Assessing difference: examining Florida's initial teacher preparation programs and exploring alternative specifications of value-added models

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2010

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June 10, 2010

Abstract: This study explores important statistical issues on the appropriate functional form and model specification of the value-added educational achievement equation. We also wish to estimate the causal effect of a teacher's institution of academic preparation and pedagogical training. Standardized test scores, viz., the Florida Comprehensive Assessment Tests (FCAT), provide a measure of pupil academic achievement. Accordingly, this study uses a value-added regression model to establish whether there is a "college preparation effect" on the average pupil's FCAT reading and mathematics scores. We find that value-added regression analysis fails to uncover robust and substantive college preparation effects. Regardless of race (African American, Hispanic, or white), male or female status, or FCAT mathematics versus FCAT reading, pupil academic achievement does not vary substantively according to a teacher's college of preparation. Further, the statistical significance of teacher program effects also depends on the functional form and specification of the value-added model.

JEL codes: I2, J15, J44, J45, J48

Key words: teacher quality, value-added model, historically black colleges and universities, HBCU, teacher productivity, education and value-added

Teacher preparation institutions are now being challenged to defend the effectiveness of their graduates in the classroom. Many also suggest that the pay and promotion of teachers should be strongly tied to their in-class productivity, as measured by their pupils' performance on standardized examinations. Such discussions presume 1) there is a strong consensus on how to assess a teacher's value-added with respect to students' academic achievement, 2) there are substantively large teacher program effects across alternative institutions. This study explores important statistical issues on the appropriate functional form and model specification of the value-added educational achievement equation. We also wish to estimate the causal effect of a teacher's institution of academic preparation and pedagogical training. We find that the statistical significance and substantive importance of alternative teacher preparation programs vary according to the specification of the value-added regression.

Section I of this paper presents pertinent information of the institution context of Florida's supply of new teachers and the utilization of the state's standardized test for public schools. Section II provides a discussion of the various econometric issues involved in estimating the academic achievement equation. Sections III and IV presents the study's data and results, respectively. We conclude in section V with a discussion of the study's results and limitations.

I. Pupil academic achievement and Florida's supply of new teachers: institutional context

Florida Comprehensive Assessment Test

The Florida Comprehensive Assessment Test (FCAT) is a criterion-based examination established by the State of Florida, used to assess learning effectiveness in reading and mathematics, for pupils in grades 3 – 10. The FCAT tests student mastery at each grade level and yields developmental scale scores for the Sunshine State standards. School accountability,

teacher pay and promotion, and student graduation criteria are based on the FCAT developmental scale scores.

Based on the developmental scale scores, student achievement on the FCAT is assigned an ordinal rank of 1 – 5. Level 1 and 2 are the lowest levels of achievement, signifying minimal or limited grade-level content. Achievement level 3 (the lowest level consistent with proficient achievement) signifies that performance is on grade-level, students are at least partly successful with grade-level content. Levels 4 and 5 indicate that students are mostly successful or completely successful with the most challenging grade-level content.

A pupil is deemed to have made an annual learning gain when one of the following conditions hold: i) there is improvement on the achievement level over the previous year; or, ii) the student has maintained a proficient achievement level on FCAT relative to the previous year; or, iii) pupil remained within FCAT achievement levels 1 or 2 but demonstrated more than 1 year's growth on the FCAT development scale score (Florida Department of Education, 2010b). The later method is not applicable for pupils retained at the same grade level, persons whose who declined a grade level, or pupils who are 2 or more grade levels higher than the previous year; for these pupils, learning gains are accessed according to method i) or ii). If a pupil's FCAT achievement level declines from one year to the next, the pupil is not deemed to have made an annual learning gain.

Teacher preparation

The State University System of Florida, private universities and colleges, and other public and private institutions supply new teachers to Florida's public school's through 1 of 4 paths: 1) initial teacher preparation program (ITP); 2) alternative certification in an educator preparation institute (EPI); 3) alternative certification program in school district (DAC); and,

professional training option (PTO) for non-education majors. ITP completers are graduates of the State University System of Florida (11 public universities), the Florida College System (community colleges), and independent colleges and universities. All State University System institutions are ITP participants. Chipola College, Miami-Dade College, and St. Petersburg College are the only Florida College System institutions with an ITP, but 27 Florida College System institutions have an EPI. Eighteen of Florida's independent colleges and universities have an ITP.

ITP programs provide the traditional route for entering the teaching profession. Individuals must demonstrate general and subject knowledge, along with mastery of professional preparation and education competence. ITP program completers are qualified for a Professional Certification upon program completion. Often, ITP program completers will have completed one or more years of teaching at the point of program completion.

Colleges and universities offering ITP programs "are also authorized to offer an approved Professional Training Option (many times delivered as a minor in education) to degree seekers outside of the college of education or as a post-baccalaureate program of study (Milton, et al., 2008:2)." PTO teachers enter the profession by completing all the education courses required for professional preparation, along with obtaining a subject area bachelor's degree outside of the college of education. The PTO is design for undergraduate students in a discipline where there is a Florida Department of Education certification, but where the college or university does not offer the disciplinary specialty within the college of education. For example, FAMU's College of Education has decided to offer the PTO only for disciplines such as journalism, agriculture, etc.

EPIs are also managed by Colleges of Education. Certification via EPI differs from PTO in that the EPI is a program designed for individuals who currently hold a degree in another

field; but wish to enter into education. EPI individuals enter the teaching profession by demonstrating mastery of professional preparation and education competence.

Colleges of Education are not involved in DAC programs. Each local school district manages its own DAC, though each program is approved by the Florida Department of Education. The district programs generally serve bachelor's degree holders hired to teach with a Temporary Certificate. According to Milton, et al. (2008:3), "These programs [DAC and EPI] were conceived to help primarily with critical shortage areas in secondary education where a content major in the areas of arts and sciences could be paired with intense pedagogical training to move teachers without delay into the classroom with the tools they need to become effective."

During 2003-2004, 71 percent, 19 percent, and 10 percent of individuals completing a Florida teacher preparation program were graduates of public universities of Florida, independent colleges and universities of Florida, DAC programs, respectively (Florida Department of Education, 2009b). For 2006-2007, the supply shares were public universities (54 percent), independent colleges and universities (16 percent), DAC programs (18 percent), EPI programs (9 percent), and public colleges (3 percent).

Fifty-five percent and 53 percent of EPI and ITP program completers, respectively, go on to enter teaching but 87 percent of DAC program completers enter into the teaching profession (Florida Department of Education, 2010). Among all program completers of 2007-2008, 65 percent were ITP program completers, 19 percent were DAC program graduates, and 16 EPI program graduates. Among all program completers of 2007-2008 who were employed as a teacher during 2008-2009, 58 percent were ITP program completers, 28 percent were DAC program graduates, and 14 EPI program graduates.

Measured by the percentage of pupils with at least 50 percent learning gains, there appears to be little difference in the effectiveness of ITP, DAC, and EPI programs (Table 1).

[Insert Table 1]

According to the Florida Department of Education (2009a), 64 percent of FAMU ITP completers had 50 percent of their pupils make learning gains during 2007-2008.

State University System of Florida

The State University System of Florida consists of 11 public universities differing in size, scope, and student demographics, disbursed throughout the state's population centers (Table 4). New College of Florida is a small liberal arts institution, classified as a Baccalaureate College by the Carnegie Foundation. It does not have a College of Education. Florida Gulf Coast University (FGCU) and the University of North Florida (UNF) are Master's Colleges and Universities (Larger Programs). FGCU does not have offer tenure to its faculty nor does its College of Education offer a doctoral degree.

Florida A & M University (FAMU) and the University of West Florida (UWF) are medium size universities classified as Doctoral/Research Universities. UWF and FAMU offer a Doctor of Education and a Doctor of Philosophy, respectively, in educational leadership.

Florida Atlantic University (FAU) and University of Central Florida (UCF) are Research Universities - High Research Activity. Both offer Doctor of Education and Doctor of Philosophy degrees. FAU has an EPI, while UCF has a PTO program.

Florida State University, University of Florida, University of South Florida, and Florida International University are Research Institutions - Very High Research Activity. Each offers multiple doctoral degrees. The US News and World Report shows that the University of Florida's College of Education has nationally ranked graduate academic programs: Counselor

Education (No. 3), Special Education (5) and Educational Administration (26). "Overall, the college ranks 54th nationally and 25th among public education institutions in the elite Association of American Universities (http://www.coe.ufl.edu/)."

[Insert Table 4]

II. Model

The quality of preparation provided to students may vary across and within universities. College students of greater ability or greater willingness to work may be disproportionately attracted to higher quality (more challenging) academic majors. Hence, the teaching ability of graduating teachers may vary both because of heterogeneity in the ability, effort, and background of college students and because of heterogeneity in the quality of academic majors and teaching program.

Consider pupil i potential achievement for grade g, where $A_{1,igt}$ is the pupil's year t potential achievement if the pupil's teacher entered teaching via a degree from college 1 and $A_{0,igt}$ is the pupil's year t potential achievement if the pupil's teacher entered teaching via college 0. Let $A_{ig_{t-1}}$ represent pupil i actual achievement during the previous year. Hence, the potential annual achievement gain to each pupil is

$\Delta A_{1,igt} = A_{1,igt} - A_{ig_{t-1}}$ and

$\Delta A_{0,igt} = A_{0,igt} - A_{ig_{t-1}}$.

If there are no endogeneity problems, the differences in achievement represent the value added by college 1 teachers (the treatment group in the experiment) relative to college 0 teachers (the control group in the experiment). For any given pupil i, we observe either $A_{1,igt}$ or $A_{0,igt}$ (or, $\Delta A_{1,igt}$ or $\Delta A_{0,igt}$), but not both. We observe the average pupil's achievement according to the

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collegiate program (P) of the teacher and therefore we may state the observed difference in pupil achievement as $E(A_{1,igt}) - E(A_{0,igt}) = E(A_{igt}|P = 1) - E(A_{igt}|P = 0)$.

In a regression framework, this is

$$A_{ijgt} = \beta_0 + \beta_1 P_{ijgt} + \varepsilon_{it},$$

for student i and teacher j and where P = 1 if teacher has a college degree from teacher preparation program P, but 0 otherwise. If $E(\varepsilon|P) = 0$, then $\beta_1 = E(A_{igt}|P = 1) - E(A_{igt}|P = 0)$ is the mean value-added attributable to teachers having a collegiate program P degree.

For observational data, it is likely that $E(\varepsilon|P) \neq 0$. Consistent and efficient estimation of the differential productivity effect of teacher program P training (β_1) is conditional on our ability to resolve this endogeneity problem via our sampling framework and empirical specification of the pupil achievement equation. All of the teachers included in this study are new graduates of public universities in the state of Florida; as such, each teacher from university P received pre-professional training from a university of identical academic standards and resources and on-the-job training is not correlated with P status.

To construct a regression model free of other endogeneity problems, we must further control for nonrandom assignment of college students across universities, nonrandom assignment of pupils to schools, and nonrandom matching of teachers and pupils within schools. We do so by adding the following vectors to our regression model: teacher characteristics (T), pupil's grade level and other characteristics (C), and school characteristics (S). In this case, $\beta_1 = E(A_{ijkt}|P = 1, \text{grade}_{ijkt}, T_{ijkt}, C_{ijkt}, S_{ijkt}) - E(A_{ijkt}|P = 0, \text{grade}_{ijkt}, T_{ijkt}, C_{ijkt}, S_{ijkt})$ is the mean value-added attributable to teachers having a program P degree, conditional on the characteristics of i = 1, …, n pupils, j = 1, …, J teachers, and k = 1, …, K schools.

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Equation (1) states that pupil academic achievement (A_i) is a function of pupil ability and prior learning ($A_{i,t-1}$), teacher preparation program P, pupil grade level, teacher characteristics (T), additional pupil characteristics (C), school fixed effects (S), and ε is a random error term.

$$(1)\ A_{ijkt} = \beta_0 + \alpha A_{i,t-1} + \sum_{p \in P} P_{ijpt} \beta_{1,p} + \beta_2 \text{Grade}_{it} + T_t \beta_3 + C_t \beta_4 + \sum_k School_{kt} \delta_k + \varepsilon_t,$$

where P = {p_1, p_2, …, p_n} is set of mutually exclusive and collectively exhaustive binary variables representing alternative undergraduate teacher preparation institutions.

Teacher's demographic characteristics = {years of teaching experience, African American male, African American female, white male, white female (omitted), Latino, Latina, Native American male, Native American female, Asian male, Asian female, mixed race male, mixed race female, other race male, other race female}. We capture a teacher's analytical skills, intellectual development, and work ethic prior to college entry by a vector of college entry examination scores, viz., scholastic achievement test (SAT) mathematics and verbal scores, and teacher's undergraduate grade point average within the State University System of Florida.

The following variables control for pupil heterogeneity: race (black, white, Hispanic) and gender identity of the pupil; English language learner status of the pupil, that is, whether the pupil is currently enrolled in classes specifically designed for limited English proficiency (LEP) students or pupil is classified as LEP pupil but not enrolled in LEP classes, pupil who left the LEP program within past 2 years or who left the LEP program more than 2 years ago; pupil is eligible for free or reduced price lunch; primary exceptionality (22 controls for learning disabilities, alternative measures of handicap status, and giftedness).[1]

Other controls include grade of pupil and year of examination.

Teacher's college major consists of 21 academic disciplines within the College of Education and 36 content areas outside of the College of Education.

The teacher preparation institutions included in this study include Florida's initial teacher preparation programs, which consist of three mostly two-year degree institutions, Chipola College, Miami-Dade College, and St. Petersburg College, and the SUS institutions.

We test for the statistical significance and substantive educational importance of teacher's program of preparation. Our primary hypotheses are

H_0: $\beta_{1,p} = 0$ for each p and

H_1: $\beta_{1,p} \neq 0$.

Pupil learning during a given period depends on a pupil's entire history of learning, as affected by previous socioeconomic status, past teachers, natural ability, developed ability, past peers, and so forth. Thus, $A_{i,t-1}$ is a baseline achievement measure, a sufficient statistic for all past unobserved educational inputs and a pupil's endowment of mental capacity. Todd and Wolpin (2003) show that baseline achievement ($A_{i,t-1}$) is endogenous, that is, $E(\varepsilon_t | A_{i,t-1}) \neq 0$.

There are functional form and specification challenges posed by this endogeneity issue. One approach ignores the endogeneity problem and estimates (1) as specified (Noelle, et al., 2008; Boyd, et al., 2008; Chingos and Peterson, 2010). This approach yields parameter estimates that are biased and inconsistent and the standard errors are incorrect.

A second approach seeks to eliminate the endogeneity problem via an annual gain specification of the achievement function. This approach assumes $\alpha = 1$ and uses ordinary least squares to estimate

(2) $A_{ijkt} - A_{i,t-1} = \beta_0 + \sum_{p \in P} P_{ijpt} \beta_{1,p} + \beta_2 \text{Grade}_{it} + T_t \beta_3 + C_t \beta_4 + \sum_{k} School_{kt} \delta_k + \varepsilon_t.$

However, the annual gain specification is inappropriate on three grounds: i) it imposes a very strong assumption on learning persistence; ii) it misspecifies the achievement function; and, iii) it exacerbates the endogeneity problem.

