## **The Performance Review Program for Initial Licensure**

PRPIL is an alternative licensure route available to teachers already working in Massachusetts public schools. Although there are a number of alternative programs that embed teacher preparation within fulltime classroom teaching, PRPIL was originally intended as an option for teachers working in districts without ready access to these programs. Notably, the pathway is significantly less expensive to candidates than alternative programs. Participation in PRPIL costs \$2,500 plus additional expenses for coursework, compared to up to nearly \$10,000 for popular alternative programs.

The current PRPIL pathway is operated by Class Measures, a vendor for the state. Under the existing procedures, teachers who advance their license through PRPIL must document courses

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<sup>2</sup> The aforementioned regulatory changes also expanded the eligibility for advancing a license through PRPIL. During the time period covered in this study, PRPIL did not advance elementary licenses nor was it available to teachers working in locations with access to other alternative programs for mid-career teachers. These restrictions were removed in July 2017. We list the subject areas covered by PRPIL in the data considered in this study in Appendix A.



and experience relevant to the Professional Standards for Teachers and complete the Massachusetts Candidate Assessment for Performance (CAP), a performance assessment that all candidates completing their initial license undergo as part of their program. However, many of the program's features differ from other options in Massachusetts. Candidates for PRPIL must have worked for three years in their licensure area in order to advance their preliminary license.<sup>3</sup> They also have more choice in satisfying the pedagogical component in the licensure requirements. Although it is not required in the regulatory framework for the PRPIL pathway, Class Measures requires candidates to complete 120 hours of pedagogical training. Candidates can complete this requirement through a combination of professional development and university course work (120 hours is equivalent to about 3 university courses).<sup>4</sup> Candidates therefore have some flexibility in how they complete these prerequisites.

During the program, teachers work with a mentor teacher and instructional consultant to demonstrate their qualification for an initial license. The candidate nominates the mentor and Class Measures, which administers the PRPIL program, recruits the instructional consultant. The yearlong process is similar to the Candidate Assessment of Performance (CAP) that is used in teacher preparation programs.<sup>5</sup> In the PRPIL case, the mentor fills the role of the supervising practitioner, who provides guidance and support on an ongoing basis, and the instructional consultant fills the role of the program supervisor, who coordinates the required assessment activities. As part of the process, the mentor and instructional consultant complete at least four observations of the teacher candidate. After the observations, the candidate completes a portfolio documenting that her practice meets the professional teaching standards. The candidate submits both the summative assessment based on the CAP and the portfolio to Class Measures for review. Following satisfactory completion of these requirements, a teacher candidate is recommended for initial licensure.

In Table 1, we show the number of candidates completing PRPIL and other routes to initial licensure for each year between 2010 and 2015. In the second column, we count the number of candidates in each cohort of PRPIL teachers. In the third column, we count teachers completing alternative programs for initial licensure. These programs include those operated by districts, educational consortia, and charter schools as well as other programs such as Boston Teacher Residency and Teach for America. Not all of these programs are substitutes for teachers considering PRPIL; Boston Teacher Residency, for instance, recruits inexperienced teaching candidates. Finally, in the last column, we count teachers completing other preparation programs leading to initial teaching licenses. This last group of programs, which includes both baccalaureate and post-baccalaureate programs hosted at colleges or universities, is the largest supplier of new teachers in Massachusetts. However, as can be seen in the table, PRPIL has become a common route for advancing preliminary licenses to the initial license. In each of these six years, PRPIL accounts for 5 to 8 percent of the new initial licenses.

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<sup>3</sup> Teachers can begin the process during their third year in the classroom, but cannot advance their license until they complete three years of teaching. The licensure areas offered by PRPIL are listed in Table A.1. The most notable licenses not advanced by PRPIL are elementary education and teachers of students with disabilities.

<sup>4</sup> Class Measures has a partnership with Knowledge Delivery Systems to offer professional development courses to potential candidates.

<sup>5</sup> [Guidelines for PRPIL](#); [Guidelines for the CAP](#)

In four of the six years, more teachers compete PRPIL than all alternative programs combined. The importance of this program as a source of new teachers motivates the current study.

**Table 1. Completions by Program Type and Year**

Year	PRPIL	Alternative Programs	Other Initial Licensure Preparation Programs
2010	342	304	3,990
2011	331	324	4,514
2012	330	349	4,529
2013	301	258	4,526
2014	244	310	4,349
2015	293	279	4,090

*Note:* Authors' calculations based on ELAR and PRPIL completion data. Other alternative programs include those identified as "Apprenticeship," "Teacher of Record," or "Apprenticeship/Teacher of Record." Other initial includes all other programs leading to initial academic teaching licenses.

The objective of this study is to compare the population of teachers credentialed through the PRPIL process and evaluate their effectiveness as classroom teachers. In particular, we address the following research questions:

1. How do the demographic characteristics and teaching credentials of teachers who advance to initial licenses through PRPIL compare to other teachers with initial licenses? To other teachers who advance preliminary licenses?
2. How does the effectiveness of PRPIL teachers compare to other teachers in Massachusetts? To other teachers who advance preliminary licenses?
3. How does the cost of PRPIL to candidates compare to other methods of obtaining initial licensure?

We begin the study by describing the qualifications and characteristics of PRPIL teachers. PRPIL is limited to specific licensure areas, and consequently, PRPIL teachers possess different teaching credentials and work in different types of classrooms than the average teacher in Massachusetts. We then consider the effectiveness of PRPIL graduates relative to other teachers who have advanced to an initial license using both value-added measures of teacher effectiveness and annual performance ratings. Finally, we consider how the cost of the PRPIL compares to other routes into the teaching profession.

## Interpreting the Findings in this Report

In this report, we compare the credentials, teaching experiences, and effectiveness of teachers who earned their initial license by completing PRPIL to teachers who earned their initial licenses through other pathways. Throughout the report, we focus on two sets of comparisons. First, we compare PRPIL teachers to all other teachers with either initial or professional licenses in Massachusetts. We therefore compare teachers recommended for initial licensure through PRPIL to teachers recommended for initial licensure through all other pathways, including teachers who

complete traditional or alternative preparation programs in Massachusetts and those entering from another state. Second, we compare PRPIL teachers to a subset of those with initial or professional licenses: those who advanced a preliminary license to initial licensure. This group includes those who advance through the PRPIL pathway, but also teachers who work in Massachusetts public schools before completing either a traditional or alternative preparation program. Teachers with preliminary licenses can work in public schools while they complete the requirements for initial licensure. As we show in the analysis of PRPIL costs, the potential to work while earning licensure significantly reduces its cost. Teachers with preliminary licenses may therefore have more similar backgrounds to those advanced by the PRPIL pathway than teachers who complete an educator preparation program before working in public schools.

Alternative licensure pathways, such as PRPIL, potentially increase the diversity of teachers entering the teaching profession. These findings shed some light on the effectiveness of PRPIL teachers and the diverse skills they bring to schools, but they do not directly assess how authorizing the PRPIL pathway affects the educator workforce in Massachusetts nor how effective or fully licensed teachers are distributed across the state. Our decision to focus on teachers advanced through PRPIL is consistent with prior work in Massachusetts examining variation in the effectiveness of teachers by their preparation program (Cowan et al., 2017) as well as numerous other studies that assess the relationship between licensure pathways and teacher effectiveness (e.g., Bastian & Henry, 2015; Sass, 2015). In this case, focusing on PRPIL teachers ensures that we examine only the experiences of teachers who have been approved for initial licensure by PRPIL. This comparison is important for assessing whether teachers advanced through this pathway perform similarly as other teachers in Massachusetts. However, merely offering the PRPIL pathway may change who decides to enter the teaching profession with a preliminary license. There is very little evidence on how state licensure requirements shape the career choices of prospective teachers, but researchers have found suggestive evidence that testing and other requirements affect the composition of the teacher workforce (Angrist & Guryan, 2008; Larsen, 2015). Thus, an examination of the experiences of only those who complete PRPIL may miss some of the broader effects of the pathway on the teaching profession.

As we discuss more fully in the section on PRPIL costs below, the PRPIL pathway is less expensive to prospective teachers than other licensure pathways. Expanding and diversifying the potential applicant pool by reducing the costs to earning an initial teaching license is an objective of the pathway. However, teacher attrition from the profession is highest during the first few years in the classroom, especially for teachers on preliminary licenses (Cowan et al., 2017) and many of these new teachers will not persist long enough to earn initial licensure. Because we do not observe teachers' intentions when they first enter the profession, we cannot identify which teachers intended to complete PRPIL when they first earned a preliminary license. The set of teachers we examine in this study – those who successfully earn initial licensure through PRPIL – should therefore be considered a subset of those who may have chosen to enter teaching because the pathway was available. Researchers have generally concluded that attrition from public schools is negatively associated with classroom effectiveness, so those who drop out of the profession before they earn initial licensure are likely less effective, on average, than those who do not (Feng & Sass, 2017; Goldhaber et al., 2011).