The annual gain specification requires perfect learning persistence ($\alpha = 1$), that is, all learning from the previous year carries over without loss to the current year and to all future years of learning. For this assumption to hold, everything a pupil learned in 2nd grade would persist (without any decay) for the pupil in 3rd grade and equal the achievement effects for every grade beyond 3rd grade. Harris and Sass (2008) address this problem by allowing the persistence coefficient (α) to take on a range of values within the interval $[0.20 - 1.0]$. Mostly, for elementary school and middle school, their results show that parameter estimates and standard errors decline as α decreases from 1.0 to 0.20. For high school, the opposite effect holds; namely, parameter estimates and standard errors increase as α decreases from 1.0 to 0.20.

Harris and Sass find no changes in the qualitative effects of parameters as the persistence coefficient varies and no changes in statistical significance for high school pupils, and no changes in statistical significance for 9 of 10 middle school equations. For the sole middle mathematics equation where there is an important change in statistical significance, the size of the test for the coefficient on the variable on interest moves from 0.05 to 0.10 as α decreases from 0.60 to 0.40 and the size of the test becomes greater than 0.10 at $\alpha = 0.20$. Similarly, for a middle school reading equation, the size of the test for the parameter of interest moves from 0.05 to 0.10 as α decreases from 0.40 to 0.20.

For elementary school, for 3 of 5 reading equations, Harris and Sass (2008) find that the size of test is constant at 0.10 as the persistence coefficient takes on a range of values within the interval $[0.60 - 1.0]$. But, the size of the test > 0.10 for $\alpha = 0.40$ and $\alpha = 0.20$. For the elementary

school mathematics equations, the parameter of interest becomes statistically insignificant for α = 0.60, α = 0.40, and α = 0.20 and is significant at the 5 percent and 10 percents levels α = 1.0 and α = 0.80, respectively.

The Harris and Sass results suggest that for both reading and mathematics and for elementary, middle, and high school, the persistence coefficient falls into the range $0.60 \leq \alpha < 1.0$. Mason (2010) finds complementary results, though Mason also shows that learning persistence may vary according the race and gender of pupils as well as grade level. Using the instrumental variables specification (discussed below), Mason finds that point estimates for mathematical persistence are in the interval [0.65 – 0.78] and point estimates for reading persistence are in the interval [0.72 – 0.89]. For both reading and mathematics achievement, elementary school pupils have the highest persistence effect.

Equation (1) is an autoregressive distributive lag model. For this class of models, it is well known that α = 1 indicates that the achievement function has a unit root; hence, neither $E(A_t | A_0)$ nor $Var(A_t | A_0)$ is a constant, so the achievement values will increase overtime without limit. When a unit root exists, coefficients are biased (though consistent), the standard errors are incorrect, and spurious correlation may occur.

Differencing the dependent variable is a common method for insuring that the series is stationary. Differencing equation (1) yields

(3) $A_t - A_{t-1} = A_{t-1} - A_{t-2} + \beta_1(X_t - X_{t-1}) + (\varepsilon_t - \varepsilon_{t-1})$ or

$\Delta A_t = \Delta A_{t-1} + \beta_1 \Delta X_t + v_t.$

where X represent all explanatory variables other than prior year achievement. Note that the correct annual gain specification, equation (3), is different in important ways from the annual gain specifications that are usually estimated in econometric practice, equation (2). Specifically, equation (2) suffers from omitted variable bias, since ΔA_{t-1} is omitted, and misspecification of

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the covariates, since X_t is used in equation (2) instead of ΔX_t as in equation (3). Equation (3) worsens the endogeneity problem associated with equation (1). We know $E(\varepsilon_t \,|A_{t-1}) \neq 0$, $E(\varepsilon_{t-1} \,|A_{t-2}) \neq 0$, and $E(\varepsilon_{t-1} \,|A_{t-1}) > 0$; hence, $E(v_t \,|\Delta A_{t-1}) \neq 0$. Differencing (1) solved the stationarity problem but it amplified the endogeneity problem. Utilizing (3), we would need instruments for both A_{t-1} and A_{t-2}.

Instrumental variable estimation provides a third approach for estimating (1). Per Todd and Wolpin (2003), $E(\varepsilon_t|A_{i,t-2}) = 0$ and $E(A_{i,t-1}|A_{i,t-2}) \neq 0$. We may use the latter conditional expectation to obtain a predicted baseline achievement measure $\hat{A}_{i,t-1}$ and thereby obtain consistent parameter estimates from equation (4).

(4) $A_{ijkt} = \beta_0 + \alpha\, \hat{A}_{i,t-1} + \sum_{p \in P} P_{ijpt} \beta_{1,p} + \beta_2 \text{Grade}_{it} + T_t \beta_3 + C_t \beta_4 + \sum_k School_{kt} \delta_k + \varepsilon_t.$

This approach requires at least 3 years of test scores. Only the final year of observations is available for analysis. For an imbalanced 3-year panel, such as that utilized in this study, only a fraction of the final year of observations is available for analysis. If a non-random fraction of pupils have 3 years of test scores then the instrumental variable procedure may introduce selection bias into the estimation process.

Equation (5) presents a fourth approach. It is an imputed persistence approach, combining the strengths of the annual gain and instrumental variable specifications. Specifically, we use the instrumental variable specification to obtain a race-sex group specific estimation of the persistence coefficient (α). Given the race-sex estimate $\hat{\alpha}_{rs}$ we then estimate an annual gain specification that is free of the assumption that $\alpha = 1$. A strength of this approach is that we will have just as many observations as in the annual gain specification; hence, we avoid both the possibility of selection bias, as in equation (4). Further, by not imposing $\alpha = 1$, we also avoid

strong assumptions on learning persistence, the unit root problem, and the amplified endogneity

problem, all associated with equation (2).

A weakness of equation (5) is that the imputed point estimate for the persistence

parameter ($\hat{\alpha}_{rs}$) may not unbiased or consistent; hence, the dependent variable of equation (5)

may suffer from measure error. If so, the coefficient estimates will be unbiased, consistent, and

efficient but the standard errors of the estimates are larger than they would be in the absence of

the error-in-variables problem for the dependent variable. Further, measurement error will reduce

R^2 (goodness-of-fit) relative to the case without measurement error. Hence, coefficient estimates

from (5) are less likely to reject the null hypothesis relative to a model estimated without

measure error for the dependent variable.

(5) $A_{ijkt} - \hat{\alpha}_{rs} A_{i,t-1} = \beta_0 + \sum_{p \in P} P_{ijpt} \beta_{1,p} + \beta_2 \text{Grade}_{it} + T_t \beta_3 + C_t \beta_4 + \sum_k School_{kt} \delta_k + \varepsilon_t.$

Finally, rather than concentrating on estimating the level of pupil academic achievement,

equation (6) seeks to estimate the net growth in academic achievement. This is a flow-to-flow

specification: a flow of teacher, pupil, family, and school resources during current year yields a

flow of net academic growth during the current year.

(6) $\left(\dfrac{A_{ijk,t} - A_{ijk,t-1}}{A_{ijk,t-1}} \right) = \beta_0 + \sum_{p \in P} P_{ijpt} \beta_{1,p} + \beta_2 \text{Grade}_{it} + T_t \beta_3 + C_t \beta_4 + \sum_k School_{kt} \delta_k + \varepsilon_t.$

Nevertheless, this specification suffers from all of the weaknesses of equation (2). Its primary

strength is the ease of interpretation of its coefficients. Namely, the coefficients represent annual

growth rates or rates of return associated with particular explanatory variables. Mean levels of

learning gains (expected increases in standardized test scores) vary according to grade level, so

that a given annual gain for 4th grade and 10th grade does not represent the same mean percentage

increase. (See Mason 2010). The net growth specification, equation (6), allows us to compare the program effects on learning growth across grade levels.

For each specification we estimate 12 equations: separate equations for male and female pupils, for African Americans, Hispanics, and whites, and for mathematics and reading achievement. Equation (5), the imputed persistence parameter specification, is our preferred model. The measurement error associated with this model creates higher standard errors than would be the case in the absence of measurement error (though the parameter estimates are efficient) and reduces the overall fit of the model; hence, the signs of the coefficients are valid, even though the t-statistics are less likely to reject the null hypothesis than would be the case if we did not have measurement error, and R^2 will be lower. The instrumental variable specification (equation 4) may create selection bias in our sample because we do not have a balanced sample. Our sample is limited to pupils with teachers with less than 5 years of experience; hence, for a given three-year period, we would not have the pupil's test score for the year or years the pupil had a highly experience teacher, that is, a teacher with 6 or more years of experience. Also, during a given three year period, pupils may move into or out of the sample, which also contributes to imbalance. When the imputed persistence and instrumental variable specifications have parameters with the same sign and the parameter is statistically significant in both specifications, we can be confident of the qualitative effect of the parameter estimate.

By contrast, the parameter estimates are inconsistent and the standard errors are incorrect for the lagged dependent variable (equation 1), annual gain (equation 2), and net growth (equation 6) specifications. For these specifications, we do not know the direction of the bias of the estimated coefficients. The lagged dependent variable specification suffers from endogenous variable bias, while the annual gain and net growth specifications require perfect learning

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persistence and suffer from omitted variable bias, variable misspecification, measurement error, and heighten endogenous variable bias.

III. Data

Description of variables

The data are provided by Florida's K20 Education Data Warehouse, covering pupils and their new teachers who graduated from a Florida university during the academic years 2000-2001 to 2005-2006. The teacher sample is limited to persons teaching mathematics or English courses. Pupil data refer only to pupils in mathematics and English/reading courses taught by teachers in Florida's public schools, with FCAT scores for 1998-1999 to 2005-2006. Teachers and pupils are merged via a common course identification number. Each educator teaches within the state of Florida and, therefore, has passed an identical series of state administered certification examinations. Since all educators are new teachers (no teacher has more than 5 years of post-graduation experience), they were trained by a roughly similar set of teacher-educators and other collegiate faculty at each undergraduate institution.

Experience and attrition will have a positive (negative) correlation if professional attrition is relatively higher (lower) among poor quality teachers. Given the short duration of their teaching career, on-the-job training effects (captured by years of experience) will not be confounded by attrition (Kane, Rockoff, and Staiger, 2006). If experience varies by institutional status, then estimates of the marginal effect of teacher preparation on pupil learning will be biased, inconsistent, and inefficient because of the correlation of experience and attrition. Hence, given a sample of new teachers, on-the-job training and undergraduate teacher preparation program status are uncorrelated.

Table 3 presents descriptive statistics by race of pupil. Eight percent, 2.5 percent, and 2 percent of African American, Hispanic, and white pupils, respectively, are taught by graduates of FAMU. Seventeen percent of African American pupils are taught by graduates of FAU, while 34 percent and 21 percent of Hispanic and white graduates are taught by graduates of Florida Intl. University and Univ. of South Florida, respectively. White women are the largest group of teachers of African American (40 percent), Hispanic (36 percent), and white pupils (62 percent). African American and Hispanic pupils have teachers with nearly equal SAT scores, though the SAT scores of teachers of white pupils are slightly higher.

[Insert Table 3]

Thirty-eight percent of teachers of African American pupils have an education degree, versus 43 percent and 51 percent of teachers of Hispanic and white pupils. Twenty-five percent of teachers of African American and Hispanic pupils have English degrees, while 20 percent of teachers of white pupils have English degrees. Just 4 percent of teachers of African American pupils have a degree in mathematics or statistics, while only 3 percent of teachers of Hispanic and white pupils have a mathematics or statistics degree.

About 10 percent of African American pupils and 2.5 percent of white pupils are enrolled in or eligible for enrollment in limited English proficiency courses. However, 60 percent of Hispanic pupils are currently enrolled in or eligible for enrollment in limited English proficiency courses. Two-thirds of African American pupils and 3/5 of Hispanic pupils are eligible for free or reduce price lunch, but only 27 percent of white pupils are eligible for free or reduced price lunch.

Ten percent, 11 percent, and 12 percent of African American, Hispanic, and white pupils have a specific learning disability, but 1.6 percent, 3.8 percent, and 5.1 percent, respectively, are

classified as gifted pupils. Roughly equal percentages of each group of pupils are enrolled in grades 3 – 11.

IV. Results

We estimate five specifications of the pupil academic achievement equation. The teacher program effects have virtually no sign differences between alternative specifications, though the specifications do exhibit differences in the statistical significance and absolute value of parameters. Regardless of specification or statistical significance, most teacher program parameters are negative, indicating that pupils taught by teachers who graduated from Florida Atlantic University, the comparative institution, will attain higher FCAT scores than otherwise identical pupils taught by teachers prepared at other Florida universities and colleges.

For the imputed persistence specification (equation 5), Tables 5a, 6a, and 7a (discussed below) present the teacher program effects for elementary school, middle school, and high school mathematics scores of pupils, both male and female. Tables 5b, 6b, and 7b present the same information for the reading scores of pupils. The appendix contains the results for the lagged dependent variable specification (equation 1, Tables A1 – A3), annual gain specification (equation 2, Tables A4 – A6), instrumental variable specification (equation 4, Tables A7 – A9), and net growth specification (equation 6, Tables A10 – A12).

The annual gain specification requires 100 percent achievement persistence, that is, $\alpha = 1$, while the net growth model assumes equal achievement persistence, regardless of race, gender, subject matter, or grade level. Table 4 shows that neither assumption is appropriate. Except for the reading achievement of African American females, achievement persistence declines as pupils advance from elementary school to high school. Regardless of subject matter or grade level, achievement persistence is about 10 percentage points lower among African American and Hispanic pupils than among white pupils. High school achievement persistence is greater among

females than males, though there does not appear to be a gender difference for elementary school and middle school. Finally, except for Hispanic and white elementary pupils, reading persistence is greater than mathematics persistence.

[Insert Table 4]

Because of differing dependent variables, the R^2 statistics for the alternative specifications are not comparable. However, it is noteworthy that R^2 is much lower for the specifications affected by measurement error for the dependent variable (imputed persistence, annual gain, and net growth) than for the lagged dependent and instrumental variable specifications. For example, for the imputed persistence, annual gain, and net growth specifications, for both reading and mathematics, and for male and female pupils, R^2 never exceeds 0.13 and is usually below 0.09. (See Table A13). But, for the lagged dependent variable and instrumental variable specifications, R^2 is never below 0.45 and is usually above 0.50.

With a balanced panel, the instrumental variable specification would be the preferred specification. However, with our unbalanced panel the instrumental variable specification is associated with a great reduction in degrees of freedom. For elementary school, we lose 1/4 to 1/3 of the observations. (See Table A13). For middle and high school, we lose $15 - 19$ percent of the observations. These reductions are non-random. Pupils are most likely to have new teachers for multiple years in a row at schools with high teacher turnover. Such large non-random reductions in degrees of freedom create sample selection bias.

Tables $5 - 7$ present the teacher program effects taken from the imputed persistence equations. Given the econometric problems associated with alternative specifications, along with the empirical information on the signs of the coefficients, achievement persistence, differences in

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R^2, and changes in sample size, the imputed persistence equation is our preferred specification. It is the only specification with consistent and efficient parameter estimates.

In addition to the normal procedure of identifying statistically significant parameters, we also use a system of superscripts to facilitate comparisons between statistical models. The superscript "a" indicates that a parameter is statistically significant and has the same sign for both the imputed persistence and instrumental variable specifications. When a parameter is statistically significant and has the same sign for the imputed persistence, instrumental variable, and annual gain or net growth specifications, it is identified by a "b" superscript. A "c" superscript is assigned to parameters that are statistically significant and has the same sign for both the imputed persistence and annual gain or net growth specifications. A "d" superscript is used to identify parameters that are insignificant in the imputed persistence model, but that are significant in either the annual gain or net growth specification and that have the same sign as the imputed persistence specification. Finally, an "e" superscript indicates that a parameter has the same sign in both the imputed persistence and instrumental variable specifications but that it is significant only in the latter model.

Elementary school

The imputed persistence model suggests multiple teacher program effects for the mathematics scores of Hispanic male and white female elementary pupils, but only limited teacher program effects for the mathematics scores all other race-gender pupils (Table 5a). Many of the statistically significant imputed persistence estimates are also significant in the other specifications of the pupil achievement equation.

For elementary school Hispanic males, FIU and FAMU, the state's two minority serving institutions, have mathematics achievement scores that are 37 points and 54 points lower,

respectively, than otherwise identical pupils taught by FAU trained teachers. For elementary white females, the FIU, UF, and FAMU program effects are -26 points, -27 points, and -29 points, respectively. For both race-gender groups, these are the largest program effects.

[Insert Tables 5a and 5b]

The imputed persistence model suggests the fewest number of significant teacher program effects for the reading scores of Hispanic male and female elementary pupils, with a greater number of teacher program effects for the reading scores all other race-gender pupils (Table 5b). Nearly all of the statistically significant imputed persistence estimates are significant in the other specifications of the pupil achievement equation.

The reading scores of African American males and females, white males and females, and Hispanic males taught by graduates of New College are lower than the reading scores of otherwise identical pupils taught by graduates of nearly all other other teacher programs, with program effects of -80 points and -35 points, -52 points and -43 points, and -44 points, respectively. Just St. Petersburg College has larger program effects for the reading achievement of white male (-64 points) and female (-81 points) elementary pupils.

Middle school

The imputed persistence specification reveals diverse teacher program effects for the mathematics scores of Hispanic male, African American female, and Hispanic female middle school pupils, with fewer statistically significant program effects for the mathematics scores of all other race-gender pupils (Table 6a). Many of the statistically significant imputed persistence estimates are significant in the additional specifications of the pupil achievement equation. However, it is also the case that statistically significant parameters for the instrumental variable specification are not necessarily significant for the imputed persistence specification.

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For middle school Hispanic males, FSU, UCF, and USF, have mathematics achievement scores that are 18 points, 22 points, and 24 points lower, respectively, than otherwise identical pupils taught by FAU trained teachers. For middle school African American females, UWF and FAMU have the largest mathematics program effects, -47 points and -32 points, respectively, while UCF (21 points), UF (-18 points), USF (-17 points), and FSU (-18 points) have smaller program effects. UCF, UNF, and FSU also have the only significant program effects for Hispanic females, -30 points, -29 points, and -17 points, respectively.

[Insert Tables 6a and 6b]

The imputed persistence specification uncovers no statistically significant program effects for the reading scores of middle school African American males and Hispanic females (Table 6b). Mostly, the statistically significant imputed persistence estimates are significant in the additional specifications of the pupil achievement equation, even as the alternative specifications identify statistically significant parameters that are insignificant for the imputed persistence specification.

The reading scores of Hispanic males taught by graduates of UWF are 97 points higher than the reading scores of otherwise identical pupils taught by graduates of FAU, though the program effects for UCF, USF, and UNF are -16 points, -34 points, and -35 points, respectively.

High school

The imputed persistence specification reveals diverse teacher program effects for the mathematics scores for all race-gender groups of high school pupils (Table 7a). Many of the statistically significant imputed persistence estimates are significant in the instrumental variable specification of the pupil academic achievement equation. Yet, the imputed persistence specification also shows relatively few statistically significant program effects the reading scores

of high school pupils; the instructional variable specification has a larger number of statistically significant parameters, though far less than for mathematics achievement.

[Insert Tables 7a and 7b]

For mathematics achievement, the imputed persistence specification identifies St. Petersburg College as the most distinct teacher preparation program since for 4 of the 6 race-gender equations, St. Petersburg College has the largest or the next to the largest program effects for the mathematics scores of high school pupils: -49 points (African American males), -46 points (Hispanic males), -38 points (African American females), and -35 points (Hispanic females).

V. Discussion: limitations and conclusions

We estimate five specifications of the pupil academic achievement equation: lagged dependent variable (1), annual gain (2), instrumental variables (4), imputed persistence (5), and net growth (6) specifications. For all specifications, ordinary least squares is the estimation procedure. The standard errors are adjusted for clustering: pupils with the same teacher have correlated standard errors. We estimate separate regressions for elementary (grades $3 - 6$), middle (grades $7 - 8$), and high school (grades $9 - 12$). Within each of these educational segments, we estimate separate regressions for African American males, African American females, Latinos, Latinas, white males, and white females. For each race-gender group, we estimate a separate equation for mathematics and readings. Finally, we control for teacher preparation program effects via a complete set of binary controls representing all universities and where FAU is the comparative institution. The estimation strategy yields a set of 72 regressions.

Our results show that: 1) the imputed persistence and instrumental variable specifications provide superior approaches to estimating value-added models of pupil academic achievement;

and, 2) except for Florida Atlantic University, we found little systematic evidence of a college preparation effect: pupils taught by teachers educated at Florida Atlantic University attain higher FCAT scores than pupils with identical observable characteristics but with teachers trained other Florida institutions, but there appears to be no systematic difference in teacher program effects on pupil academic achievement among the Non-FAU trained teachers.

The near absence of college preparation effects on pupil achievement is for teachers with 1-5 years of experience; hence, it is unlikely to have occurred because of differences in teacher attrition based on a teacher's college of preparation. Also, this study does not contain any information on the cost of training teachers by college of preparation. If, as this study suggests, teachers are of nearly equal quality regardless of their institution of preparation, but teacher preparation are relatively less expensive at some Florida institutions than at other Florida institutions, then there may be efficiency differences among Florida's institutions of higher education.

An important limitation of this study is that we do not have information on the effectiveness of Florida-trained teachers employed outside the state of Florida or outside of teaching within the State of Florida. Milton, et al. (2008) find that 72 percent of Initial Teacher Preparation program completers are employed in a Florida school. Only 59 percent of our Florida A & M University college of education completers is employed in a Florida school compared to 71 percent for Florida Atlanta University, 76 percent for Florida International University, 60 percent for Florida State University, and 61 percent for the University of Florida. Hence, strictly speaking, our results provide program effects for teachers who graduated from a Florida university and who choose to remain within the state of Florida. An additional important limitation of this study is that we do not control for the quality of educational leadership of

individual schools. We have no information on the direction or the statistical significance of the correlation between the preparation program of teachers and the quality of educational leadership of the schools of employment of teachers.

Also, the present study as well as the professional literature equates college preparation effects with mean test scores. But, the absence of a mean test score effect does not rule an inequality effect as capture that the standard deviation of test scores. For example, teachers trained at an institutions which emphasized "excellence" and teachers at institutions which emphasize "equity" may have pupils with identical mean test scores but with statistically significant differences in the standard deviation of test scores. Knowing whether a high mean score has occurred because a teacher has raise the scores of all pupils or just raised the scores of a few superstar pupils is a substantive policy issue.

Finally, this study has modeled education as a single product industry, that is, we have assumed that pupil standardized test scores are the sole output. However, it may be the case that education is a joint product industry, producing standardized test scores, disciplinary behavior, information regarding career opportunities, retention and promotion, and so forth. The near absence of a college preparation effect for standardized test scores does not provide information on these simultaneous educational outcomes. Further, our study does not examine academic outcomes other than reading and mathematics. Historical knowledge, science, art, and vocational preparation are important academic outcomes that may have college preparation effects. Finally, there are important non-academic outcomes that may have college preparation effects teen pregnancy prevention, absence of negative contact with the criminal justice system, and constructive civic engagement.

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Notes

[1] Primary exceptionalities include the following: educable mentally handicapped, trainable mentally handicapped, orthopedically impaired, occupational therapy, physical therapy, speech impaired, language impaired, deaf or hard of hearing, visually impaired, emotionally handicapped, specific learning disabled, gifted, hospital/homebound, profoundly mentally handicapped, dual-sensory impaired, autistic, severely emotionally disturbed, traumatic brain injured, developmentally delayed, established conditions, other health impaired, unknown.

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Table 1. Percent of pupils with 50 percent or higher learning gains

	Reading			Mathematics		
	ITP	DAC	EPI	ITP	DAC	EPI
Elementary school	88	83	**93**	81	**85**	77
Middle school	**91**	90	**91**	79	82	**84**
High school	**37**	35	31	89	**96**	82

Data are taken from Florida Department of Education, 2010.

Table 2. State University System of Florida (SUS)

Institution	Students	Carnegie Classification	College of Education
FL A & M Univ.	13,067	DRU: Doctoral/Research Universities	Ph.D., Educ. Leadership PTO
FL Atlantic Univ.	25,319	RU/H: Research Universities (high research activity)	Ed.D., Curriculum Instruction, Exceptional Student Ed. Ph.D., Counselor Educ., Educ. Leadership EPI
FL Gulf Coast Univ.	5955	Master's L: Master's Colleges and Universities (larger programs)	M.A. & M.Ed., Many programs EPI, PTO
FL International Univ.	34,865	RU/VH: Research Universities (very high research activity)	Ed.D., Adult Ed. & Human Resource Dev., Curriculum & Instruction, Ed. Admin. & Supervision, Execeptional Stud. Educ., Higher Educ. Admin., Ph.D., Curriculum & Instruction PTO
FL State Univ.	38,431	RU/VH: Research Universities (very high research activity)	Ph.D. & Ed.D., Many programs PTO
New College of FL	692	Bac/A&S: Baccalaureate Colleges--Arts & Sciences	No Education degree
Univ. of Central FL	42,465	RU/H: Research Universities (high research activity)	Ph.D. & Ed.D., Many programs PTO
Univ. of FL	47,993	RU/VH: Research Universities (very high research activity)	Ph.D. & Ed.D., Many programs EPI, PTO
Univ. of South FL	42,238	RU/VH: Research Universities (very high research activity)	Ph.D., Ed.D. Many programs
Univ. West FL	9,518	DRU: Doctoral/Research Universities	Ed.D., Alternative/Special Education, Teaching and Learning EPI, PTO
Univ. of North FL	14,533	Master's L: Master's Colleges and Universities (larger programs)	Ed.D., Educational Leadership EPI

Source: Data are derived from Carnegie Foundation for the advancement of teaching (http://www.carnegiefoundation.org/) and the web sites of each university.

Table 3. Descriptive statistics, reading and mathematics classes, grades 3 -12, by race, 2000 − 2006

	African American		Hispanic		White	
	N	Mean	N	Mean	N	Mean
FCAT Mathematics	280,488	1699	224,181	1774	429,362	1836
FCAT Reading	276,326	1632	221,535	1711	425,671	1818
Reading,annual gain	274,138	102.33	220,040	118.92	422,844	86.17
Mathematics,annual gain	278,508	93.22	222,855	93.58	427,307	78.31
Teacher Characteristics						
Fl Atlantic Univ.	284,254	0.1665	228,085	0.1235	433,240	0.0970
Fl International Univ.	284,254	0.1218	228,085	0.3434	433,240	0.0415
Univ. of West Fl	284,254	0.0333	228,085	0.0067	433,240	0.0612
Univ. of Central Fl	284,254	0.1188	228,085	0.1384	433,240	0.1830
Fl Gulf Coast Univ.	284,254	0.0169	228,085	0.0353	433,240	0.0371
Univ. of Fl	284,254	0.1135	228,085	0.0838	433,240	0.1258
Chipola Community Coll	284,254	0.0001	228,085	0.0000	433,240	0.0007
Univ. of South Fl	284,254	0.1283	228,085	0.1144	433,240	0.2055
Univ. of Miami	284,254	0.0001	228,085	0.0001	433,240	0.0000
Univ. of North Fl	284,254	0.0774	228,085	0.0173	433,240	0.0763
Fl State Univ.	284,254	0.1311	228,085	0.0927	433,240	0.1356
Fl Agri. & Mech. Univ.	284,254	0.0766	228,085	0.0247	433,240	0.0215
St. Petersburg College	284,254	0.0018	228,085	0.0013	433,240	0.0045
New College	284,254	0.0007	228,085	0.0012	433,240	0.0014
SUS grade point avg	280,114	3.09	223,995	3.10	427,887	3.27
Experience	280,488	2.18	224,181	2.22	429,362	2.20
Afr. Amer. Male	284,254	0.0789	228,085	0.0403	433,240	0.0236
Afr. Amer. Female	284,254	0.2469	228,085	0.1242	433,240	0.0808
white male	284,254	0.1297	228,085	0.1095	433,240	0.1671
white female	284,254	0.3996	228,085	0.3556	433,240	0.6246
Latino	284,254	0.0316	228,085	0.0712	433,240	0.0123
Latina	284,254	0.0679	228,085	0.2576	433,240	0.0538
Native Amer. Male	284,254	0.0022	228,085	0.0015	433,240	0.0017
Native Amer. Female	284,254	0.0014	228,085	0.0004	433,240	0.0017
Asian Amer. Male	284,254	0.0040	228,085	0.0025	433,240	0.0034
Asian Amer. Female	284,254	0.0105	228,085	0.0093	433,240	0.0082
mixed race male	284,254	0.0000	228,085	0.0000	433,240	0.0006
mixed race female	284,254	0.0002	228,085	0.0003	433,240	0.0002
other male	284,254	0.0035	228,085	0.0025	433,240	0.0033
other female	284,254	0.0103	228,085	0.0079	433,240	0.0098
SAT Mathematics	152,589	513	131,693	514	242,749	531
SAT Verbal	152,765	518	130,562	520	242,192	538

	African American		Hispanic		White	
Table 3 (continued). Descriptive statistics, by race, 2000 – 2006						
	N	Mean	N	Mean	N	Mean
Teacher Characteristics (continued)						
Special education	284,254	0.0310	228,085	0.0226	433,240	0.0401
Spec learn disabil educ	284,254	0.0183	228,085	0.0354	433,240	0.0114
Elementary education	284,254	0.1476	228,085	0.1551	433,240	0.1864
Middle education	284,254	0.0155	228,085	0.0029	433,240	0.0276
Secondary education	284,254	0.0143	228,085	0.0100	433,240	0.0234
Early childhood dev educ	284,254	0.0001	228,085	0.0001	433,240	0.0001
Agricultural education	284,254	0.0001	228,085	0.0001	433,240	0.0002
Art teacher education	284,254	0.0002	228,085	0.0002	433,240	0.0004
Business education	284,254	0.0005	228,085	0.0002	433,240	0.0005
English education	284,254	0.0762	228,085	0.0956	433,240	0.1137
Foreign language education	284,254	0.0004	228,085	0.0003	433,240	0.0004
Health education	284,254	0.0001	228,085	0.0003	433,240	0.0001
Home economics education	284,254	0.0004	228,085	0.0009	433,240	0.0003
Mathematics education	284,254	0.0505	228,085	0.0732	433,240	0.0841
Music education	284,254	0.0009	228,085	0.0005	433,240	0.0008
Physical education	284,254	0.0046	228,085	0.0052	433,240	0.0037
Science education	284,254	0.0009	228,085	0.0032	433,240	0.0015
Social science education	284,254	0.0064	228,085	0.0049	433,240	0.0096
Industrial arts education	284,254	0.0014	228,085	0.0012	433,240	0.0013
Agriculture	284,254	0.0023	228,085	0.0014	433,240	0.0026
Architecture	284,254	0.0009	228,085	0.0019	433,240	0.0006
Biology	284,254	0.0066	228,085	0.0065	433,240	0.0033
Business administration	284,254	0.0659	228,085	0.0531	433,240	0.0511
Computer & information sci	284,254	0.0134	228,085	0.0142	433,240	0.0067
Criminal justice	284,254	0.0111	228,085	0.0089	433,240	0.0073
Cultural studies	284,254	0.0004	228,085	0.0008	433,240	0.0004
Engineering	284,254	0.0220	228,085	0.0178	433,240	0.0090
English	284,254	0.2525	228,085	0.2497	433,240	0.2023
Foreign language	284,254	0.0060	228,085	0.0109	433,240	0.0040
Health	284,254	0.0114	228,085	0.0060	433,240	0.0077
History	284,254	0.0037	228,085	0.0021	433,240	0.0034
Home economics	284,254	0.0046	228,085	0.0048	433,240	0.0032
Inter-disciplinary studies	284,254	0.0011	228,085	0.0008	433,240	0.0005
Journalism & communications	284,254	0.0350	228,085	0.0313	433,240	0.0292
Legal profession	284,254	0.0001	228,085	0.0004	433,240	0.0007
Leisure	284,254	0.0045	228,085	0.0028	433,240	0.0057
Liberal arts	284,254	0.0232	228,085	0.0310	433,240	0.0293
Mathematics & statistics	284,254	0.0380	228,085	0.0279	433,240	0.0275
Natural resources	284,254	0.0003	228,085	0.0001	433,240	0.0003
Philosophy & religion	284,254	0.0019	228,085	0.0008	433,240	0.0022