Although offering PRPIL may diversify the skills or background of the teaching workforce, it may also affect the choices of teachers who would have entered the profession even in the absence of this pathway. Because it is less costly than other options, some teachers who would have first completed an alternative or traditional educator preparation program may instead choose to begin teaching with a preliminary license before advancing to an initial license through PRPIL. The PRPIL pathway may therefore reduce the amount of pre-service training teachers accumulate before entering the classroom. If they were constant across a teacher's career, then we would observe the effects of decreased pre-service preparation when we compare the effectiveness of PRPIL teachers to those earning initial licenses through other routes. But research on other alternative pathways in Massachusetts suggests these teachers may begin as less effective and later catch up to those completing traditional programs (Papay et al., 2012). Our estimates therefore likely understate the potential for the PRPIL pathway to affect overall teacher effectiveness by influencing teachers' decisions about what preparation to pursue before beginning teaching.

Just as we cannot know which teachers would have entered the profession or earned their initial license in the absence of the PRPIL pathway, we cannot observe the teachers schools would hire without the option of hiring teachers advanced through PRPIL. Thus, readers should be cautious about interpreting differences in the classroom characteristics of PRPIL and non-PRPIL teachers as representing differences in their preferences for working in particular types of schools. As we show below, PRPIL teachers tend to work in schools with higher test scores and fewer low income students. We also show that PRPIL teachers are more likely than other teachers to possess STEM or foreign language licenses. It is plausible that the differences in student characteristics represent the preferences of individual teachers in high demand licensure areas to work in more advantaged schools. On the other hand, high income school districts may have the resources to offer more advanced coursework and hire PRPIL teachers, who are disproportionately licensed in these subject areas, to teach these classes. In many cases, we examine how the characteristics of PRPIL teachers' classrooms compare to other teachers working in similar schools and subject areas, but we caution that this alone cannot disentangle the preferences of individual teachers from the preferences of schools (Boyd et al., 2013). Nor do these findings necessarily indicate how the PRPIL pathway affects the likelihood that particular schools can hire teachers in high needs areas.

## **Data and Sample**

In this study, we use data from Class Measures and several administrative databases maintained by the Massachusetts Department of Elementary and Secondary Education (ESE). Using these datasets, we construct three samples of Massachusetts teachers. Because we want to take the broadest possible look at the characteristics of PRPIL teachers, the first sample includes all teachers working in core subject teaching assignments in Massachusetts public schools. Using the course scheduling data for students and teachers, we match teachers to their assigned students between 2011 and 2015. Observations are at the teacher-course level, so teachers will appear in the data multiple times in a given year if they teach multiple courses. The course schedule information contains information on the subject area and grade level of the course. We use the student data to measure students' average achievement in prior years, student race/ethnicity, economic disadvantage, participation in English language learner (ELL) programs, learning

disabilities, and class size.<sup>6</sup> We use this sample to provide descriptive statistics on PRPIL participants and other teachers in Massachusetts.

We next limit the sample to teachers in 2014 and 2015 who are evaluated under the Massachusetts educator evaluation framework. Teachers are rated on a four-point scale (unsatisfactory, needs improvement, proficient, exemplary) on each of four teaching standards and overall; we describe the evaluation process in more detail below. The full evaluation cycle can last multiple years, and teachers receive an interim formative assessment during intervening periods. We use the overall rating on both the formative and summative evaluations to maximize the number of observations. We match the evaluation results to the classroom-level data described above. The evaluation dataset contains 49,040 unique teachers, 1,247 of whom completed PRPIL.

Finally, in order to estimate value-added models of teacher effectiveness, we retain math and ELA classrooms in grades 4 through 8. In order to ensure that teachers are responsible for the students assigned to them in the course schedule data, we limit the sample to students with only one math or ELA teacher per year. The full sample of value-added data contains 12,638 math teachers and 12,838 ELA teachers. Of these, 151 math and 93 ELA teachers are PRPIL teachers.

We link these datasets to information on teacher licensure in order to classify teachers' entry into the profession. We use data provided by Class Measures to link PRPIL teachers to state licensure records. For candidates in recent years, Class Measures provided license numbers to facilitate matching to the licensure data. For records with licensure numbers, we require that either the first or last name of the candidate match the corresponding record in the licensure dataset; not all records met this requirement. For records without licensure numbers, we match candidates by full name to the licensure dataset so long as only one Massachusetts educator ID was linked to the name. In both cases, we adjust matches to account for nicknames and the inclusion of maiden names in last names. Altogether, we successfully match 90.5% of the candidates provided by Class Measures between 2006 and 2015.

We then identify PRPIL teachers as those who completed the program and earned initial licensure in the Massachusetts licensure database. Throughout this study, we define PRPIL teachers as those who have previously earned initial licensure through PRPIL. Because the focus of this study is on the effectiveness and teaching experiences of those teachers who have successfully completed the PRPIL pathway, we only consider teachers as representing PRPIL after they have earned initial licensure. Throughout the study, we compare the characteristics and effectiveness of PRPIL teachers to other teachers based on their licensure status. We make two distinctions about teachers' licensure status. First, because PRPIL teachers typically enter the profession with a preliminary license, we classify teachers in the sample based on whether their *first* license earned in Massachusetts is of the preliminary type. Analyses that use this classification therefore compare the characteristics or effectiveness of PRPIL teachers to other teachers who entered on preliminary licenses and have later advanced their license. Second, because completing PRPIL confers initial licensure status, we also compare PRPIL teachers to

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<sup>6</sup> We use achievement in math and ELA on the MCAS from the prior year as our baseline achievement measure. For students in 9<sup>th</sup> and 10<sup>th</sup> grade, we use the 8<sup>th</sup> grade test score; for students in 11<sup>th</sup> and 12<sup>th</sup> grade, we use the 10<sup>th</sup> grade test score.

all other teachers who have earned an initial or professional license (regardless of their first license type).

## Descriptive Analysis of PRPIL Teachers

We begin by describing the characteristics, credentials, and teaching assignments of PRPIL teachers. As the PRPIL pathway has historically provided teachers working in specific grades and subjects an opportunity to earn an initial license, we first focus on how their teaching credentials differ from other teachers with initial or professional licenses in Massachusetts. PRPIL teachers generally earn similar credentials as other teachers entering the profession with preliminary licenses, but there are a few subject areas where PRPIL is especially common.

### Credentials and Characteristics of PRPIL Teachers

Licensure options that do not require teachers to first complete an educator preparation program may increase the likelihood that non-traditional teaching candidates enter the profession. In this study, we focus on licensure area (content area and academic level) and teacher demographics (gender and race/ethnicity); however we caution that these descriptive results do not necessarily imply that the presence of such pathways *causes* non-traditional teaching candidate to enter the profession. We then make several comparisons of PRPIL teachers to other teachers working in Massachusetts public schools. The simplest approach is to examine mean characteristics of teachers who earn initial licensure through the PRPIL pathway to other teachers. We present these summary statistics in Table 2, which compare the demographics and teaching credentials of PRPIL teachers to other teachers. We compare PRPIL teachers to two other groups: all other teachers who have advanced to an initial license (regardless of their first license type), and all other teachers who began teaching on a preliminary license. We estimate all means at the teacher-year level, so each teacher may contribute multiple observations.

In the first column, we display the characteristics of all teachers with either an initial or professional license working in Massachusetts schools between 2011 and 2015. Recall that our group of PRPIL teachers (those who have previously advanced their licenses) is a subset of the group in column 1. In column 2, to compare the characteristics of PRPIL teachers to others who enter without previously completing an educator preparation program, we restrict the sample to teachers who entered the profession with a preliminary license but who currently possess either an initial or professional license. Finally, in column 3, we display the characteristics of teachers who have advanced via the PRPIL pathway.<sup>7</sup>

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<sup>7</sup> Generally, PRPIL completers enter the profession with a preliminary license and use the program to graduate to an initial license. In our sample, there are two teachers who possessed an initial teaching license before participating in PRPIL.