Table 3 (continued). Descriptive statistics, by race, 2000 – 2006						
	African American		Hispanic		White	
	N	Mean	N	Mean	N	Mean
Teacher Characteristics (continued)						
Physics	284,254	0.0020	228,085	0.0011	433,240	0.0016
Psychology	284,254	0.0326	228,085	0.0307	433,240	0.0240
Public admin & service	284,254	0.0072	228,085	0.0055	433,240	0.0036
Social science	284,254	0.0530	228,085	0.0371	433,240	0.0428
Visual and performing arts	284,254	0.0087	228,085	0.0082	433,240	0.0075
Pupil Characteristics						
Male	284,254	0.4963	228,085	0.5089	433,240	0.5160
LEP, enrolled	284,254	0.0320	228,085	0.1500	433,240	0.0074
LEP, eligible	284,254	0.0632	228,085	0.4481	433,240	0.0187
Free or reduced lunch	284,254	0.6575	228,085	0.5986	433,240	0.2695
educable mentally handicapped	284,254	0.0119	228,085	0.0031	433,240	0.0028
trainable mentally handicapped	284,254	0.0001	228,085	0.0000	433,240	0.0000
orthopedically impaired	284,254	0.0009	228,085	0.0010	433,240	0.0015
speech impaired	284,254	0.0065	228,085	0.0051	433,240	0.0106
language impaired	284,254	0.0197	228,085	0.0091	433,240	0.0080
deaf or hard of hearing	284,254	0.0011	228,085	0.0011	433,240	0.0014
visually impaired	284,254	0.0003	228,085	0.0002	433,240	0.0004
emotionally handicapped	284,254	0.0219	228,085	0.0072	433,240	0.0173
specific learning disabled	284,254	0.1012	228,085	0.1141	433,240	0.1226
gifted	284,254	0.0161	228,085	0.0375	433,240	0.0508
hospital/homebound	284,254	0.0011	228,085	0.0010	433,240	0.0019
autistic	284,254	0.0004	228,085	0.0010	433,240	0.0011
severely emot disturbed	284,254	0.0041	228,085	0.0022	433,240	0.0025
traumatic brain injured	284,254	0.0002	228,085	0.0002	433,240	0.0002
established conditions	284,254	0.0001	228,085	0.0000	433,240	0.0000
other health impaired	284,254	0.0052	228,085	0.0059	433,240	0.0102
Grade 3	280,488	0.0101	224,181	0.0092	429,362	0.0053
Grade 4	280,488	0.0422	224,181	0.0469	429,362	0.0542
Grade 5	280,488	0.0385	224,181	0.0392	429,362	0.0470
Grade 6	280,488	0.1680	224,181	0.1534	429,362	0.1696
Grade 7	280,488	0.1723	224,181	0.1870	429,362	0.1854
Grade 8	280,488	0.1456	224,181	0.1549	429,362	0.1526
Grade 9	280,488	0.2244	224,181	0.2178	429,362	0.2141
Grade 10	280,488	0.1481	224,181	0.1597	429,362	0.1557
Grade 11	280,488	0.0379	224,181	0.0253	429,362	0.0131
Grade 12	280,488	0.0128	224,181	0.0067	429,362	0.0030

Table 3 (continued). Descriptive statistics, by race, 2000 – 2006						
	African American		Hispanic		White	
	N	Mean	N	Mean	N	Mean
School Characteristics						
Title 1 status						
Schoolwide 2000	284,254	0.4753	228,085	0.3696	433,240	0.1939
Targeted Assistance 2000	284,254	0.0241	228,085	0.0180	433,240	0.0437
Schoolwide 2001	284,254	0.4127	228,085	0.3381	433,240	0.1830
Targeted Assistance 2001	284,254	0.0161	228,085	0.0126	433,240	0.0284
Schoolwide 2002	284,254	0.3824	228,085	0.3144	433,240	0.1706
Targeted Assistance 2002	284,254	0.0100	228,085	0.0091	433,240	0.0224
Schoolwide 2003	284,254	0.3605	228,085	0.2952	433,240	0.1583
Targeted Assistance 2003	284,254	0.0057	228,085	0.0061	433,240	0.0102
Schoolwide 2004	284,254	0.3204	228,085	0.2579	433,240	0.1332
Targeted Assistance 2004	284,254	0.0020	228,085	0.0024	433,240	0.0060
Schoolwide 2005	284,254	0.2722	228,085	0.2092	433,240	0.1041
Targeted Assistance 2005	284,254	0.0012	228,085	0.0013	433,240	0.0033
Year 2000	284,254	0.0059	228,085	0.0054	433,240	0.0076
Year 2001	284,254	0.0502	228,085	0.0471	433,240	0.0569
Year 2002	284,254	0.1153	228,085	0.1095	433,240	0.1167
Year 2003	284,254	0.1963	228,085	0.1891	433,240	0.1939
Year 2004	284,254	0.2771	228,085	0.2775	433,240	0.2756
Year 2005	284,254	0.3420	228,085	0.3543	433,240	0.3405

Table 4. Estimates of achievement persistence: by race, gender, grade, and subject matter

	Males	African American	Hispanic	White
Elementary school	Mathematics	0.77	0.75	0.86
	Reading	0.77	0.74	0.85
Middle school	Mathematics	0.69	0.66	0.78
	Reading	0.76	0.71	0.80
High school	Mathematics	0.58	0.64	0.71
	Reading	0.71	0.71	0.79
	Females	African American	Hispanic	White
Elementary school	Mathematics	0.77	0.78	0.83
	Reading	0.77	0.74	0.88
Middle school	Mathematics	0.69	0.67	0.77
	Reading	0.78	0.70	0.79
High school	Mathematics	0.61	0.67	0.73
	Reading	0.77	0.70	0.86

Table 5a.
Imputed persistence coefficient specification, mathematics: elementary school, program effects

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	**-37.78****,**b**	**-36.95*****,**b**	**-41.96*****,**b**	-14.25	-17.32*,a	-26.16**
	(16.64)	(9.328)	(9.813)	(14.22)	(9.592)	(12.33)
Univ. of West Florida	**-52.98****,**b**	-8.278e	17.80	-6.659	-8.878	-11.86
	(25.73)	(43.28)	(20.15)	(19.98)	(43.39)	(15.09)
Univ. of Central Florida	15.31	-17.21*,a	-3.648	**36.37*****,**c**	-0.669	-16.54**
	(13.10)	(9.947)	(8.089)	(13.39)	(13.90)	(8.364)
Fl. Gulf Coast University	-18.22	2.799	5.339	7.533	-1.372	-5.791
	(22.14)	(12.97)	(13.71)	(22.14)	(16.23)	(12.08)
University of Florida	-13.94	-21.23**,a	-6.618	11.64	-9.513	-26.98***,a
	(14.15)	(10.77)	(8.415)	(12.27)	(11.24)	(9.403)
Univ. of South Florida	-5.739	-21.39**,a	-4.131	10.44	-3.600e	-15.43*,a
	(13.40)	(10.46)	(7.841)	(13.27)	(11.16)	(8.795)
Univ. of North Florida	-12.54	-49.44	-1.957	-0.895	9.950	-5.893
	(13.87)	(36.39)	(9.544)	(22.69)	(38.96)	(10.58)
Florida St. University	-5.550e	-5.630	0.301	-8.341	-1.987	-8.125
	(13.34)	(14.98)	(10.68)	(14.52)	(15.77)	(10.14)
Florida A & M University	-5.372e	-53.74***	-25.56**	-8.286	-20.39	-28.60*
	(15.52)	(19.11)	(11.75)	(14.14)	(20.07)	(15.52)
St. Pete College	11.22		16.10	-23.09		2.936
	(22.13)		(17.12)	(18.88)		(16.14)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	4719	4128	7267	4724	3869	6602
R^2	0.065	0.102	0.086	0.074	0.102	0.098

* 10 percent level of significance, ** 5 percent level of significance, *** 1 percent level of significance
[a] statistically significant for both imputed coefficient and instrumental variable specifications and same sign
[b] statistically significant for both imputed coefficient, instrumental variable, and annual gain or net growth specifications and same sign
[c] statistically significant for both imputed coefficient and annual gain or net growth specifications and same sign and same sign for imputed coefficient and annual gain or net growth
[d] same sign for imputed coefficient and annual gain or net growth
[e] same sign as imputed coefficient, but statistically significant only for instrumental variable specification

Table 5b. Teacher preparation program effects (imputed coefficient), reading: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-22.53**,[a]	-7.772	-8.564	-22.20*,[a]	1.932[d]	-13.13[d]
	(11.15)	(10.95)	(12.90)	(12.26)	(10.25)	(9.632)
Univ. of West Florida	-33.97	-24.87	-11.32	-1.624	14.41	-11.95
	(25.79)	(19.19)	(13.36)	(15.65)	(17.11)	(16.26)
Univ. of Central Florida	-16.57**,[c]	-19.77**,[c]	-9.136[d]	-10.66[d]	-5.106	-11.51[d]
	(8.390)	(8.994)	(6.937)	(7.745)	(8.541)	(7.552)
Fl. Gulf Coast University	-36.30**,[c]	-35.24**,[b]	-15.56*,[a]	6.896	-11.96	-19.64*,[a]
	(16.47)	(16.46)	(8.823)	(16.34)	(12.37)	(11.28)
University of Florida	-30.18***,[b]	-23.20**,[a]	-20.87***,[b]	-24.39***,[b]	-19.72**	-21.95***,[b]
	(9.891)	(11.04)	(7.188)	(7.825)	(9.869)	(7.657)
Univ. of South Florida	-28.97***,[b]	-15.57	-20.53***,[a]	-17.26*,[a]	-15.20	-11.76
	(10.51)	(11.41)	(7.673)	(9.985)	(11.33)	(8.017)
Univ. of North Florida	-23.06[d]	7.011	-24.57**,[b]	-16.66*,[a]	18.74	-37.49***,[b]
	(14.04)	(17.93)	(11.11)	(9.851)	(24.41)	(13.20)
Florida St. University	-43.69***,[b]	-13.09	-8.729	-23.13***,[b]	2.290	-4.189
	(9.366)	(10.29)	(7.836)	(7.996)	(9.762)	(7.852)
Florida A & M University	2.855	-7.569	-26.20**,[a]	4.996	-11.73	-43.48***,[b]
	(12.75)	(21.64)	(12.39)	(12.18)	(18.15)	(14.38)
St. Pete College	-156.3*,[a]		-63.76[d,e]	-40.40*,[a]		-80.53[d,e]
	(94.53)		(47.34)	(21.61)		(50.16)
New College	-80.38***,[b]	-10.33	-51.74***,[b]	-35.38***,[a]	43.72***,[c]	-42.53***,[b]
	(11.44)	(12.05)	(8.742)	(9.543)	(12.35)	(9.272)
Observations	12549	10077	20944	12346	9357	19342
R^2	0.065	0.073	0.043	0.073	0.078	0.053

* 10 percent level of significance, ** 5 percent level of significance, *** 1 percent level of significance

[a] statistically significant for both imputed coefficient and instrumental variable specifications and same sign

[b] statistically significant for both imputed coefficient, instrumental variable, and annual gain or net growth specifications and same sign

[c] statistically significant for both imputed coefficient and annual gain or net growth specifications and same sign and same sign for imputed coefficient and annual gain or net growth

[d] same sign for imputed coefficient and annual gain or net growth

[e] same sign as imputed coefficient, but statistically significant only for instrumental variable specification

Table 6a
Imputed persistence coefficient specification, mathematics: middle school, program effects

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-7.731[e]	-10.90[e]	8.057	-13.82	-13.89[e]	-15.31*,[c]
	(8.234)	(10.91)	(8.424)	(9.298)	(9.042)	(8.072)
Univ. of West Florida	-28.22[e]	9.872	-2.429	-47.48**,[a]	-21.26	-5.161
	(28.05)	(43.11)	(12.48)	(20.86)	(22.13)	(12.21)
Univ. of Central Florida	-12.27[e]	-22.12**,[a]	6.075	-21.32**	-29.66***,[a]	-8.922[e]
	(8.489)	(8.750)	(6.526)	(8.445)	(8.731)	(6.219)
Fl. Gulf Coast University	3.877	-10.99	16.65	5.972	-9.274	23.30[e]
	(8.571)	(11.95)	(14.76)	(15.46)	(14.43)	(14.48)
University of Florida	-5.133	-7.334[e]	10.07	-18.07**	-2.800	-1.802
	-8.011	(9.911)	(6.283)	(8.132)	(8.498)	(6.330)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	-4.939	-24.41**,[a]	7.866	-17.24*	-10.95[e]	-3.628
	(9.782)	(9.874)	(7.150)	(9.641)	(9.466)	(6.412)
Univ. of North Florida	-1.964[e]	-17.59	-0.788[e]	-15.34[e]	-28.95*	-8.998
	(13.50)	(29.57)	(10.12)	(11.88)	(17.41)	(8.634)
Florida St. University	-8.420[e]	-18.04*,[a]	2.528[d]	-17.70**	-17.04*,[a]	-11.37*,[a]
	(8.434)	(9.361)	(6.889)	(7.971)	(9.101)	(6.653)
Florida A & M University	-23.53*	-17.05[e]	21.53**,[c]	-31.53***	-5.774[e]	-5.940
	(12.93)	(12.95)	(9.352)	(11.31)	(12.10)	(10.26)
St. Pete College	-22.60**,[c]		-5.373[e]	0		-7.484[e]
	(10.38)		(8.103)	(0)		(7.876)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	7600	6988	13814	7742	6601	13853
R^2	0.027	0.040	0.020	0.032	0.038	0.021

* 10 percent level of significance, ** 5 percent level of significance, *** 1 percent level of significance
[a] statistically significant for both imputed coefficient and instrumental variable specifications and same sign
[b] statistically significant for both imputed coefficient, instrumental variable, and annual gain or net growth specifications and same sign
[c] statistically significant for both imputed coefficient and annual gain or net growth specifications and same sign and same sign for imputed coefficient and annual gain or net growth
[d] same sign for imputed coefficient and annual gain or net growth
[e] same sign as imputed coefficient, but statistically significant only for instrumental variable specification