**Table 2. Characteristics and Credentials of PRPIL Teachers**

	(1)	(2)	(3)
	All Initial/Professional	First License is Preliminary	PRPIL Teachers
<b>Asian</b>	<b>1.1</b>	<b>1.5</b>	<b>1.3</b>
<b>African American</b>	<b>2.2</b>	<b>2.6</b>	<b>1.1</b>
<b>Hispanic</b>	<b>2.0</b>	<b>3.1</b>	<b>3.7</b>
<b>Male</b>	<b>22.7</b>	<b>36.2</b>	<b>47.1</b>
<b>Holds Foreign Language License</b>	<b>4.6</b>	<b>8.3</b>	<b>13.3</b>
<b>Holds Art License</b>	<b>9.5</b>	<b>8.5</b>	<b>11.3</b>
<b>Holds Reading/ELA License</b>	<b>12.8</b>	<b>16.9</b>	<b>14.9</b>
<b>Holds History License</b>	<b>6.5</b>	<b>11.8</b>	<b>9.6</b>
<b>Holds Math License</b>	<b>9.7</b>	<b>20.3</b>	<b>22.9</b>
<b>Holds Science License</b>	<b>7.7</b>	<b>15.7</b>	<b>18.8</b>
<b>Holds Elementary Ed. License</b>	<b>38.0</b>	<b>15.0</b>	<b>1.5</b>
<b>Holds ELL License</b>	<b>4.7</b>	<b>6.0</b>	<b>2.8</b>
<b>Holds Special Education License</b>	<b>16.2</b>	<b>14.1</b>	<b>0.7</b>
<b>Holds Shortage Area License</b>	<b>42.1</b>	<b>68.1</b>	<b>66.7</b>
<b>Holds Elementary Level License</b>	<b>63.9</b>	<b>37.0</b>	<b>25.2</b>
<b>Holds Middle School Level License</b>	<b>69.9</b>	<b>91.4</b>	<b>99.8</b>
<b>Holds High School Level License</b>	<b>49.1</b>	<b>76.6</b>	<b>89.1</b>
<b>N</b>	<b>282,519</b>	<b>36,657</b>	<b>5,973</b>

Notes: Observations are at the teacher-year level. All initial/professional indicates all teachers in teaching positions who currently possess either an initial or professional license. The “first license is preliminary” group (column 2) includes teachers with initial licenses whose first Massachusetts teaching license was of the preliminary type. The “PRPIL teachers” group (column 3) includes teachers who have advanced to initial licensure through PRPIL.

Demographically, PRPIL teachers differ from teachers entering through traditional and preliminary routes. Comparing columns 1 and 3, PRPIL teachers are more likely than other teachers on initial or professional licenses to be Hispanic (3.7 percent compared to 2.0 percent) or male (47.1 percent compared to 22.7 percent). Although these differences partially reflect general differences between teachers who enter the profession with preliminary licenses and those who enter with initial licenses, PRPIL teachers also differ from others entering with preliminary licenses. PRPIL teachers are less likely than other teachers who enter with preliminary licenses to be African American (1.1 percent compared to 2.6 percent) and slightly less likely to be Asian (1.3 percent compared to 1.5 percent).

Teachers who advance their license to initial through the PRPIL pathway also have significantly different license types than other teachers with initial or professional licenses. During the period we study, the PRPIL pathway was limited to particular license types and teachers who entered with preliminary licenses were more likely than other teachers to earn licenses in specialized content areas. Perhaps most notably, PRPIL did not offer an elementary education program during this period, and therefore very few of the PRPIL teachers possess this license. Among all

teachers working in Massachusetts schools, about 35 percent hold an elementary education license and about 60 percent hold a license covering elementary grades. By contrast, only about 2 percent of PRPIL teachers hold an elementary license and only 25 percent hold a license covering elementary grades. Relative to other teachers with initial or professional licenses, PRPIL teachers are also much more likely to hold content area licenses in STEM and foreign language fields. About 23 percent of PRPIL teachers hold a math license and 19 percent hold a science license, compared to only 10 percent and 8 percent, respectively, among all teachers. Similarly, 13 percent of PRPIL teachers have a foreign language license, compared to only 5 percent among all teachers. Overall, 67 percent of PRPIL teachers hold a shortage area license, compared to only 44 percent of all teachers.<sup>8</sup> The licensure patterns of PRPIL teachers are more similar to other teachers who enter with preliminary licenses. Preliminary teachers are also much more likely to possess shortage area licenses, such as math and science.

We might expect the license areas of PRPIL teachers to more closely reflect the broader pool of teachers who advance preliminary licenses. And although we generally do find that PRPIL teachers are more similar to other teachers entering with preliminary licenses, there are some interesting differences in which types of teachers elect to advance their licenses via PRPIL. Unsurprisingly, given the lack of a PRPIL option at the elementary level, the 1.5 percent of PRPIL teachers with an elementary education license is much smaller than the 15 percent among all teachers entering with a preliminary license. But, while similar proportions of PRPIL teachers and other preliminary teachers possess shortage area licenses (67 percent and 68 percent, respectively), the exact licensure areas differ. Among teachers entering with preliminary licenses, the PRPIL pathway is especially popular among teachers with foreign language, art, and science licenses.

Because PRPIL teachers are not evenly distributed throughout the state or across grade levels, the statewide comparisons in Table 2 may miss ways in which PRPIL teachers differ from their closest colleagues. For instance, middle schools likely hire more teachers with teaching licenses in specific content areas than elementary schools. Because PRPIL teachers are significantly more likely to have middle school level licenses, we should expect their credentials to differ from the average teacher in Massachusetts. To compare PRPIL teachers to others working in similar environments, we more formally test for differences between PRPIL teachers and others using regression analysis. By including controls for district and school, we can compare PRPIL teachers to others working in the same districts and at the same school levels. Similarly, we include controls for experience and first license type to compare PRPIL teachers to other teachers entering the teaching profession through the same pathway.

We present the results of these adjusted comparisons in Table 3. The coefficients in Table 3 below answer a simple question: Compared to other teachers in Massachusetts with similar characteristics, how do PRPIL teachers differ in terms of observed characteristics? Depending on the set of control variables, the comparison group differs. In the top row of Table 3, we identify the group of teachers that PRPIL teachers are being compared to. In column 1, we omit all controls and the coefficient represents the difference between columns 1 and 3 in Table 2. The

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<sup>8</sup> We use the shortage areas reported to the U.S. Department of Education Office of Postsecondary Education for student financial aid programs (Cross, 2016). The list varies by year, but generally includes English as a Second Language, English/Language Arts, Mathematics, Foreign Languages, Science, and Special Education.



next columns represent successively more restrictive comparisons: between PRPIL teachers and other teachers with initial or professional licenses in the same district (column 2); between PRPIL teachers and others in the same school (column 3); and finally between PRPIL teachers and others with the same experience and first license type (column 4).

**Table 3. Additional Comparisons of PRPIL Teacher Characteristics**

	(1)	(2)	(3)	(4)
Comparison group:	All teachers	Same district	Same school	Same school, experience, & licensure pathway
Asian teacher	0.1 (0.3)	0.3** (0.1)	0.1 (0.1)	0.0 (0.3)
African American teacher	-1.1*** (0.3)	-0.2 (0.2)	-0.3 (0.2)	-0.4 (0.3)
Hispanic teacher	1.7*** (0.5)	2.2*** (0.2)	1.9*** (0.2)	1.3*** (0.5)
Male teacher	24.9*** (1.4)	23.7*** (0.5)	15.1*** (0.5)	9.2*** (1.6)
Foreign language license	8.9*** (0.9)	8.6*** (0.3)	5.9*** (0.3)	4.5*** (0.9)
Art license	1.9 (1.3)	1.7*** (0.4)	2.2*** (0.4)	3.2** (1.2)
Math license	13.4*** (1.1)	12.6*** (0.4)	7.9*** (0.4)	1.4 (1.2)
Science license	11.3*** (1.0)	10.6*** (0.3)	6.4*** (0.3)	1.7 (1.1)
Shortage area license	24.7*** (1.5)	23.4*** (0.6)	9.2*** (0.6)	-5.0*** (1.4)
N	315,436	315,436	315,436	315,436
Regression includes:				
<i>District Fixed Effects</i>	N	Y	N	N
<i>School Fixed Effects</i>	N	N	Y	Y
<i>Experience Indicators</i>	N	N	N	Y
<i>Indicator for First License Type</i>	N	N	N	Y

*Notes:* Estimated coefficients from regressions of teacher credentials and characteristics on indicators for whether the teacher has advanced by PRPIL. Each cell reports the coefficient from a separate regression. Regressions additionally include variables listed in the bottom of the table. The indicator for first license type indicates whether a teacher's first license was of the preliminary type. Dichotomous variables are expressed as percentages. Observations are at the teacher-year level and licenses are indicated if active in that year. Estimated standard errors clustered by teacher in parentheses.

\* p< 0.10, \*\* p<0.05, \*\*\* p<0.01.

In the first several rows, we again compare the demographic characteristics of PRPIL teachers to others working in Massachusetts. *We find that the representation of Hispanic and Asian teachers within the PRPIL pathway is similar regardless of whether we compare them to all other teachers in Massachusetts or to others working in the same geographic areas. However, much of the underrepresentation of African American teachers in the PRPIL pathway can be explained by how PRPIL teachers were distributed across the state.* Although we found that PRPIL teachers were only about half as likely as other teachers to be African American, this difference almost completely disappears when we compare PRPIL teachers only to others working in the same school or district. Compared to other teachers in the same district, PRPIL teachers are not statistically significantly less likely to be African American. Similarly, about one third of the difference in the proportion of male teachers can be explained by differences in how they are distributed across grade levels.

We next reconsider the license types of PRPIL teachers in light of the differences in school grade level between PRPIL and non-PRPIL teachers and the different specialization patterns of teachers entering with preliminary licenses. In this case, the comparisons in columns 3, which adjust for differences in license field by school, and 4, which adjust for differences by license pathway and experience, are informative. As before, we find that PRPIL teachers are more likely to have foreign language or arts licenses. These differences are statistically significant when we limit comparisons to other teachers in the same school or with the same licensure pathway. However, schools and license pathway explain about half of the difference in the foreign language license rate. *On the other hand, much of the differential emphasis of PRPIL teachers on STEM fields is driven by school level or licensure pathway. PRPIL teachers are not more likely than other teachers in the same school who entered the profession on a preliminary license and who have similar levels of experience to possess either math or science licenses, and they are actually less likely to possess shortage area licenses overall.*

The findings in Tables 2 and 3 do suggest that a somewhat different set of teachers elect to advance their license through PRPIL than through other non-traditional routes to initial licensure. For the high-demand shortage and STEM fields, much of this difference can be explained by the types of schools in which PRPIL teachers work. However, we caution against interpreting differences in license areas and teacher demographics as effects of the PRPIL pathway on teacher supply. We do not observe how (or whether) teachers would have advanced their preliminary licenses in the absence of the PRPIL pathway, and thus our descriptive analysis provides little guidance about their likely career decisions if this pathway did not exist.

## **Classroom Assignments of PRPIL Teachers**

Having shown that PRPIL teachers possess different subject area licenses than other teachers with initial or professional licenses, we now turn to an analysis of their teaching. We begin our descriptive analysis of PRPIL teachers' work environments by tabulating the assignments of PRPIL teachers. Using data on all core subject teaching assignments in Massachusetts between 2011 and 2015, we show the percentage of classes overall and in each subject taught by PRPIL teachers in Table 4. We also list the percentage of classes taught by teachers who have previously advanced a preliminary license (row 2) as well as all teachers with initial or professional licenses (row 3). In Panel A, we look at all classrooms in Massachusetts. Overall, PRPIL teachers are a relatively small portion of the Massachusetts teacher workforce. About 1.7

percent of all classrooms are taught by teachers who have advanced their license via PRPIL. This is about 16 percent of all classrooms taught by a teacher who has advanced a preliminary license.

**Table 4. Course Assignments by Pathway, Subject, and Grade Level**

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	All	Foreign Lang.	Art	ELA/ Reading	Social Studies	Math	Science
<b>Panel A. All Classrooms</b>							
PRPIL	1.7	5.0	2.1	1.2	1.1	2.3	2.0
Adv. Prelim.	10.6	16.9	9.4	10.1	9.4	13.8	12.2
Initial	91.4	80.6	91.1	92.9	93.5	89.4	89.4
N	513,772	29,075	59,375	121,352	73,103	96,622	70,749
<b>Panel B. Elementary Level Classrooms</b>							
PRPIL	0.4	3.3	1.8	0.2	0.1	0.5	0.2
Adv. Prelim.	6.1	12.0	8.9	5.9	5.6	7.1	5.4
Initial	95.0	79.1	91.9	95.6	96.2	94.3	95.5
N	317,761	5,073	41,061	73,901	43,265	50,717	40,764
<b>Panel C. Middle School Level Classrooms</b>							
PRPIL	1.9	3.0	2.0	1.2	1.4	2.6	2.4
Adv. Prelim.	15.6	17.2	10.1	14.1	13.6	19.0	18.7
Initial	83.6	71.4	87.5	86.0	85.3	81.4	80.8
N	31,254	1,387	3,277	9,733	4,610	7,146	4,589
<b>Panel D. High School Classrooms</b>							
PRPIL	4.0	5.5	2.8	3.2	2.6	4.8	5.0
Adv. Prelim.	18.2	18.0	10.4	17.2	15.3	21.7	22.0
Initial	86.0	81.5	89.6	89.5	90.3	84.4	81.1
N	164,757	22,615	15,037	37,718	25,228	38,759	25,396

*Notes:* The observations are at the teacher-class-section-school-year level. *Adv. Prelim.* teachers are those who have advanced to an initial license, but whose first teaching license was a preliminary license (including PRPIL teachers). *PRPIL* teachers are those who have advanced to initial licensure through PRPIL. *Initial* teachers include those who have earned initial licenses through some other route (including those with professional licenses). Subject area is defined using the state course codes. Classifications exclude non-core subjects and Chapter 74-Approved Vocational Technical Education courses.

However, PRPIL teachers are better represented in some specific subject and grade level areas.<sup>9</sup> This frequently matches the distribution of the licenses shown in the previous section. In Panel

<sup>9</sup> We use the assignment coding in the EPIMS database. At the elementary level, some districts code self-contained elementary classrooms as a single “all subjects” class, while others code separate sections with different subjects. We use the district coding scheme in this analysis. The school level code is a characteristic of the class to which a particular teacher is assigned and does not necessarily reflect the grade level of the students. The elementary classrooms are predominantly for students in grades 1 through 6; middle school classrooms are for students in grades 7 through 8; and high school classrooms are typically for students in grades 9 through 12.

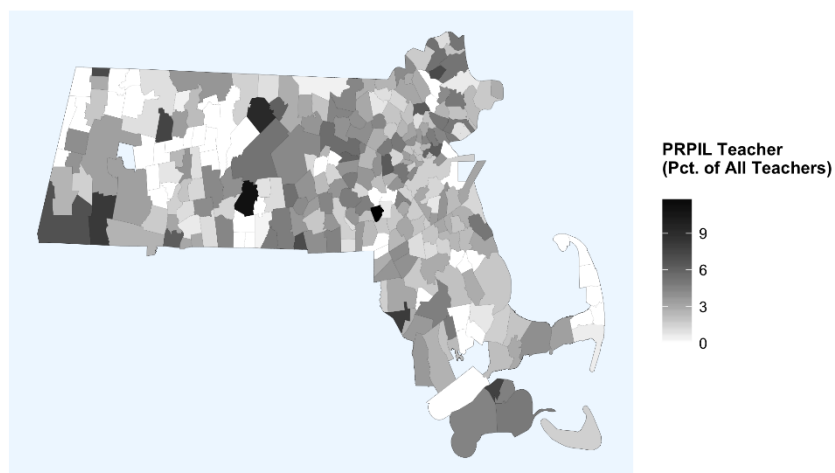
B, we show the assignments of elementary teachers. Given that PRPIL did not advance elementary education licenses during the period we study, only 0.4 percent of elementary classrooms are taught by PRPIL teachers. By contrast, PRPIL teachers are better represented at the middle school and, especially, high school levels. Teachers who have advanced through PRPIL lead 1.9 percent of middle school classrooms and 4.0 percent of high school classrooms. At the high school level, PRPIL teachers are responsible for 22 percent of all classrooms taught by teachers with advanced preliminary licenses.

The distribution of courses is also consistent with the licensure areas frequently advanced through PRPIL. Overall, PRPIL teachers lead 5.0 percent of foreign language classes, 2.1 percent of art classes, 2.3 percent of math classes, and 2.0 percent of science classes. *These numbers are even larger at the high school level: PRPIL teachers staff 4.8 and 5.0 percent of high school math and science courses, respectively.* As the comparisons of licenses advanced through PRPIL to other advanced preliminary licenses would indicate, part of these staffing patterns reflect where teachers from preliminary pathways are most likely to teach. *At the high school level, 18.2 percent of all classrooms, and more than 20 percent of math and science classrooms, are led by teachers with advanced preliminary licenses.*

## Classroom Characteristics of PRPIL Teachers

The PRPIL program provides an initial licensure option for districts without access to other alternative programs that serve midcareer teachers. Because some of these programs serve specific geographical areas, PRPIL teachers may not be distributed uniformly across the state. Any geographical clustering could influence the types of students PRPIL teachers serve. We therefore plot the distribution of PRPIL teachers across the state between 2011 and 2015 in Figure 1. Overall, PRPIL teachers are about 2 percent of the teacher workforce, although they are significantly better represented in some school districts. They are more common in the central, northeastern, and southwestern regions of the state. Districts in the northwestern and southeastern regions tend to have fewer PRPIL teachers.

**Figure 1. PRPIL Teachers by District, 2011-2015**



*Notes:* Map shows teachers by district for 2011-2015. Shading indicates PRPIL teachers as a percentage of all teachers working in the district.

As we showed above, PRPIL teachers also differ in the subject and grade level of their licenses and classroom assignments. These differences also suggest that they serve different populations of students. To assess differences in student characteristics, we regress a teacher’s classroom characteristics on an indicator for whether she advanced through PRPIL teacher, and in some specifications, additional controls for school or classroom context. These additional controls include adjustments for the specific teaching assignment. PRPIL teachers are more likely to earn licensure in particular subject areas and grade levels, and these adjustments ensure that comparisons are made to other teachers working in the same subject and grade level.