Table 6b. Teacher preparation program effects (imputed coefficient), reading: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-4.141[e]	1.396	**2.342**[d]	-0.239	**11.42**[d]	-3.294
	(10.47)	(8.749)	(9.036)	(8.236)	(7.338)	(8.314)
Univ. of West Florida	-0.0820	**97.07**,b**	-9.156	**-33.97**,a**	-47.58	-11.20
	(22.25)	(43.13)	(18.07)	(15.51)	(46.41)	(10.19)
Univ. of Central Florida	-8.889[e]	-15.68*,a	-8.717	**5.303**[d]	6.276	-1.769
	(8.864)	(8.819)	(6.797)	(7.384)	(8.357)	(7.231)
Fl. Gulf Coast University	-30.00[e]	-25.32[e]	-8.572	**25.15**[d]	**9.003**[d]	**9.539**[d]
	(18.30)	(25.34)	(9.616)	(19.51)	(16.62)	(9.991)
University of Florida	-3.112[e]	-10.08[e]	-3.155	5.836	10.21	-5.810
	(10.20)	(9.084)	(6.460)	(7.796)	(8.586)	(7.378)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	-9.312[e]	-33.96***,a	-24.87***,a	-7.935[e]	-13.84[e]	-12.30*,a
	(8.698)	(9.394)	(6.581)	(7.596)	(8.727)	(7.293)
Univ. of North Florida	-12.32[e]	**-55.32***,b**	-2.822	**7.516**[d]	-23.79	-11.19
	(10.52)	(17.43)	(8.780)	(9.639)	(16.05)	(10.36)
Florida St. University	-8.127	-13.67[e]	-11.29*	2.483	0.505	-4.345
	(8.401)	(9.310)	(6.416)	(6.511)	(7.717)	(7.343)
Florida A & M University	-6.773	-19.96	-5.432	5.859	1.158	-20.15*
	(11.31)	(13.03)	(10.53)	(9.233)	(11.27)	(11.21)
St. Pete College	0		**113.0**[d]	**330.4***,b**		**-382.3***,b**
	(0)		(81.23)	(17.49)		(10.68)
New College	36.77	-35.43[e]	-9.921	**-34.58**,a**	16.15	-21.63[a]
	(41.57)	(41.25)	(11.58)	(15.71)	(43.65)	(18.03)
Observations	14986	14677	25939	14774	13515	24288
R^2	0.053	0.049	0.027	0.038	0.048	0.029

* 10 percent level of significance, ** 5 percent level of significance, *** 1 percent level of significance
[a] statistically significant for both imputed coefficient and instrumental variable specifications and same sign
[b] statistically significant for both imputed coefficient, instrumental variable, and annual gain or net growth specifications and same sign
[c] statistically significant for both imputed coefficient and annual gain or net growth specifications and same sign and same sign for imputed coefficient and annual gain or net growth
[d] same sign for imputed coefficient and annual gain or net growth
[e] same sign as imputed coefficient, but statistically significant only for instrumental variable specification

Table 7a.
Imputed persistence coefficient specification, mathematics: high school, program effects

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-4.882	-11.37*,a	-28.70***,a	-11.75*,a	-14.91**,a	-13.79*,a
	(8.067)	(6.510)	(8.334)	(6.919)	(6.085)	(7.844)
Univ. of West Florida	-6.268	-25.90***,a	**-14.86**,c	**-22.86***,c	-10.81*	**-8.560**d
	(6.878)	(6.798)	(7.316)	(8.714)	(5.900)	(9.686)
Univ. of Central Florida	-13.04**	-23.11***,a	-19.28***,a	-16.92***,a	**-25.25***,b	-13.27***,a
	(5.661)	(6.437)	(4.107)	(6.197)	(5.350)	(4.591)
Fl. Gulf Coast University	-20.25	-34.64***,a	-24.76***,a	**-29.16***,c	-20.37***,a	-18.87**,a
	(15.34)	(11.11)	(5.600)	(15.53)	(6.893)	(7.870)
University of Florida	-11.99**,a	-13.93**,a	**-19.04***,b	-15.36***,a	-15.42**,a	-11.73***,a
	(5.214)	(6.524)	(3.956)	(4.878)	(5.998)	(4.009)
Univ. of South Florida	-6.964	-21.19***,a	**-23.54***,b	**-15.71***,b	-17.84***,a	-18.55***,a
	(5.612)	(7.352)	(4.798)	(5.559)	(6.051)	(4.655)
Univ. of North Florida	**7.087**d	3.576	-3.466	-6.996	-10.05e	-2.245
	(5.846)	(7.005)	(4.501)	(6.326)	(7.427)	(4.134)
Florida St. University	-7.138	-15.77**,a	**-21.15***,b	-14.13***,a	-13.56**,a	-10.31**,a
	(5.373)	(7.495)	(4.059)	(4.438)	(5.944)	(4.181)
Florida A & M University	-8.324	-5.335	**-35.36***,c	-21.82***	-3.795e	-9.478
	(9.872)	(9.758)	(8.645)	(5.674)	(6.963)	(6.659)
St. Pete College	-49.12***,a	-46.29***,a	-20.99*,a	-38.16***,a	-35.11***,a	-14.20**,a
	(7.346)	(9.907)	(11.22)	(7.543)	(11.57)	(6.053)
New College	**26.28***,c	**-51.95***,b	-24.60***	-11.36*,a	-12.69e	-3.345e
	(7.630)	(8.917)	(5.831)	(6.663)	(8.440)	(5.908)
Observations	11923	11216	20075	12618	10984	19522
R^2	0.073	0.082	0.063	0.080	0.074	0.084

* 10 percent level of significance, ** 5 percent level of significance, *** 1 percent level of significance

[a] statistically significant for both imputed coefficient and instrumental variable specifications and same sign

[b] statistically significant for both imputed coefficient, instrumental variable, and annual gain or net growth specifications and same sign

[c] statistically significant for both imputed coefficient and annual gain or net growth specifications and same sign and same sign for imputed coefficient and annual gain or net growth

[d] same sign for imputed coefficient and annual gain or net growth

[e] same sign as imputed coefficient, but statistically significant only for instrumental variable specification

Table 7b. Teacher preparation program effects (imputed coefficient), reading: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-21.92**	20.53*	-3.065	4.352	9.253	-1.506
	(9.998)	(10.79)	(9.460)	(8.187)	(7.469)	(7.901)
Univ. of West Florida	29.81[e]	-9.194	3.254	1.035	0.310	-12.24
	(24.76)	(31.41)	(12.91)	(9.966)	(24.98)	(11.69)
Univ. of Central Florida	-3.595	-7.362	-13.08[e]	-6.460[e]	-13.81	-11.61[e]
	(8.570)	(11.06)	(8.187)	(9.246)	(8.567)	(7.136)
Fl. Gulf Coast University	-13.97	-37.80*,[a]	-15.32[e]	9.679	-41.32**,[a]	-41.65***,[a]
	(16.33)	(21.11)	(12.92)	(12.44)	(16.74)	(11.97)
University of Florida	-16.92**	2.272	-14.48*	-7.304[e]	-2.265	-7.907
	(8.247)	(11.28)	(8.040)	(7.699)	(8.708)	(7.190)
Univ. of South Florida	-29.50***,[a]	-12.04[e]	-14.83*,[a]	-17.00**,[a]	-15.06*,[a]	-12.59*,[a]
	(8.378)	(10.86)	(8.191)	(6.701)	(8.118)	(7.239)
Univ. of North Florida	-7.632	-0.226	-13.20[e]	-11.56	-18.05	-12.95
	(9.245)	(18.00)	(9.758)	(8.698)	(16.34)	(8.252)
Florida St. University	-8.359	9.996	-9.886	-2.037	2.754	-12.16*
	(8.035)	(11.49)	(8.113)	(6.945)	(8.293)	(7.098)
Florida A & M University	-9.284[e]	-1.004	-5.276	-13.92	7.072[e]	-14.16
	(11.17)	(14.76)	(16.05)	(9.583)	(13.60)	(15.24)
St. Pete College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
New College	25.17[e]	-53.37	-16.07	11.44	-18.34	-12.84[e]
	(16.45)	(78.02)	(31.82)	(11.54)	(23.49)	(9.944)
Observations	20200	16489	29688	21415	16687	27289
R^2	0.081	0.090	0.061	0.086	0.108	0.060

* 10 percent level of significance, ** 5 percent level of significance, *** 1 percent level of significance

[a] statistically significant for both imputed coefficient and instrumental variable specifications and same sign

[b] statistically significant for both imputed coefficient, instrumental variable, and annual gain or net growth specifications and same sign

[c] statistically significant for both imputed coefficient and annual gain or net growth specifications and same sign and same sign for imputed coefficient and annual gain or net growth

[d] same sign for imputed coefficient and annual gain or net growth

[e] same sign as imputed coefficient, but statistically significant only for instrumental variable specification

Appendix.

This appendix contains the teacher preparation program coefficients for the lagged dependent variable (1), annual gain (2), instrumental variable (4), net growth specifications (6) of the academic achievement equation.

Table A1a.
Teacher preparation program effects (lagged dependent variable), mathematics: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-40.39**	-38.80***	-47.56***	-15.99	-18.58*	-30.12***
	(16.62)	(9.569)	(9.545)	(14.77)	(9.754)	(11.48)
Univ. of West Florida	-55.17**	-16.32	17.80	-7.250	-11.00	-12.09
	(26.30)	(40.12)	(22.43)	(19.85)	(44.17)	(14.14)
Univ. of Central Florida	17.31	-20.65**	-5.644	38.82***	-2.116	-18.63**
	(14.29)	(9.967)	(8.678)	(14.63)	(14.27)	(8.396)
Fl. Gulf Coast University	-18.89	0.197	2.925	4.838	-2.845	-6.729
	(23.40)	(13.17)	(13.55)	(22.61)	(16.64)	(11.21)
University of Florida	-14.51	-23.26**	-9.401	11.11	-10.80	-30.30***
	(14.37)	(11.00)	(9.358)	(13.37)	(11.47)	(9.575)
Univ. of South Florida	-8.308	-24.73**	-11.08	7.370	-5.461	-21.33**
	(13.81)	(10.69)	(8.120)	(13.84)	(11.28)	(8.618)
Univ. of North Florida	-14.16	-53.43	-3.499	-2.566	8.793	-10.36
	(14.81)	(36.09)	(10.57)	(23.41)	(39.42)	(10.85)
Florida St. University	-10.65	-10.18	-6.122	-9.742	-4.167	-12.85
	(14.03)	(15.14)	(11.89)	(15.12)	(16.22)	(10.20)
Florida A & M University	-8.317	-57.70***	-27.23**	-7.640	-22.47	-33.16**
	(16.69)	(19.78)	(13.02)	(15.28)	(20.50)	(16.09)
St. Pete Coll	8.033		16.29	-34.81*		0.415
	(23.74)		(18.00)	(20.63)		(16.56)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	4719	4128	7267	4724	3869	6602
R-squared	0.571	0.641	0.671	0.580	0.656	0.696

Table A2a.
Teacher preparation program effects (lagged dependent variable), mathematics: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-16.37*	-17.19	2.626	-20.49**	-18.44**	-14.23*
	(8.408)	(10.95)	(8.212)	(9.356)	(9.199)	(7.662)
Univ. of West Florida	-35.87	-4.323	-11.85	-61.69***	-30.96	-13.16
	(29.93)	(43.13)	(13.55)	(23.11)	(22.87)	(12.16)
Univ. of Central Florida	-16.37*	-29.20***	0.155	-22.60***	-34.13***	-10.86
	(8.636)	(8.955)	(7.057)	(8.396)	(8.863)	(6.728)
Fl. Gulf Coast University	-0.339	-13.54	10.55	1.039	-13.59	22.56**
	(8.923)	(13.13)	(15.92)	(13.23)	(12.69)	(11.39)
University of Florida	-9.795	-11.29	5.796	-20.91**	-5.403	-4.293
	(8.513)	(10.25)	(6.741)	(8.338)	(8.791)	(6.655)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	-9.975	-30.55***	0.373	-21.45**	-15.32	-8.726
	(10.28)	(10.37)	(7.578)	(9.773)	(9.771)	(7.101)
Univ. of North Florida	-8.342	-23.35	-6.380	-22.88	-32.37*	-11.59
	(15.46)	(30.10)	(11.52)	(14.53)	(18.45)	(9.612)
Florida St. University	-13.45	-21.50**	-4.917	-19.31**	-20.42**	-14.35**
	(8.930)	(9.667)	(7.812)	(8.165)	(9.546)	(7.282)
Florida A & M University	-28.59**	-27.90**	10.07	-34.93***	-12.51	-11.39
	(13.86)	(14.02)	(8.789)	(11.74)	(12.93)	(9.568)
St. Pete College	1.720		-15.23*	0		-18.21**
	(10.59)		(8.913)	(0)		(8.833)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	7600	6988	13814	7742	6601	13853
R-squared	0.511	0.606	0.626	0.556	0.627	0.654

Table A3a.
Teacher preparation program effects (lagged dependent variable), mathematics: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-5.405	-13.42**	-32.02***	-13.66*	-17.61***	-16.06**
	(8.220)	(6.753)	(8.433)	(7.316)	(6.176)	(8.098)
Univ. of West Florida	-5.628	-26.46***	-13.96*	-21.11**	-11.34*	-8.068
	(7.010)	(7.137)	(7.729)	(8.811)	(5.825)	(10.64)
Univ. of Central Florida	-13.43**	-24.81***	-21.09***	-17.93***	-26.95***	-14.91***
	(5.750)	(6.646)	(4.240)	(6.421)	(5.534)	(4.697)
Fl. Gulf Coast University	-20.80	-37.39***	-26.97***	-28.39*	-21.64***	-20.42**
	(15.35)	(11.67)	(5.790)	(15.91)	(7.177)	(8.219)
University of Florida	-12.43**	-15.03**	-20.36***	-16.46***	-16.46***	-13.27***
	(5.266)	(6.635)	(4.125)	(5.039)	(6.121)	(4.287)
Univ. of South Florida	-6.906	-22.72***	-25.46***	-16.16***	-19.70***	-20.74***
	(5.776)	(7.702)	(5.000)	(5.838)	(6.260)	(4.975)
Univ. of North Florida	6.743	3.697	-3.703	-7.369	-11.23	-2.652
	(5.996)	(7.395)	(4.767)	(6.730)	(7.542)	(4.520)
Florida St. University	-7.666	-17.30**	-22.49***	-15.22***	-15.17**	-11.68***
	(5.407)	(7.584)	(4.230)	(4.639)	(5.963)	(4.435)
Florida A & M University	-9.172	-7.302	-36.89***	-23.75***	-5.652	-10.99
	(10.04)	(10.20)	(8.989)	(6.201)	(7.093)	(7.102)
St. Pete Coll	-50.70***	-50.60***	-24.32**	-41.57***	-39.28***	-18.54***
	(7.555)	(10.53)	(11.40)	(7.960)	(12.18)	(6.334)
New College	25.36***	-52.53***	-27.57***	-12.65*	-19.89**	-5.620
	(7.770)	(9.069)	(6.134)	(7.024)	(9.171)	(6.220)
Observations	11923	11216	20075	12618	10984	19522
R-squared	0.535	0.595	0.681	0.562	0.622	0.714