The results of this analysis are in Table 5. As before, we call out the comparison group for each model in the first row of the table. Reading across the rows, we can investigate sources for the differences in classroom characteristics between PRPIL and non-PRPIL teachers. We compare PRPIL teachers to all other teachers with initial or professional licenses in column 1; to all other teachers working in the same district (column 2) or school (column 3); to all teachers in the same school, subject, and grade level (column 4); and to teachers in the same school, assignment type, and licensure pathway (column 5). As we describe below, many of the most striking differences in the classroom composition of PRPIL and non-PRPIL teachers are driven by the districts in which they work.

In the first two rows, we show that PRPIL teachers work with higher achieving students than other teachers with initial or professional licenses. Overall, students of PRPIL teachers scored about 0.12 to 0.14 standard deviations higher on prior achievement tests.<sup>10</sup> Comparing the “all teachers” and “same district” columns, we see that about half of this difference is explained by the fact that PRPIL teachers work in school districts with higher student achievement. *Even within schools, however, PRPIL teachers are more likely to teach higher achieving students than their colleagues (column 3).* Looking at the column that controls for course assignments, about half of this within school gap is explained by the fact that PRPIL teachers are more likely to work in subjects, such as arts and foreign language, with high achieving students. Overall, differences in teachers’ subject and grade level assignments within schools explain about 17 to 18 percent of the gap between PRPIL and non-PRPIL teachers in baseline student achievement.

The next row indicates that PRPIL teachers also work with higher income students than other teachers in Massachusetts. In classrooms taught by PRPIL teachers, the economic disadvantage rate is about 8 percentage points lower. As is the case with student achievement, much of this difference – more than three quarters – can be explained by the sorting of PRPIL teachers across school districts. The sorting of teachers across schools within a district explains much of the rest of the gap. Although estimates of differences in poverty rates between students of PRPIL and non-PRPIL teachers working in the same school (columns 3 to 5) are statistically significant, they represent less than 10 percent of the overall gap. In the remaining rows, we consider other student characteristics. Again, sorting of PRPIL teachers across districts tends to be the dominant source of differences in student characteristics. PRPIL teachers have fewer African American and Hispanic students, and in each case, at least 80 percent of the difference can be explained by sorting across districts.

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<sup>10</sup> We use prior achievement tests because differences in current achievement may be driven by differences in the effectiveness of PRPIL and non-PRPIL teachers.



**Table 5. Classroom Characteristics of PRPIL Teachers**

	(1)	(2)	(3)	(4)	(5)
Comparison group:	All teachers	Same district	Same school	Same school & assignment	Same school, assignment, experience & licensure pathway
Baseline math test	0.124*** (0.015)	0.063*** (0.009)	0.045*** (0.009)	0.024*** (0.009)	0.031*** (0.009)
Baseline ELA test	0.137*** (0.015)	0.069*** (0.009)	0.052*** (0.008)	0.027*** (0.008)	0.032*** (0.008)
Econ. disadvantaged students	-7.779*** (0.867)	-1.856*** (0.256)	-0.726*** (0.173)	-0.429** (0.169)	-0.486*** (0.183)
English language learner students	-3.821*** (0.357)	-1.836*** (0.255)	-0.368* (0.192)	-0.163 (0.146)	-0.262 (0.175)
Learning disabled students	-3.243*** (0.281)	-3.345*** (0.247)	-2.313*** (0.241)	-1.096*** (0.222)	-0.891*** (0.243)
Male students	-0.610** (0.240)	-0.623*** (0.227)	0.093 (0.219)	0.346 (0.212)	0.302 (0.221)
Asian students	-0.142 (0.311)	0.124 (0.178)	0.397** (0.164)	0.324** (0.160)	0.439*** (0.167)
African American students	-2.922*** (0.263)	-0.092 (0.104)	-0.239*** (0.074)	-0.220*** (0.074)	-0.169** (0.085)
Hispanic students	-4.007*** (0.608)	-0.695*** (0.212)	-0.239* (0.125)	-0.136 (0.123)	-0.258* (0.135)
Regression Includes:					
<i>District Fixed Effects</i>	N	Y	N	N	N
<i>School Fixed Effects</i>	N	N	Y	Y	Y
<i>Assignment Fixed Effects</i>	N	N	N	Y	Y
<i>Experience Indicators</i>	N	N	N	N	Y
<i>Indicator for First License Type</i>	N	N	N	N	Y

Notes: Estimated coefficients from regressions of mean classroom characteristics on indicators for whether the teacher completed PRPIL. The observations are at the teacher-course-school-year level. Sample includes all teachers with initial or professional licenses in the current year. Number of observations: lagged math test (287,679), lagged reading test (287,460), all others (469,633). Estimated standard errors clustered by teacher in parentheses. Regressions are weighted by student enrollment in each class.

\* p< 0.10, \*\* p<0.05, \*\*\* p<0.01.

# The Effectiveness of PRPIL Teachers

We assess the effectiveness of PRPIL teachers using two measures of teacher effectiveness: value-added to state standardized tests in math and ELA and performance ratings under the educator evaluation framework. Neither measure fully captures all important teaching skills, but prior research has documented their importance for a variety of student and school outcomes. For instance, teacher value-added measures predict student achievement over the course of a teacher’s career and student outcomes long after they leave the classroom (Chetty et al., 2014b; Goldhaber & Hansen, 2013). Qualitative assessments of teaching practice, such as the observations and evaluations used in the educator evaluation framework, predict student learning gains and professional judgments of a variety of diverse teaching skills (Harris & Sass, 2014; Jacob & Lefgren, 2008; Kane et al., 2011).

## PRPIL Teachers and Student Achievement

We use value-added techniques to estimate the ability of PRPIL teachers to improve student test scores. There is a lengthy literature on specifying value-added models for the evaluation of the relationship between teacher characteristics and student learning. We use standard specifications of the value-added models that include prior test scores, student, class, and school characteristics, and teacher experience that have been shown to provide relatively unbiased predictions of student achievement gains in experimental and quasi-experimental settings (Bacher-Hicks et al., 2017; Chetty et al., 2014a; Koedel et al., 2015):

$$Y_{ijt} = X_{ijt}\gamma + \text{PRPIL}_j\beta + \epsilon_{it}. \quad (1)$$

We estimate Eq. (1) using the full sample of teachers so that  $\beta$  indicates the effect of PRPIL teachers on student test scores relative to all other teachers with the same level of experience. In order to compare PRPIL teachers to other teachers that enter the profession with preliminary licenses, we also add an indicator for initial license route and current licensure status to some specifications. In this case, the comparison group is other teachers currently on initial licenses who entered the profession on preliminary licenses and who have the same level of experience, rather than all teachers in Massachusetts.

One major limitation of the value-added analysis is that the annual student achievement measures are available only for students in grades 4-8 in math and ELA. As shown in the analyses of course assignments above, this covers a significant portion of the overall population of teachers in Massachusetts. But PRPIL teachers are disproportionately found in subjects, such as foreign languages and science, without annual testing. The value-added analysis may therefore provide limited information about the overall performance of PRPIL teachers. We therefore caution that these analyses should only be interpreted as reflecting the performance of elementary and middle school math and ELA PRPIL teachers and not all PRPIL teachers in Massachusetts. In the following section, we use performance ratings data to assess the effectiveness of PRPIL teachers working in other roles.

An additional concern with the specification in Eq. (1) is that PRPIL teachers may be disproportionately represented in schools that differ in unobserved ways from schools that hire few PRPIL teachers. For instance, PRPIL teachers are more likely to work in schools that



perform better on the state accountability program. Thus, the PRPIL effects we estimate may partially reflect the performance of the schools PRPIL teachers work in, such as differences in school resources or leadership, rather than their performance as individual teachers. In order to control for such differences, we make two additions to our baseline models. First, we estimate models that add school fixed effects. These control for unobserved factors of schools – such as funding or leadership – that affect all students equally. In this case, the coefficient  $\beta$  represents the difference in test score gains between students assigned to PRPIL teachers and those assigned to other teachers in the same school. This approach has been used in prior studies of teacher preparation where the non-random matching of teachers to schools may be a concern (Mihaly et al., 2013; Glazerman et al., 2006).

Second, we replace the controls for prior-year test scores in Eq. (1) with student fixed effects. The classroom analysis above suggests that PRPIL teachers may work in more advanced classrooms. The tracking of students to advanced classes may pose problems if these students would otherwise have larger test score gains. Some prior research at the middle school level suggests this may be a concern in the estimation of teacher value-added (Protik et al., 2013). The student fixed effects models solve this selection problem in much the same way that the school fixed effects models solve the problem of unobservable school characteristics. Specifically, we estimate the effects of PRPIL teachers by comparing student achievement during years in which students are assigned PRPIL teachers to years in which the same students are assigned other teachers in the school.<sup>11</sup>

Although these models should provide some protection against the non-random sorting of PRPIL teachers to schools and classrooms, this assurance does come at some cost. By comparing achievement gains of students assigned to PRPIL teachers only to other teachers in the same school, school and student fixed effects models may understate true differences in teacher effectiveness between PRPIL and non-PRPIL teachers. Extending the above hypothetical, schools that hire more PRPIL teachers may have more effective teachers on average than other schools. If this were the case, then the comparison group of teachers in the school fixed effects models—other teachers working in schools with PRPIL teachers—is more effective than the entire pool of Massachusetts teachers. Thus, the implicit comparison in school fixed effects models would not describe the expected difference in test scores between a student assigned a PRPIL teacher and one assigned an “average” teacher. But the comparison may nonetheless be more informative of the policy importance of the PRPIL. One objective of the current study is to understand the implications of the PRPIL option for the teacher applicant pool. Comparing PRPIL teachers to other teachers actually hired by a particular school system should therefore provide a better estimate of how PRPIL teachers compare to other teachers a school system might have plausibly hired.

We present the results for math in Panel A of Table 6. PRPIL teachers appear to be similarly effective as other Massachusetts teachers who possess initial licenses (columns 1-3). The point estimates are negative without adjustments for teachers’ first license type, and somewhat

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<sup>11</sup> Because student fixed effects models implicitly compare student achievement in years where students are assigned PRPIL teachers to years in which they are assigned non-PRPIL teachers, the precision of the estimates depends on the number of years of student data available. Thus, using data from earlier grades provides more precisely estimated effects even though PRPIL teachers rarely teach in elementary classrooms. However, the results (not shown) are similar when we restrict the sample to middle school classrooms only.

imprecisely estimated, but are not statistically significant. For models with student fixed effects, which are the most conservative estimates, the point estimate of -0.013 deviations corresponds to about one additional week of learning (Bloom et al., 2008); however, we cannot rule out either positive effects of PRPIL teachers or more negative effects. In addition, we find little difference in value-added between PRPIL teachers with an initial license and others who have advanced from a preliminary license (columns 4-6). In the most conservative estimates, we find a difference of only 0.001 standard deviations, or less than an additional day of instruction.

**Table 6. PRPIL Teacher Math Value-added**

	(1)	(2)	(3)	(4)	(5)	(6)
Comparison group:	All teachers	Same school	Other teachers taught by same students	Same licensure pathway	Same school & pathway	Other teachers taught by same students & same pathway
<b>Panel A. Math Value-added</b>						
PRPIL teacher	-0.016 (0.013)	-0.001 (0.012)	-0.013 (0.012)	-0.006 (0.014)	0.007 (0.012)	-0.001 (0.013)
N	1,401,583	1,401,583	1,415,201	1,401,583	1,401,583	1,415,201
<b>Panel B. ELA Value-added</b>						
PRPIL teacher	0.007 (0.016)	0.016 (0.015)	-0.018 (0.017)	0.011 (0.016)	0.016 (0.015)	-0.004 (0.018)
N	1,317,977	1,317,977	1,330,292	1,317,977	1,317,977	1,330,292
Regression includes:						
<i>School Fixed Effects</i>	N	Y	N	N	Y	N
<i>Student Fixed Effects</i>	N	N	Y	N	N	Y
<i>Indicator for First License Type</i>	N	N	N	Y	Y	Y

*Notes:* Value-added analysis of PRPIL teachers in grades 4-8. Observations are at the student level. All models include classroom and school average lagged achievement, race/ethnic composition, economic disadvantage, participation in ELL, and learning disability status, and an indicator for whether the teacher currently has an initial or professional license. Models in columns 1-2 and 4-5 additionally include cubic polynomials of students' lagged achievement in math and ELA and the individual student characteristics described above. Standard errors clustered by teacher in parentheses.

\* p < 0.10, \*\* p < 0.05, \*\*\* p < 0.01.

In Panel B of Table 6, we repeat the analysis with ELA achievement. As before, we do not find that PRPIL teachers are less effective than other teachers with initial licenses in Massachusetts. Comparing PRPIL teachers to all other teachers, we estimate average differences in student achievement that range from 0.016 to -0.018, but none of these differences is statistically significant. Nor do we find that PRPIL teachers are differently effective than other teachers on preliminary licenses.

The lack of precision in the student achievement comparisons is driven by the relatively small number of PRPIL teachers working in tested grades and subjects. Most of the PRPIL teachers either work in high schools, which are not included in this analysis, or in fields like art, social studies, and foreign languages, which are not tested. The value-added analysis may be unrepresentative of the full population of PRPIL teachers. We therefore turn to an analysis of the effectiveness of PRPIL teachers using data collected under the Massachusetts educator evaluation framework.

## PRPIL Teachers and Performance Ratings

Beginning in 2014, teachers in Massachusetts were evaluated under the new educator evaluation framework. These evaluations are aligned to the Professional Standards for Teaching (PST) and cover four areas of teaching practice:<sup>12</sup>

- *Curriculum, planning, and assessment* covers content and pedagogical knowledge, lesson planning, and the use and analysis of assessment data.
- *Teaching all students* assesses the classroom environment, student work and engagement, and appreciation for diverse student backgrounds and learning needs.
- *Family and community engagement* includes indicators for the quality of communication with parents and families and their engagement in their children’s learning.
- *Professional culture* covers teachers’ professional development and contributions to school leadership.

These standards form the basis of teachers’ performance ratings. One major strength of the evaluation data is that the performance assessments are available for a large number of classroom teachers in Massachusetts.<sup>13</sup> Prior research has found that the kinds of evidence considered in the evaluations predict student learning gains. For example, classroom observations of teacher practice predict student achievement gains and students’ reports of classroom environment (Blazar, 2015; Grossman et al., 2013; Kane et al., 2011, 2013). Similarly, evaluations by administrators or mentors can predict test-based measures of effectiveness (Harris & Sass, 2014; Jacob & Lefgren, 2008). Evaluations may therefore provide useful information about teacher effectiveness for teachers in grades and subjects not covered by state testing requirements.

A limitation of the evaluation measure is that it does not provide much differentiation in the effectiveness of teachers. In our sample, 86% of teachers receive the proficient rating. The evaluation data can therefore provide information about whether teachers are either exceptionally effective or exceptionally ineffective, but they provide less evidence about the differences in performance among the majority of teachers in the middle of the effectiveness distribution. This

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<sup>12</sup> This coverage of the PST follows Massachusetts Department of Elementary and Secondary Education (2015a, 2015e).

<sup>13</sup> We use data on 79,094 performance ratings in 2014 and 2015. Of the core subject classroom teachers in our sample, 87.3% are matched to a performance rating.

limitation, of course, is offset by the fact that the performance ratings are available for a much larger group of teachers in a variety of subjects and grade levels.

We estimate differences in the performance of PRPIL teachers using regression models similar to the value-added models we estimated in the prior section. The analysis follows our previous study of teacher preparation in Massachusetts (Cowan et al., 2017).<sup>14</sup> In that prior study, we found differences in the application of ratings across school districts in Massachusetts. Some districts were more likely to use exceptional ratings categories (either high or low) than others. This sort of district-level variation in ratings standards may affect our results if PRPIL teachers are more likely to teach in districts that award higher (or lower) ratings. In our prior work, we found that limiting comparisons of teacher performance ratings to those within the same school or district accounted for these differences in rating standards. We therefore estimate models with school fixed effects in order to adjust for different ratings standards:

$$Y_{jdt} = X_{jdt}\gamma + PRPIL_j\beta + \alpha_d + \epsilon_{jdt} \quad (2)$$

In Eq. (2),  $d$  denotes school and  $\alpha_d$  is a school fixed effect. Beyond accounting for differences in ratings standards across schools, there is some evidence that qualitative evaluations may be sensitive to the composition of teachers' classrooms (Gill et al., 2016; Steinberg & Garrett, 2016). We therefore include school and classroom characteristics and teacher experience in the control vector  $X$ . The interpretation of  $\beta$  is also similar to the value-added case: it provides the average difference in ratings for PRPIL teachers relative to other teachers. As before, we additionally add indicators for first license type to compare PRPIL teachers to others entering with preliminary licenses.