Table A1b.
Teacher preparation program effects (lagged dependent variable), reading: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-28.76**	-8.722	-7.213	-29.50**	-1.579	-12.07
	(11.79)	(11.87)	(15.49)	(12.82)	(11.23)	(12.31)
Univ. of West Florida	-34.03	-21.93	-2.002	-7.397	10.00	-5.902
	(24.88)	(20.25)	(15.66)	(13.72)	(22.62)	(19.15)
Univ. of Central Florida	-17.83**	-19.23**	-0.783	-14.91*	-5.975	-3.111
	(8.706)	(9.038)	(6.844)	(8.327)	(8.656)	(7.008)
Fl. Gulf Coast University	-35.03**	-41.54**	-19.47**	0.298	-20.71	-25.30***
	(16.73)	(16.54)	(7.811)	(16.81)	(12.84)	(9.036)
University of Florida	-34.84***	-25.83**	-18.20***	-29.56***	-25.34**	-22.31***
	(10.54)	(11.36)	(6.910)	(8.765)	(10.13)	(6.690)
Univ. of South Florida	-33.27***	-19.03	-25.87***	-25.41**	-19.53	-20.38**
	(10.79)	(12.05)	(7.951)	(10.92)	(12.16)	(7.995)
Univ. of North Florida	-19.19	0.374	-18.29*	-19.33*	15.85	-30.83***
	(15.17)	(19.59)	(10.25)	(10.83)	(22.82)	(10.26)
Florida St. University	-46.24***	-16.54	-6.399	-26.90***	-0.464	-2.793
	(9.756)	(10.49)	(7.935)	(9.023)	(9.891)	(7.147)
Florida A & M University	1.389	0.898	-22.54	2.165	-9.005	-41.74***
	(12.88)	(24.36)	(14.71)	(12.32)	(17.10)	(14.09)
St. Pete Coll	-177.0*		-56.59	-53.66***		-65.01**
	(91.89)		(41.31)	(14.05)		(32.94)
New College	-100.3***	-19.27	-56.78***	-61.32***	36.21***	-52.15***
	(12.05)	(12.30)	(8.664)	(10.63)	(12.81)	(8.640)
Observations	12549	10077	20944	12346	9357	19342
R-squared	0.558	0.634	0.620	0.596	0.656	0.623

Table A2b.
Teacher preparation program effects (lagged dependent variable), reading: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-16.84	-1.706	-8.695	-7.083	8.431	-9.922
	(11.26)	(8.607)	(10.46)	(10.34)	(7.423)	(9.154)
Univ. of West Florida	-5.652	90.70**	-12.26	-40.06**	-44.54	-15.41
	(23.18)	(41.74)	(20.19)	(16.31)	(40.36)	(11.15)
Univ. of Central Florida	-18.83**	-18.96**	-8.984	-3.585	3.288	-3.566
	(9.540)	(8.944)	(7.726)	(8.153)	(8.481)	(7.619)
Fl. Gulf Coast University	-45.29**	-33.88	-12.96	3.130	-0.616	0.496
	(19.30)	(26.90)	(10.93)	(20.41)	(17.34)	(12.05)
University of Florida	-12.81	-14.98	1.255	-6.563	7.269	-4.827
	(10.80)	(9.397)	(7.238)	(8.417)	(8.758)	(7.980)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	-20.99**	-40.62***	-30.86***	-18.95**	-17.59**	-19.18**
	(9.411)	(9.503)	(7.448)	(8.476)	(8.767)	(7.572)
Univ. of North Florida	-17.71	-60.17***	0.322	-2.190	-25.33	-10.60
	(13.44)	(17.43)	(10.38)	(12.02)	(18.15)	(11.50)
Florida St. University	-9.637	-17.25*	-7.153	-1.066	-1.698	-4.245
	(8.947)	(9.476)	(7.160)	(7.391)	(7.982)	(7.499)
Florida A & M University	-9.072	-23.67*	-8.976	-0.193	-3.627	-25.78**
	(11.95)	(13.96)	(11.21)	(10.44)	(12.14)	(12.18)
St. Pete College	0		98.62	212.8***		-399.5***
	(0)		(65.51)	(19.25)		(11.36)
New College	27.78	-39.68	-7.854	-38.70*	2.957	-25.95*
	(18.98)	(34.66)	(12.92)	(20.87)	(37.18)	(14.58)
Observations	14986	14677	25939	14774	13515	24288
R-squared	0.559	0.599	0.597	0.589	0.614	0.617

Table A3b. Teacher preparation program effects (lagged dependent variable), reading: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-23.10**	19.41*	-5.203	2.423	9.329	-4.151
	(10.84)	(11.14)	(10.16)	(9.207)	(7.803)	(9.572)
Univ. of West Florida	33.02	-5.830	1.980	0.419	-1.162	-9.733
	(21.74)	(30.28)	(10.67)	(12.10)	(24.39)	(13.36)
Univ. of Central Florida	-3.128	-10.44	-17.67**	-8.570	-15.07*	-19.38**
	(8.933)	(11.35)	(8.899)	(9.582)	(8.841)	(8.929)
Fl. Gulf Coast University	-10.74	-42.89*	-20.59	6.761	-43.51**	-48.20***
	(17.37)	(21.90)	(13.65)	(13.60)	(17.16)	(13.53)
University of Florida	-17.76**	-1.193	-16.95*	-11.17	-3.750	-12.01
	(8.756)	(11.68)	(8.735)	(8.332)	(9.044)	(9.015)
Univ. of South Florida	-29.95***	-15.47	-21.28**	-21.63***	-16.48**	-19.62**
	(8.736)	(11.17)	(8.974)	(7.213)	(8.331)	(9.220)
Univ. of North Florida	-7.754	-1.471	-21.10**	-14.78	-20.01	-25.53**
	(10.03)	(18.11)	(10.67)	(8.984)	(16.46)	(10.10)
Florida St. University	-6.308	9.345	-12.70	-2.028	3.043	-13.64
	(8.465)	(11.73)	(8.872)	(7.563)	(8.601)	(8.910)
Florida A & M University	-11.84	-4.111	-10.66	-16.82	5.968	-18.17
	(12.08)	(15.06)	(16.63)	(10.44)	(14.21)	(18.05)
St. Pete Coll	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
New College	25.13*	-60.51	-31.26	7.777	-23.18	-30.78**
	(12.89)	(76.94)	(29.53)	(12.93)	(22.96)	(13.00)
Observations	20200	16489	29688	21415	16687	27289
R-squared	0.477	0.538	0.548	0.522	0.564	0.588

Table A4a. Teacher preparation program effects (annual gain), mathematics: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-34.48*	-26.56***	-35.04***	-9.920	-5.681	-18.12
	(17.76)	(9.690)	(10.86)	(15.44)	(11.00)	(14.63)
Univ. of West Florida	-47.55*	37.02	17.80	-5.190	10.65	-11.40
	(26.02)	(62.06)	(18.08)	(23.39)	(37.54)	(18.82)
Univ. of Central Florida	14.06	2.150	-1.180	30.27**	12.67	-12.30
	(13.12)	(11.39)	(8.436)	(12.03)	(13.32)	(9.058)
Fl. Gulf Coast University	-16.42	17.45	8.324	14.24	12.20	-3.889
	(21.21)	(14.79)	(14.61)	(22.64)	(15.56)	(14.38)
University of Florida	-10.11	-9.802	-3.178	12.97	2.385	-20.24**
	(14.29)	(11.59)	(8.421)	(12.11)	(12.00)	(9.891)
Univ. of South Florida	-4.239	-2.574	4.456	18.07	13.55	-3.469
	(13.98)	(11.15)	(8.529)	(13.20)	(13.03)	(9.869)
Univ. of North Florida	-6.760	-26.97	-0.0519	3.264	20.62	3.164
	(12.76)	(38.79)	(9.434)	(22.40)	(36.30)	(11.07)
Florida St. University	6.813	19.97	8.242	-4.855	18.11	1.462
	(13.90)	(17.59)	(10.18)	(14.58)	(15.64)	(11.06)
Florida A & M University	-10.89	-31.45*	-23.49*	-9.896	-1.175	-19.36
	(14.59)	(18.44)	(12.11)	(13.63)	(20.90)	(16.47)
St. Pete College	17.45		15.87	6.086		8.052
	(22.12)		(16.91)	(20.03)		(16.49)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	4719	4128	7267	4724	3869	6602
R-squared	0.080	0.099	0.086	0.099	0.109	0.105

Table A5a. Teacher preparation program effects (annual gain), mathematics: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	12.06	9.499	16.75*	4.248	2.036	-17.24*
	(10.59)	(13.32)	(10.10)	(11.65)	(11.62)	(10.37)
Univ. of West Florida	-10.73	55.94	12.64	-8.943	12.66	9.114
	(29.76)	(47.24)	(13.62)	(20.76)	(26.87)	(15.35)
Univ. of Central Florida	-2.923	0.867	15.55**	-17.85*	-14.05	-5.469
	(10.95)	(10.93)	(6.982)	(10.55)	(11.23)	(6.719)
Fl. Gulf Coast University	13.49	-2.705	26.41	19.34	5.823	24.60
	(12.91)	(11.65)	(16.07)	(22.99)	(23.08)	(21.00)
University of Florida	5.500	5.514	16.92**	-10.40	6.310	2.645
	(9.985)	(11.26)	(6.871)	(9.895)	(10.16)	(7.218)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	6.553	-4.471	19.86***	-5.831	4.339	5.468
	(10.93)	(11.35)	(7.664)	(10.77)	(11.31)	(6.553)
Univ. of North Florida	12.61	1.097	8.164	5.100	-17.01	-4.373
	(12.71)	(30.29)	(9.772)	(10.09)	(18.57)	(8.909)
Florida St. University	3.064	-6.828	14.44*	-13.34	-5.222	-6.066
	(9.900)	(11.35)	(7.455)	(9.531)	(11.17)	(7.219)
Florida A & M University	-11.96	18.16	39.88***	-22.30*	17.79	3.780
	(15.53)	(15.61)	(12.22)	(13.46)	(17.71)	(13.61)
St. Pete College	-78.40***		10.41	0		11.64
	(12.80)		(8.626)	(0)		(8.132)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	7600	6988	13814	7742	6601	13853
R-squared	0.022	0.052	0.039	0.025	0.061	0.022

Table A6a. Teacher preparation program effects (annual gain), mathematics: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	6.406	11.42*	-3.582	7.143	4.216	2.162
	(10.01)	(6.874)	(9.562)	(8.240)	(7.275)	(8.665)
Univ. of West Florida	-21.66**	-19.72*	-21.70***	-40.34***	-7.092	-11.88**
	(10.52)	(10.50)	(6.592)	(10.42)	(13.30)	(5.131)
Univ. of Central Florida	-4.310	-4.170	-5.667	-7.356	-13.06**	-2.040
	(5.609)	(7.182)	(5.026)	(6.278)	(6.192)	(5.062)
Fl. Gulf Coast University	-7.639	-4.121	-8.195	-36.44**	-11.19	-8.220
	(19.50)	(11.10)	(8.198)	(16.00)	(8.595)	(7.741)
University of Florida	-1.959	-1.645	-8.979**	-4.557	-7.975	-1.117
	(5.836)	(7.537)	(4.435)	(6.108)	(6.702)	(3.813)
Univ. of South Florida	-8.538	-4.080	-9.088*	-11.38*	-4.567	-3.663
	(5.734)	(7.012)	(4.981)	(6.070)	(6.700)	(4.381)
Univ. of North Florida	14.75**	2.516	-2.201	-3.506	-1.352	0.530
	(7.312)	(8.327)	(5.924)	(8.067)	(8.810)	(5.351)
Florida St. University	5.123	1.337	-11.15**	-3.336	-2.058	-0.988
	(6.201)	(7.958)	(4.667)	(6.088)	(7.075)	(4.253)
Florida A & M University	10.89	16.52	-23.85**	-2.426	9.571	0.841
	(7.488)	(10.59)	(9.319)	(9.228)	(9.103)	(7.990)
St. Pete Coll	-14.59	0.582	4.206	-4.926	-6.438	15.15***
	(10.81)	(9.384)	(10.70)	(8.949)	(9.627)	(5.748)
New College	45.97***	-46.05***	-2.089	1.510	37.83***	12.46*
	(8.285)	(10.36)	(6.680)	(7.551)	(9.329)	(6.356)
Observations	11923	11216	20075	12618	10984	19522
R-squared	0.031	0.027	0.022	0.041	0.045	0.029

Table A4b. Teacher preparation program effects (annual gain), reading: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-13.69	-6.188	-9.416	-11.12	9.162	-13.59
	(11.92)	(11.11)	(12.58)	(13.19)	(10.59)	(9.417)
Univ. of West Florida	-33.97	-31.93	-17.81	7.881	24.05	-14.88
	(30.54)	(23.51)	(13.92)	(22.29)	(16.92)	(16.09)
Univ. of Central Florida	-14.74	-21.27**	-14.96**	-3.206	-3.294	-15.61*
	(9.433)	(9.973)	(7.595)	(9.023)	(9.483)	(8.209)
Fl. Gulf Coast University	-38.09**	-22.53	-12.69	17.63	6.332	-16.77
	(17.65)	(17.76)	(10.54)	(17.67)	(13.36)	(12.90)
University of Florida	-23.55**	-18.22	-22.72***	-15.68*	-7.947	-21.70**
	(10.49)	(11.76)	(8.093)	(8.764)	(10.72)	(8.535)
Univ. of South Florida	-22.91*	-8.957	-16.61**	-3.851	-5.502	-7.412
	(11.74)	(11.85)	(8.283)	(10.90)	(11.50)	(8.645)
Univ. of North Florida	-28.59*	20.46	-28.94**	-12.31	24.97	-40.72***
	(15.66)	(18.53)	(13.19)	(13.07)	(29.39)	(15.45)
Florida St. University	-40.13***	-6.299	-10.30	-17.07*	8.133	-4.821
	(10.92)	(11.50)	(8.672)	(9.287)	(10.96)	(8.732)
Florida A & M University	4.885	-25.71	-28.73**	9.974	-17.53	-44.28***
	(14.65)	(20.65)	(12.47)	(14.67)	(24.03)	(16.23)
St. Pete College	-126.9		-68.72	-17.84		-88.16
	(99.09)		(55.18)	(40.89)		(59.54)
New College	-52.18***	8.247	-48.21***	8.198	59.13***	-37.71***
	(12.54)	(13.42)	(9.633)	(10.68)	(13.22)	(10.15)
Observations	12549	10077	20944	12346	9357	19342
R-squared	0.094	0.105	0.062	0.106	0.126	0.081

Table A5b. Teacher preparation program effects (annual gain), reading: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	11.81	8.675	14.21	9.338	20.35*	5.068
	(12.25)	(11.65)	(9.733)	(9.873)	(10.55)	(10.06)
Univ. of West Florida	6.883	112.0**	-5.884	-26.12	-56.87	-5.865
	(22.43)	(49.99)	(17.95)	(17.19)	(67.31)	(10.60)
Univ. of Central Florida	3.784	-7.982	-8.401	16.59*	15.30	0.487
	(9.900)	(10.99)	(7.262)	(8.758)	(10.38)	(7.943)
Fl. Gulf Coast University	-10.76	-5.192	-3.881	53.66***	37.95**	20.96*
	(21.76)	(24.05)	(11.46)	(20.51)	(18.39)	(11.66)
University of Florida	9.168	1.417	-7.995	21.45**	19.51*	-7.096
	(11.01)	(11.41)	(7.101)	(9.241)	(11.43)	(7.875)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	5.378	-18.25	-18.40**	6.452	-2.504	-3.611
	(9.695)	(11.71)	(7.174)	(8.569)	(10.97)	(8.135)
Univ. of North Florida	-5.573	-43.86*	-6.188	20.05*	-19.08	-11.81
	(11.56)	(23.04)	(9.245)	(10.62)	(14.55)	(10.57)
Florida St. University	-6.220	-5.253	-15.68**	7.118	6.804	-4.486
	(9.525)	(11.41)	(7.010)	(7.868)	(9.901)	(8.324)
Florida A & M University	-3.821	-11.29	-1.555	13.97	16.06	-13.06
	(12.55)	(14.43)	(12.11)	(10.20)	(12.01)	(13.24)
St. Pete College	0		128.6	484.2***		-360.6***
	(0)		(98.46)	(19.60)		(11.74)
New College	47.75	-25.31	-12.21	-28.84	56.01	-16.17
	(80.39)	(60.83)	(15.70)	(17.52)	(66.08)	(24.26)
Observations	14986	14677	25939	14774	13515	24288
R-squared	0.031	0.032	0.032	0.023	0.032	0.023