**Table 7. Performance Ratings of PRPIL Teachers**

	(1)	(2)	(3)	(4)
Comparison group:	Same school	Same school & assignment	Same school & pathway	Same school, assignment & pathway
PRPIL Teacher	-0.015 (0.010)	-0.009 (0.010)	0.004 (0.011)	0.007 (0.011)
N	116,858	116,857	116,858	116,857

*Notes:* Sample includes all teachers working in core subject areas receiving summative or formative ratings in 2014-15. Observations are at the teacher-course-year level and are weighted by the inverse of the number of assignments a teacher has in each year. All models include an indicator for formative ratings, experience indicators, classroom and school composition (prior achievement, race/ethnicity, economic disadvantage, ELL status, learning disability status, and class size), and school fixed effects. All models additionally include an indicator for whether a teacher has an initial or professional license. In columns (3) and (4), models also include indicators for whether a teacher's first license was preliminary and an interaction of this indicator with the initial/professional indicator. Standard errors clustered by teacher in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

*In Table 7, we show that PRPIL teachers earn similar performance ratings as other teachers on initial licenses in Massachusetts.* The estimates are similar regardless of whether we control for the assignment type, so we focus on those estimates. In column 2, we compare PRPIL teachers to

<sup>14</sup> In the prior study, we used the average of teachers' four ratings on the PST rather than the overall rating because there is more variation than in the final performance rating. For simplicity, we use the final rating here, although the results are similar in either case.

all other teachers in Massachusetts who working in a similar assignment. The point estimate, -0.009, is negative but statistically insignificant. On average, this suggests that PRPIL teachers score about 0.9 percent of a point lower on the four point scale. For comparison, this is less than a third of the difference between a second and third year teacher in this model (results on teacher experience are omitted for brevity). In columns 3 and 4, we add an indicator for first license type, so that comparisons are between PRPIL teachers and other teachers who have advanced from preliminary to initial licenses. The findings are similar: PRPIL teachers are rated as slightly more effective than other teachers entering with preliminary licenses, but the point estimate, 0.007, is small and again statistically insignificant.

In Table 8, we split the sample of teachers by the subject area assignment of their classroom and re-estimate differences in performance ratings between PRPIL and non-PRPIL teachers. We find little heterogeneity in the relative effectiveness of PRPIL and non-PRPIL teachers across subjects. In column 1, where we compare PRPIL teachers to all other teachers with initial or professional licenses, we find that PRPIL teachers are rated as less effective in math. The point estimate, -0.036, corresponds to about the average difference in performance ratings between a fourth and fifth year math teacher. None of the other comparisons is statistically significant, although a few (e.g., art and science) are similar in magnitude, but imprecisely estimated. In the next column, we include pathway indicators to compare PRPIL teachers to others who have advanced a preliminary license. As in Table 7, the differences between PRPIL and other teachers entering on a preliminary license are smaller than in column 1 and uniformly insignificant.

**Table 8. Performance Ratings of PRPIL Teachers by Subject Assignment**

	(1)	(2)
<b>Comparison group:</b>	Same assignment	Same assignment & licensure pathway
<b>Foreign Language Teachers</b>	-0.005 (0.023)	0.005 (0.025)
<b>N</b>	9,319	9,319
<b>Art Teachers</b>	0.041 (0.036)	0.023 (0.040)
<b>N</b>	14,240	14,240
<b>Reading/ELA Teachers</b>	0.015 (0.025)	0.035 (0.026)
<b>N</b>	29,066	29,066
<b>Social Studies Teachers</b>	-0.015 (0.031)	-0.001 (0.033)
<b>N</b>	17,269	17,269
<b>Math Teachers</b>	-0.036** (0.018)	-0.011 (0.019)
<b>N</b>	24,627	24,627
<b>Science Teachers</b>	-0.020 (0.021)	-0.003 (0.023)
<b>N</b>	16,838	16,838

*Notes:* Sample includes all teachers working in core subject areas receiving summative or formative ratings in 2014-15. Observations are at the teacher-course-year level and are weighted by the inverse of the number of assignments a teacher has in each year. All models include an indicator for formative ratings, experience indicators, classroom and school composition (lagged achievement, race/ethnicity, economic disadvantage, ELL status, learning disability status, and class size), and school and assignment fixed effects. All models additionally include an indicator for whether a teacher has an initial or professional license. In column (2), models also include indicators for whether a teacher's first license was preliminary and an interaction of this indicator with the initial/professional indicator. Standard errors clustered by teacher in parentheses. Standard errors clustered by teacher in parentheses. \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

## The Costs of PRPIL Participation

The PRPIL option is an alternative to other licensure pathways in Massachusetts. The pathway allows teachers to work in the classroom while they earn their initial licensure and is less expensive than other licensure options. In order to provide some evidence on how the PRPIL pathway may affect access to the initial license, we assess both (1) the costs of the PRPIL option relative to other pathways and (2) the effectiveness of PRPIL graduates relative to other programs.

Estimating the “cost” of participation in PRPIL or other practice-based licensure programs is not straightforward. This is because the proper definition of cost includes both the direct cost incurred by participants plus any other indirect costs associated with participation. The indirect costs and benefits to candidates include differences in earnings potential during and after participation in the program. One advantage of pathways such as PRPIL is that teachers work while completing their preparation, which substantially reduces the cost in foregone earnings. For this analysis, we estimate the cost by comparing total discounted earnings over the first five years in the profession. We focus on a shorter timeline for two reasons. First, we do not model teacher attrition in this exercise and so focusing on a shorter time horizon may provide a more realistic (albeit more limited) comparison. Second, teachers are required to advance to a professional certificate after five years in the classroom. Some teachers elect to earn a master’s degree to satisfy the professional certification requirements. Thus, salary differences between teachers advanced through PRPIL and those advanced through routes may become less important over time. We also make a number of additional simplifying assumptions to estimate the value of each pathway. First, we measure annual earnings using the average salary for the five school districts with the largest population of PRPIL teachers so that estimated salaries are consistently defined across program types.<sup>15</sup> Second, we only include additional compensation for master’s degrees if earning a degree is necessary for earning the initial license (e.g., completion of post-baccalaureate programs). Teachers who participate in PRPIL or other nontraditional routes may elect to obtain additional education afterward, but we ignore this possibility here. Third, we assume that tuition costs are paid in the year in which they are incurred.<sup>16</sup> After we estimate annual earnings net of the tuition charges, we can sum the discounted earnings across a five-year window to arrive at the final early career earnings stream.

The direct cost—tuition—is the easiest to measure. We list the tuition costs of PRPIL and another alternative program offered by the Collaborative for Education Services (CES) in the first row of Table 9.<sup>17</sup> We assume that PRPIL teachers pay tuition in their third year of employment, which is consistent with the pathway requirements.<sup>18</sup> For the CES program, we assume that teachers pay tuition during the first year. For the post-baccalaureate programs (educator preparation programs that lead to a master’s degree), we use tuition data reported in the

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<sup>15</sup> These school districts are Boston, Brockton, Lowell, Springfield, and Worcester. We use salaries from the 2015-16 school year.

<sup>16</sup> If students borrow to cover the cost of tuition, then we would tend to overstate the present value of earnings for the higher tuition pathways. Thus, these estimates are likely somewhat conservative.

<sup>17</sup> We chose CES for this analysis as it was the most popular alternative program during this time period. Other popular programs have similar cost structures.

<sup>18</sup> Teachers can begin PRPIL during their third year in the classroom, although they cannot advance their license until the end of the school year.

Integrated Postsecondary Education Data System (IPEDS). Based on IPEDS data, the average tuition at programs offering postgraduate programs in Massachusetts is \$20,451 per year. We also assume that post-baccalaureate students pay tuition during the first year. In terms of direct tuition costs, PRPIL is less expensive than both the CES program and postgraduate programs. But the tuition costs are only part of the difference in program costs. PRPIL teachers must earn some credit through either professional development or university coursework (row 2 of Table 9); these costs are not included in the base tuition for PRPIL, but are included for CES and postgraduate programs.<sup>19</sup> We assume that PRPIL teachers pay these costs in the year before they enroll in PRPIL.

**Table 9. Costs Associated with Various Practice-Based Programs**

	PRPIL	Collaborative for Education Services	Post-Baccalaureate
Total Tuition	\$2,500	\$8,650	\$20,451
Additional credit cost?	\$757	No	No
Annual Stipend	Teacher salary	Teacher salary	<ul style="list-style-type: none"> <li>• None (Full-Time Student)</li> <li>• Teacher Salary (Full-Time Teacher)</li> </ul>
MA Salary Adjustment	No	No	Years 2-5
Discounted Five Year Earnings	\$239,092	\$233,454	\$182,063 \$239,005
Difference Relative to PRPIL	\$0	-\$5,638	<ul style="list-style-type: none"> <li>• -\$57,029</li> <li>• -\$87</li> </ul>
Relative Value-added of Completers (math)	N/A	0.029 (0.028)	0.020 (0.013)

*Note:* Costs based on those reported on program websites. Earnings are based on 2015-2016 teacher salary schedules in Boston, Brockton, Lowell, Springfield, and Worcester. The estimated tuition cost for post-bac programs is the average tuition and fees reported in IPEDS for graduate students among post-bac programs in Massachusetts. Estimated value-added for PRPIL is based on teachers who have previously advanced to initial licensure through PRPIL. The estimate for CES is for all alternative programs using the sample of program completers described in Cowan et al. (2017). We omit programs limited to select populations, such as Teach for America and MATCH Public Charter Schools. The estimate for post-bac programs is for all postgraduate programs using the sample of program completers described in Cowan et al. (2017).

Finally, the pathways differ significantly in the earnings of teachers during the first five years in the profession. We assume that PRPIL and CES teachers work full time at the rate for teachers with a bachelors (BA) degree. The difference in earnings between the PRPIL and CES pathways (\$5,638) then largely reflects the difference in tuition. For the post-baccalaureate programs, we estimate two separate models. First, we assume students study full time during the program and begin working as teachers at the MA salary level during the second year. In the second case, we assume that post-baccalaureate students are also working as fulltime teachers. In this case, they

<sup>19</sup> For PRPIL, we estimate the cost of obtaining credit through a university program or professional development points (PDPs). PRPIL recommends earning PDPs through [Knowledge Delivery Systems \(KDS\)](#). For PRPIL-approved PDP programs, the price per hour ranges from \$6.20-\$6.63. The least expensive method of fulfilling the 120 hour requirement currently costs \$757.



earn the BA degree salary level during the first year of employment. Because the foregone earnings during the year of study is a significant portion of the total cost of a post-baccalaureate program, the results differ significantly based on assumptions about teachers' employment. For teachers who do not work while students, the discounted earnings for the post-baccalaureate program are \$57,029 lower than for the PRPIL pathway.<sup>20</sup> If we instead assume that teachers work while in school, the difference is only \$87 over the first five years. That is, the higher salary paid to teachers with masters degrees nearly offsets the upfront tuition cost within five years.<sup>21</sup>

In order to estimate teacher effectiveness, we repeat the analysis of teacher effectiveness outcomes after limiting the sample to teachers completing PRPIL or one of the other program types.<sup>22</sup> Similar to the overall findings presented earlier in this report, the estimated pathway effects for both alternative programs and postgraduate programs are not statistically significantly higher than for PRPIL teachers. The point estimates are both positive and suggest that completers of alternative and post-baccalaureate programs are about 0.02 to 0.03 student standard deviations more effective in math instruction. Because the results are not statistically significant, we do not find strong evidence that teacher prepared through these alternative routes are more effective teachers than those completing PRPIL. We do find, however, that PRPIL teachers have higher discounted earnings during the early portion of their teaching career.

## Discussion

PRPIL is a pathway to initial teacher licensure for Massachusetts teachers who did not complete an educator preparation program before entering the classroom. It was intended to open teacher licensure opportunities for mid-career individuals with prior work experience or content expertise by allowing them to demonstrate that they offer the same teaching competencies as other pre-professional license teachers, without completing a preparation program. These alternative licensing options may broaden the pool of potential applicants for teaching positions by reducing the cost of becoming a teacher. In this descriptive study, we take a detailed look at both the credentials of PRPIL teachers and the characteristics of the classrooms in which they teach. Combining the analysis of licensure patterns and teaching assignments, it is possible to draw some tentative conclusions about the role of PRPIL in the broader teacher labor market and suggest areas for future causal explorations of the effects of authorizing this pathway.

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<sup>20</sup> However, note that the earnings premium for master's programs will accumulate over time, which increases the relative value of those routes.

<sup>21</sup> After five years in the classroom on an initial license, teachers must advance to a professional license. Teachers who have already completed a master's program can advance their license through a 12-credit sequence; thus, beyond five years, these figures likely somewhat understate the tuition savings to teachers who complete their *initial* licensure requirements through a post-baccalaureate program ending in a master's degree.

<sup>22</sup> As we discussed in our prior report, estimates of program effects bundle the effects of the training itself with effects of the characteristics of teachers who select into those programs. Therefore, estimates of the relative effects of different pathways provide an estimate of the implications of small changes in the eligibility rules of PRPIL so long as selection into the program remains the same. This is a strong assumption, and we note that estimates of the benefit of expanding or contracting PRPIL eligibility are somewhat speculative. Nonetheless, we can estimate the cost of the program to candidates and provide evidence on how the effectiveness of program completers compares to other similar pathways.

First, teachers who advance to initial licenses through PRPIL are more likely to possess licenses in shortage areas, such as foreign languages, math, and science, than teachers who earn initial licenses in other ways. In fact, PRPIL teachers lead about 4 to 6 percent of all foreign language, math, and science classrooms at the high school level. At least part of this difference is attributable to the fact that teachers who enter the profession with preliminary licenses are more likely to teach math and science courses. Teachers who advance via PRPIL are, in fact, just as likely to have licenses in math and science as other teachers who have advanced preliminary licenses and who teach in the same school. It is therefore unclear whether the existence of the PRPIL pathway increases the supply of these high-needs teachers. Some teachers in these fields who completed PRPIL may have chosen to enter the profession through other routes, potentially at higher cost, but some may not have. In particular, PRPIL advances about 300 teachers each year, and it is not clear whether other programs would have the capacity to prepare the teachers currently enrolled in PRPIL.

Second, PRPIL teachers work in significantly different classroom settings than other teachers entering through preliminary licenses or through traditional university-based educator preparation programs. PRPIL teachers are less likely to work in schools that place at Level Three or higher on the state accountability system. Their students also score higher on standardized tests, are less likely to be economically disadvantaged, English language learners, or have learning disabilities. Much of this difference can be attributed to the districts in which PRPIL teachers work, which suggests that districts making use of this licensure option serve higher income and higher achieving students. Importantly, we do not know whether this reflects a preference of teachers or the resources of schools. Although differences in the characteristics of students taught by PRPIL and non-PRPIL teachers may reflect the preferences of individual teachers, it may also reflect the demand of high income school districts for teachers of more advanced math and science courses. The current distribution of PRPIL teachers may also reflect eligibility restrictions or recruitment choices by the current vendor, and these are likely to change under new regulations. Thus, one important caveat is that this study cannot address the causal question of whether expanding access to the PRPIL program will affect the staffing of teachers in high needs subjects and hard-to-staff schools. School districts that use the PRPIL for shortage area teachers may have an easier time attracting teachers even in the absence of the PRPIL option and it could be that the program does little to affect overall teacher supply in these schools. On the other hand, the fact that PRPIL teachers disproportionately work in high income districts is not inconsistent with the possibility that the pathway also increases the absolute number of teachers licensed in high needs areas in low income districts.

Third, offering the PRPIL pathway may create unintended consequences. The pathway provides teachers who work on preliminary licenses the opportunity to advance to an initial license, but it may also affect who enters the profession or which route to an initial license they choose. Because it is less costly than other options, some teachers who would have first completed an alternative or traditional educator preparation program may instead choose to begin teaching with a preliminary license before advancing to an initial license through PRPIL. The PRPIL pathway may therefore reduce the amount of pre-service training teachers accumulate before entering the classroom. Our estimates of teacher effectiveness, which focus on more experienced teachers who have already advanced to initial licensure, are unlikely to capture these potential effects.

Finally, the current study was conducted during a time when PRPIL was not available to teachers in elementary classrooms and was offered by a single vendor. It may be difficult to generalize the findings, particularly around teacher effectiveness, to contexts with significantly different structure on the PRPIL pathway. Recent research has linked the quality of mentorship during the student teaching internship to future effectiveness in the workforce (Goldhaber et al., 2016; Ronfeldt 2012, 2015). If teachers accrue some benefit by participating in the PRPIL process, it may be difficult to predict how teachers prepared through other similar pathways sponsored by other providers would fare in the workplace. In addition, teachers advancing math or science licenses through PRPIL may have specialized content knowledge that is useful in the high school classrooms in which they currently work, but would be less useful in elementary school classrooms.

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## Appendix A. PRPIL Licensure Areas

Table A.1. Initial Licenses Offered by PRPIL

License Area	Grade Level
Biology	5-8, 8-12
Business	5-12
Chemistry	5-8, 8-12
Dance	All
Earth Science	5-8, 8-12
English	5-8, 8-12
English as a Second Language	All
English Language Learning	PreK-6, 5-12
Foreign Languages	PreK-6, 5-12
General Science	5-8
Health/Family and Consumer Sciences	All
History	5-8, 8-12
Instructional Technology	All
Latin and Classical Humanities	5-12
Mathematics	5-8, 8-12
Middle School: Humanities	5-8
Middle School: Mathematics/Science	5-8
Music: Vocational/Instrumental/General	All
Physical Education	PreK-8, 5-12
Physics	5-8, 8-12
Political Science/Political Philosophy	5-8, 8-12
Speech	All
Technology/Engineering	5-12
Theater	All
Visual Art	PreK-8, 5-12

Source: <http://www.classmeasures.com/our-services/product-group-prpil/initial-licensure-prpil/program-details/eligibility/>





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