Table A6b. Teacher preparation program effects (annual gain), reading: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-18.59*	24.89**	0.317	8.662	7.874	0.773
	(10.58)	(11.27)	(10.00)	(8.419)	(7.684)	(7.870)
Univ. of West Florida	21.82	-22.11	5.205	2.786	10.20	-14.38
	(34.58)	(37.90)	(20.03)	(9.231)	(30.83)	(13.80)
Univ. of Central Florida	-5.076	4.241	-5.806	-1.627	-5.272	-5.180
	(9.895)	(11.71)	(8.300)	(10.24)	(8.973)	(6.891)
Fl. Gulf Coast University	-22.02	-18.51	-7.185	15.71	-25.84	-36.34***
	(16.49)	(19.55)	(13.42)	(13.09)	(16.04)	(12.04)
University of Florida	-14.23	15.37	-10.79	0.657	7.500	-4.588
	(9.219)	(11.56)	(8.301)	(8.342)	(8.830)	(6.976)
Univ. of South Florida	-28.23***	1.743	-4.913	-7.455	-5.715	-6.775
	(9.499)	(11.33)	(8.316)	(7.576)	(8.891)	(6.940)
Univ. of North Florida	-7.330	4.192	-0.977	-4.738	-4.505	-2.678
	(10.04)	(19.32)	(9.725)	(10.03)	(17.40)	(7.951)
Florida St. University	-12.98	12.04	-5.352	-0.932	0.400	-10.91
	(9.154)	(12.37)	(8.282)	(7.763)	(8.586)	(6.987)
Florida A & M University	-2.365	10.64	3.084	-7.715	14.73	-10.88
	(11.91)	(15.91)	(17.56)	(10.33)	(12.52)	(14.83)
St. Pete Coll	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
New College	25.58	-27.73	7.521	19.08*	16.19	2.116
	(30.30)	(82.76)	(36.10)	(11.07)	(29.16)	(9.316)
Observations	20200	16489	29688	21415	16687	27288
R-squared	0.043	0.052	0.033	0.060	0.067	0.045

Table A7a.
Teacher preparation program effects (instrumental variable), mathematics: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-53.04**	-36.49**	-45.57***	-19.58	-23.89**	-15.72
	(21.41)	(14.17)	(9.354)	(19.85)	(11.80)	(11.16)
Univ. of West Florida	-85.63**	-109.0***	-11.35	-21.17	-42.66	-25.56
	(33.86)	(29.62)	(17.80)	(22.17)	(57.24)	(16.10)
Univ. of Central Florida	4.147	-26.72*	6.524	18.20	-6.355	-9.147
	(21.09)	(13.81)	(11.13)	(15.98)	(21.75)	(11.13)
Fl. Gulf Coast University	-24.97	29.34	18.58	-20.72	24.65	8.840
	(35.57)	(18.28)	(17.20)	(20.94)	(26.61)	(10.29)
University of Florida	-23.56	-28.90**	-4.052	12.80	-1.941	-32.01***
	(16.33)	(14.28)	(11.69)	(14.73)	(16.45)	(11.59)
Univ. of South Florida	-24.76	-27.12**	-8.756	-10.33	-35.41***	-21.08*
	(15.14)	(12.69)	(9.734)	(13.48)	(13.54)	(11.37)
Univ. of North Florida	7.657	-17.71	-3.371	20.52	40.54	-3.082
	(16.57)	(14.83)	(13.10)	(20.92)	(48.61)	(13.43)
Florida St. University	-47.62***	-35.31	-14.91	-22.01	0.760	-20.18
	(16.97)	(22.01)	(15.52)	(13.71)	(21.82)	(15.20)
Florida A & M University	-55.60**	0	47.24	4.269	95.00	42.67
	(21.55)	(0)	(57.94)	(37.73)	(95.25)	(41.19)
St. Pete Coll	-57.45		20.79	-15.94		12.15
	(38.01)		(21.23)	(26.99)		(19.29)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
predmathlag	0.806***	0.755***	0.858***	0.815***	0.767***	0.834***
	(0.0238)	(0.0283)	(0.0181)	(0.0229)	(0.0257)	(0.0163)
Observations	3253	3087	5299	3232	2874	4813
R-squared	0.493	0.552	0.611	0.510	0.550	0.611

Table A8a.
Teacher preparation program effects (instrumental variable), mathematics: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-23.02**	-29.56**	-5.282	-13.74	-21.85**	-16.98
	(11.22)	(12.82)	(7.873)	(11.14)	(10.08)	(10.95)
Univ. of West Florida	-48.51*	-20.83	-25.86	-62.21**	-22.82	-20.75
	(25.65)	(55.12)	(17.20)	(31.30)	(30.49)	(15.15)
Univ. of Central Florida	-21.80**	-29.35***	-8.275	-10.32	-17.69*	-13.75*
	(9.104)	(10.15)	(7.411)	(9.897)	(9.161)	(7.839)
Fl. Gulf Coast University	6.944	-12.10	7.957	8.449	2.245	19.13**
	(11.44)	(15.33)	(14.23)	(11.70)	(9.441)	(7.738)
University of Florida	-8.758	-24.56**	-3.939	-3.955	-3.284	-9.036
	(8.770)	(12.24)	(7.366)	(10.12)	(9.875)	(7.580)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	-11.77	-24.53**	-10.20	-12.52	-17.74*	-13.15
	(11.03)	(11.77)	(8.285)	(10.88)	(10.28)	(8.099)
Univ. of North Florida	-25.77*	-11.41	-22.63*	-37.62**	-36.29	-16.97
	(15.40)	(31.70)	(12.23)	(18.55)	(22.27)	(12.14)
Florida St. University	-28.46***	-37.06***	-20.97**	-15.24	-24.65**	-22.21**
	(9.746)	(11.65)	(10.35)	(9.443)	(10.33)	(9.216)
Florida A & M University	3.353	-113.7***	11.08	-23.42	-70.28**	0.762
	(26.55)	(29.80)	(21.93)	(16.77)	(30.79)	(25.72)
St. Pete Coll	3.740		-20.75*	0		-28.07***
	(11.97)		(11.86)	(0)		(10.03)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
predmathlag	0.682***	0.665***	0.790***	0.685***	0.679***	0.791***
	(0.0177)	(0.0163)	(0.0126)	(0.0171)	(0.0172)	(0.0144)
Observations	6182	5892	11654	6319	5594	11751
R-squared	0.505	0.583	0.592	0.532	0.606	0.627

Table A9a.
Teacher preparation program effects (instrumental variable), mathematics: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-2.842	-15.92*	-30.66***	-19.64**	-19.17***	-23.54**
	(9.786)	(8.150)	(9.736)	(9.010)	(6.390)	(10.25)
Univ. of West Florida	-2.005	-32.71**	-11.92	-14.03	-7.763	2.810
	(7.125)	(15.83)	(9.365)	(9.317)	(9.298)	(12.46)
Univ. of Central Florida	-11.69	-25.64***	-15.17***	-17.31**	-21.68***	-14.75***
	(7.252)	(7.377)	(5.666)	(7.137)	(5.974)	(5.649)
Fl. Gulf Coast University	-4.648	-61.63***	-26.91***	-7.418	-13.68*	-27.55**
	(13.86)	(15.67)	(8.506)	(20.41)	(7.732)	(11.18)
University of Florida	-11.64*	-17.69**	-16.08***	-14.62**	-14.25**	-9.871*
	(6.524)	(7.380)	(6.192)	(6.239)	(6.830)	(5.935)
Univ. of South Florida	-3.523	-20.58**	-20.76***	-16.18**	-25.15***	-19.76***
	(8.301)	(8.551)	(7.206)	(7.149)	(7.744)	(6.936)
Univ. of North Florida	12.05	1.638	9.083	0.412	-20.33**	4.494
	(8.502)	(10.71)	(7.321)	(8.897)	(9.674)	(6.933)
Florida St. University	-5.210	-21.95***	-14.89**	-14.63**	-16.51***	-11.59*
	(7.057)	(7.521)	(6.148)	(5.875)	(6.126)	(6.020)
Florida A & M University	12.24	-21.63	-23.14	-11.94	-35.86***	-21.43
	(13.90)	(18.64)	(25.98)	(11.46)	(7.853)	(16.49)
St. Pete Coll	-45.78**	-80.68***	-22.32***	-54.68***	-44.18***	-25.80***
	(18.20)	(25.07)	(6.401)	(8.481)	(12.66)	(8.735)
New College	7.550	-53.76***	-7.315	-32.37***	-28.01***	-24.37***
	(9.078)	(10.91)	(8.576)	(9.117)	(10.49)	(8.494)
predmathlag	0.565***	0.624***	0.712***	0.577***	0.649***	0.720***
	(0.0135)	(0.0160)	(0.0113)	(0.0130)	(0.0143)	(0.0106)
Observations	9707	9089	16574	10459	8937	16299
R-squared	0.477	0.556	0.634	0.514	0.573	0.674

Table A7b.
Teacher preparation program effects (instrumental variable), reading: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-28.78**	4.253	-21.71	-45.74***	1.755	-11.10
	(14.02)	(15.61)	(18.71)	(15.11)	(15.79)	(15.56)
Univ. of West Florida	-21.60	140.9***	1.107	-39.58	-34.04	8.432
	(30.18)	(46.48)	(21.50)	(31.58)	(50.27)	(23.28)
Univ. of Central Florida	-11.90	-6.687	5.264	-18.09	-3.417	7.046
	(12.77)	(12.15)	(8.850)	(12.40)	(11.87)	(8.142)
Fl. Gulf Coast University	-18.08	-53.78***	-28.31**	-18.20	-21.28	-35.53***
	(20.79)	(17.66)	(13.42)	(21.57)	(18.61)	(12.00)
University of Florida	-42.71***	-24.62*	-15.26*	-37.57***	-19.69	-20.68***
	(14.75)	(14.66)	(8.827)	(13.26)	(13.86)	(7.239)
Univ. of South Florida	-34.45**	-15.68	-29.57***	-34.60**	-12.62	-14.95
	(14.66)	(16.69)	(10.29)	(15.50)	(15.05)	(11.11)
Univ. of North Florida	-23.79	-2.981	-21.77*	-27.82*	3.151	-25.03**
	(18.64)	(26.80)	(11.24)	(14.34)	(20.60)	(10.26)
Florida St. University	-48.90***	-18.67	-8.725	-35.64***	-3.986	-0.510
	(14.36)	(14.00)	(9.273)	(13.15)	(14.19)	(8.842)
Florida A & M University	-11.58	-92.92	-90.83***	-7.394	-24.32	-100.8***
	(35.17)	(131.9)	(21.81)	(21.79)	(34.43)	(19.22)
St. Pete Coll	-296.4***		-87.69***	-130.0***		-32.11***
	(114.2)		(13.90)	(29.56)		(11.85)
New College	-73.93***	20.88	-31.62***	-34.83**	-2.519	-82.21***
	(16.40)	(16.14)	(11.34)	(14.55)	(16.75)	(10.15)
predreadlag	0.771***	0.777***	0.872***	0.811***	0.772***	0.888***
	(0.0164)	(0.0188)	(0.0137)	(0.0167)	(0.0177)	(0.0128)
Observations	8553	6748	14230	8398	6201	13085
R-squared	0.499	0.583	0.572	0.554	0.602	0.580

Table A8b. Teacher preparation program effects (instrumental variable), reading: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-27.59**	1.582	-8.901	-14.52	-5.233	-12.07
	(13.68)	(9.318)	(13.12)	(11.08)	(9.310)	(9.840)
Univ. of West Florida	-23.23	97.05***	-29.09	-50.99***	-22.47	-29.17**
	(21.44)	(36.95)	(22.75)	(19.12)	(29.64)	(13.78)
Univ. of Central Florida	-23.35**	-19.33*	-7.910	-13.33	-7.397	-9.115
	(10.60)	(10.31)	(10.07)	(8.814)	(9.620)	(7.872)
Fl. Gulf Coast University	-50.78**	-47.75*	-3.477	-20.93	-30.21	-13.91
	(23.90)	(28.75)	(17.37)	(32.08)	(18.89)	(13.92)
University of Florida	-20.85*	-30.09***	5.542	-26.54***	-12.94	-10.09
	(11.33)	(11.23)	(9.786)	(8.590)	(9.971)	(7.894)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	-26.41**	-39.72***	-35.05***	-32.72***	-40.21***	-32.39***
	(10.56)	(10.85)	(10.20)	(9.150)	(10.05)	(7.730)
Univ. of North Florida	-25.99*	-48.37**	-1.306	-27.41**	-37.08	-15.17
	(15.66)	(19.73)	(12.77)	(12.76)	(30.77)	(11.51)
Florida St. University	-5.439	-20.04*	-4.924	-12.79	-13.74	-10.59
	(9.431)	(11.12)	(9.452)	(8.710)	(9.504)	(7.773)
Florida A & M University	21.97	-29.60	-20.26	9.196	-1.637	-23.67
	(16.92)	(42.30)	(23.67)	(14.80)	(37.67)	(18.89)
St. Pete Coll	0		42.10	-230.5***		-319.1***
	(0)		(51.84)	(19.29)		(12.66)
New College	-5.287	-73.80**	-16.96	-57.56***	-52.17*	-37.31***
	(15.43)	(36.04)	(15.28)	(18.95)	(27.88)	(12.99)
predreadlag	0.740***	0.736***	0.778***	0.781***	0.735***	0.790***
	(0.0118)	(0.0120)	(0.00932)	(0.0106)	(0.0136)	(0.00878)
Observations	12197	11919	21511	12059	11130	20291
R-squared	0.546	0.565	0.556	0.570	0.575	0.592

Table A9b. Teacher preparation program effects (instrumental variable), reading: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-15.09	15.55	0.116	1.853	14.21	-3.727
	(12.65)	(10.81)	(10.21)	(10.52)	(8.991)	(10.45)
Univ. of West Florida	29.91**	-5.682	2.777	-15.16	-14.45	-19.13
	(14.71)	(43.97)	(10.78)	(17.88)	(21.27)	(16.93)
Univ. of Central Florida	7.721	-9.225	-13.88*	-16.13*	-9.840	-20.37**
	(10.54)	(10.77)	(8.432)	(9.638)	(10.01)	(9.562)
Fl. Gulf Coast University	17.59	-61.42***	-22.62*	15.03	-41.08**	-51.12***
	(20.45)	(17.40)	(12.44)	(21.56)	(18.39)	(14.01)
University of Florida	-13.12	-9.091	-10.55	-19.08**	-8.947	-17.05*
	(10.01)	(11.55)	(8.398)	(8.863)	(9.999)	(9.756)
Univ. of South Florida	-22.27**	-23.61**	-23.49***	-28.89***	-19.33**	-23.89**
	(9.870)	(10.70)	(8.902)	(8.390)	(8.924)	(10.15)
Univ. of North Florida	8.812	4.936	-18.04*	-14.36	-22.85	-30.13***
	(13.03)	(16.54)	(10.45)	(10.23)	(16.12)	(11.53)
Florida St. University	-2.571	7.736	-7.183	-7.124	3.313	-12.19
	(9.846)	(10.85)	(8.489)	(8.439)	(9.225)	(9.577)
Florida A & M University	-49.39**	-5.895	-7.774	-32.01	73.69*	-11.36
	(22.30)	(19.42)	(47.15)	(26.46)	(38.34)	(39.36)
St. Pete Coll	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
New College	13.70	-68.09	-51.18**	-11.66	-35.11	-49.23**
	(13.91)	(46.46)	(25.37)	(15.46)	(23.54)	(19.38)
predreadlag	0.727***	0.747***	0.812***	0.758***	0.753***	0.855***
	(0.0115)	(0.0129)	(0.00916)	(0.0123)	(0.0130)	(0.00920)
Observations	16517	13852	24812	17681	13996	22994
R-squared	0.453	0.507	0.543	0.490	0.533	0.575

Table A10a. Teacher preparation program effects (net growth), mathematics: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-0.0231	-0.0133	-0.0202**	-0.00427	0.00545	-0.00444
	(0.0166)	(0.00970)	(0.00807)	(0.0144)	(0.0103)	(0.0117)
Univ. of West Florida	-0.0470**	0.0898	0.00820	-0.00262	0.00335	-0.00969
	(0.0230)	(0.0875)	(0.0121)	(0.0244)	(0.0296)	(0.0154)
Univ. of Central Florida	0.00160	0.0132	-0.000583	0.0213**	0.0149	-0.00756
	(0.0129)	(0.0103)	(0.00625)	(0.0106)	(0.0115)	(0.00662)
Fl. Gulf Coast University	-0.0216	0.0133	0.0108	-0.00365	0.00720	0.00316
	(0.0226)	(0.0125)	(0.00999)	(0.0198)	(0.0149)	(0.0104)
University of Florida	-0.00846	0.000004	-0.000521	0.00960	0.00415	-0.00821
	(0.0153)	(0.0114)	(0.00612)	(0.0108)	(0.0111)	(0.00730)
Univ. of South Florida	-0.00245	0.00596	0.00762	0.0195	0.0181	0.00256
	(0.0129)	(0.0106)	(0.00650)	(0.0128)	(0.0135)	(0.00744)
Univ. of North Florida	-0.0136	-0.0138	0.000409	0.00482	0.00973	0.00516
	(0.0121)	(0.0331)	(0.00900)	(0.0184)	(0.0282)	(0.00809)
Florida St. University	0.00306	0.0353*	0.00344	-0.0120	0.0114	0.00685
	(0.0131)	(0.0187)	(0.00725)	(0.0133)	(0.0129)	(0.00870)
Florida A & M University	-0.00159	-0.0200	-0.0142	-0.00965	0.0129	-0.00869
	(0.0139)	(0.0184)	(0.00971)	(0.0137)	(0.0184)	(0.0117)
St. Pete Coll	-0.0200		0.00522	-0.0137		0.00575
	(0.0235)		(0.0124)	(0.0202)		(0.0122)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	4719	4128	7267	4724	3869	6602
R-squared	0.095	0.095	0.089	0.117	0.105	0.121

Table A11a. Teacher preparation program effects (net growth), mathematics: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	0.0111	0.0125	0.00953	0.00597	0.00348	-0.0111
	(0.00953)	(0.0107)	(0.00676)	(0.00949)	(0.00889)	(0.00700)
Univ. of West Florida	-0.00435	0.0503*	0.0104	0.00184	0.00990	0.00807
	(0.0289)	(0.0296)	(0.00908)	(0.0188)	(0.0212)	(0.0106)
Univ. of Central Florida	-0.00285	-0.000936	0.0123**	-0.00936	-0.00984	-0.00269
	(0.00931)	(0.00898)	(0.00492)	(0.00834)	(0.00907)	(0.00486)
Fl. Gulf Coast University	0.00608	-0.0107	0.0211*	0.0187	0.0101	0.0183
	(0.0112)	(0.0108)	(0.0116)	(0.0170)	(0.0181)	(0.0155)
University of Florida	0.00208	0.00397	0.0120**	-0.00480	0.00403	0.00319
	(0.00872)	(0.00939)	(0.00481)	(0.00792)	(0.00766)	(0.00537)
Chipola Community Coll.			0			0
			(0)			(0)
Univ. of South Florida	0.00240	-0.00696	0.0144***	0.000761	0.00511	0.00561
	(0.00899)	(0.00924)	(0.00540)	(0.00860)	(0.00936)	(0.00483)
Univ. of North Florida	0.00814	-0.00253	0.00898	0.00909	-0.0167	-0.00187
	(0.0109)	(0.0221)	(0.00652)	(0.00900)	(0.0118)	(0.00605)
Florida St. University	0.000346	-0.00820	0.0133**	-0.00983	-0.00691	-0.000881
	(0.00809)	(0.00902)	(0.00532)	(0.00746)	(0.00867)	(0.00518)
Florida A & M University	-0.0132	0.0120	0.0314***	-0.0156	0.00634	0.00410
	(0.0132)	(0.0134)	(0.00874)	(0.0111)	(0.0146)	(0.0103)
St. Pete College	-0.0504***		0.0106*	0		0.0114*
	(0.0102)		(0.00608)	(0)		(0.00581)
New College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
Observations	7600	6988	13814	7742	6601	13853
R-squared	0.028	0.066	0.051	0.039	0.079	0.034

Table A12a. Teacher preparation program effects (net growth), mathematics: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	0.00468	0.00987**	-0.00171	0.00655	0.00516	0.00344
	(0.00748)	(0.00471)	(0.00600)	(0.00595)	(0.00535)	(0.00517)
Univ. of West Florida	-0.0131	-0.0115	-0.0146***	-0.0274***	-0.00111	-0.00599**
	(0.00849)	(0.00727)	(0.00422)	(0.00716)	(0.0119)	(0.00302)
Univ. of Central Florida	-0.00215	0.000254	-0.00301	-0.00307	-0.00670	0.000509
	(0.00400)	(0.00488)	(0.00324)	(0.00434)	(0.00449)	(0.00289)
Fl. Gulf Coast University	0.00376	0.00541	-0.00123	-0.0205*	-0.00786	-0.00379
	(0.0147)	(0.00790)	(0.00633)	(0.0121)	(0.00606)	(0.00465)
University of Florida	-0.00172	-0.00001	-0.00492*	-0.00104	-0.00452	0.000456
	(0.00418)	(0.00502)	(0.00294)	(0.00443)	(0.00462)	(0.00220)
Univ. of South Florida	-0.00579	0.00154	-0.00476	-0.00635	-0.000580	-0.000988
	(0.00433)	(0.00491)	(0.00322)	(0.00430)	(0.00493)	(0.00247)
Univ. of North Florida	0.0109**	0.00246	-0.00241	-0.00140	-0.00006	0.00115
	(0.00539)	(0.00587)	(0.00374)	(0.00561)	(0.00588)	(0.00314)
Florida St. University	0.00351	0.00244	-0.00671**	-0.000871	0.000261	0.000699
	(0.00458)	(0.00508)	(0.00302)	(0.00431)	(0.00493)	(0.00241)
Florida A & M University	0.00699	0.0118	-0.0145**	-0.000001	0.00722	0.00208
	(0.00546)	(0.00744)	(0.00612)	(0.00685)	(0.00676)	(0.00482)
St. Pete College	-0.00574	0.00805	0.00241	-0.000333	-0.00218	0.00922***
	(0.00797)	(0.00662)	(0.00611)	(0.00610)	(0.00623)	(0.00317)
New College	0.0235***	-0.0325***	-0.00235	-0.00142	0.0405***	0.00739**
	(0.00621)	(0.00705)	(0.00432)	(0.00533)	(0.00641)	(0.00373)
Observations	11923	11216	20075	12618	10984	19522
R-squared	0.040	0.030	0.028	0.049	0.049	0.033

Table A10b. Teacher preparation program effects (net growth), reading: elementary school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-0.0314	-0.0185	0.0112	0.000585	0.0960**	-0.0263*
	(0.0284)	(0.0479)	(0.0250)	(0.0301)	(0.0482)	(0.0153)
Univ. of West Florida	0.0706	-0.121	-0.0292	0.0329	-0.0122	-0.0121
	(0.138)	(0.0788)	(0.0202)	(0.0750)	(0.0583)	(0.0170)
Univ. of Central Florida	-0.0608**	-0.0388	-0.0230	-0.0451*	0.0153	-0.0240*
	(0.0274)	(0.0367)	(0.0145)	(0.0258)	(0.0294)	(0.0145)
Fl. Gulf Coast University	-0.112**	-0.110**	-0.0125	0.111	0.0144	0.000478
	(0.0497)	(0.0459)	(0.0214)	(0.0940)	(0.0517)	(0.0288)
University of Florida	-0.0137	-0.0324	-0.00494	-0.0394*	0.0128	-0.0170
	(0.0278)	(0.0422)	(0.0148)	(0.0219)	(0.0333)	(0.0137)
Univ. of South Florida	-0.0642**	-0.0643	-0.00926	-0.00536	0.0186	-0.0198
	(0.0301)	(0.0391)	(0.0177)	(0.0271)	(0.0344)	(0.0155)
Univ. of North Florida	0.00116	0.0480	-0.0103	-0.0262	0.200	-0.0490***
	(0.0523)	(0.106)	(0.0243)	(0.0223)	(0.123)	(0.0176)
Florida St. University	-0.0749***	-0.00321	-0.00926	-0.0438**	0.0421	-0.00534
	(0.0231)	(0.0445)	(0.0152)	(0.0196)	(0.0346)	(0.0145)
Florida A & M University	-0.0165	-0.0734	-0.0106	0.00117	0.00625	-0.0428**
	(0.0368)	(0.0508)	(0.0265)	(0.0319)	(0.0451)	(0.0200)
St. Pete Coll	-0.211		-0.134**	-0.0722		-0.100**
	(0.137)		(0.0624)	(0.0505)		(0.0394)
New College	-0.0266	0.0357	-0.00138	0.00142	0.176***	-0.00236
	(0.0312)	(0.0524)	(0.0178)	(0.0280)	(0.0563)	(0.0160)
Observations	12549	10077	20944	12346	9357	19342
R-squared	0.100	0.102	0.072	0.095	0.086	0.105

Table A11b. Teacher preparation program effects (net growth), reading: middle school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	0.0189	0.0107	0.0260***	0.0131	0.0202**	0.00451
	(0.0124)	(0.0108)	(0.00949)	(0.0103)	(0.00949)	(0.00778)
Univ. of West Florida	0.0205	0.0680*	-0.00171	-0.0124	-0.0265	0.00165
	(0.0225)	(0.0389)	(0.0121)	(0.0155)	(0.0572)	(0.00706)
Univ. of Central Florida	0.00732	-0.00590	-0.00210	0.0195**	0.0131	0.00165
	(0.00973)	(0.0104)	(0.00572)	(0.00879)	(0.00942)	(0.00590)
Fl. Gulf Coast University	-0.0125	-0.00709	-0.000551	0.0547***	0.0540**	0.0184*
	(0.0231)	(0.0225)	(0.0103)	(0.0190)	(0.0261)	(0.0110)
University of Florida	0.0179	0.0113	-0.00217	0.0236***	0.0195*	-0.00361
	(0.0110)	(0.0111)	(0.00560)	(0.00915)	(0.0103)	(0.00581)
Chipola			0			0
			(0)			(0)
Univ. of South Florida	0.0111	-0.00725	-0.00475	0.00807	0.00189	0.00204
	(0.00992)	(0.0110)	(0.00562)	(0.00837)	(0.0102)	(0.00615)
Univ. of North Florida	0.00126	-0.0231	-0.00293	0.0191*	-0.0203	-0.00608
	(0.0113)	(0.0272)	(0.00724)	(0.0103)	(0.0124)	(0.00711)
Florida St. University	-0.00114	-0.00281	-0.00873	0.00992	0.00235	-0.000673
	(0.00919)	(0.0106)	(0.00542)	(0.00801)	(0.00908)	(0.00613)
Florida A & M University	-0.00353	0.000738	0.00144	0.0150	0.00845	-0.00336
	(0.0125)	(0.0137)	(0.00957)	(0.0106)	(0.0102)	(0.0103)
St. Pete Coll	0		0.146*	0.829***		-0.263***
	(0)		(0.0777)	(0.0217)		(0.00926)
New College	0.0438	-0.0268	-0.0146	-0.0321*	0.0473	-0.0155
	(0.0788)	(0.0460)	(0.0113)	(0.0175)	(0.0671)	(0.0161)
Observations	14986	14677	25939	14774	13515	24288
R-squared	0.036	0.049	0.044	0.033	0.049	0.038

Table A12b. Teacher preparation program effects (net growth), reading: high school

	Male African American	Hispanic	White	Female African American	Hispanic	White
Florida Intl. University	-0.0156*	0.0166**	0.00280	0.00631	0.00580	-0.00009
	(0.00798)	(0.00817)	(0.00619)	(0.00606)	(0.00539)	(0.00516)
Univ. of West Florida	0.0155	-0.0120	0.00566	-0.00174	0.0243	-0.00982
	(0.0309)	(0.0254)	(0.0140)	(0.00713)	(0.0300)	(0.00854)
Univ. of Central Florida	-0.00618	0.00383	0.000727	0.00127	-0.00134	-0.00145
	(0.00757)	(0.00837)	(0.00486)	(0.00702)	(0.00616)	(0.00451)
Fl. Gulf Coast University	-0.0206	-0.0112	-0.000376	0.0130	-0.0168	-0.0196***
	(0.0136)	(0.0146)	(0.00810)	(0.00951)	(0.0103)	(0.00750)
University of Florida	-0.0117*	0.0130	-0.00241	0.00298	0.00807	-0.00180
	(0.00707)	(0.00844)	(0.00491)	(0.00615)	(0.00623)	(0.00454)
Univ. of South Florida	-0.0189***	0.00254	0.00129	-0.00264	-0.000597	-0.00281
	(0.00723)	(0.00828)	(0.00483)	(0.00561)	(0.00655)	(0.00448)
Univ. of North Florida	-0.00481	0.000219	0.00295	-0.000664	-0.00295	-0.000459
	(0.00815)	(0.0129)	(0.00586)	(0.00692)	(0.0116)	(0.00506)
Florida St. University	-0.0108	0.00647	-0.0000003	0.000044	0.00175	-0.00562
	(0.00693)	(0.00889)	(0.00487)	(0.00550)	(0.00590)	(0.00454)
Florida A & M University	0.000641	0.0130	0.00703	-0.00601	0.00956	-0.00506
	(0.00960)	(0.0130)	(0.0108)	(0.00726)	(0.00891)	(0.00884)
St. Pete College	0	0	0	0	0	0
	(0)	(0)	(0)	(0)	(0)	(0)
New College	0.0102	-0.00471	0.00651	0.0130*	0.0160	0.00155
	(0.0246)	(0.0518)	(0.0208)	(0.00762)	(0.0204)	(0.00599)
Observations	20200	16489	29688	21415	16687	27289
R-squared	0.032	0.047	0.031	0.050	0.061	0.044

Table A13. Comparison of alternative specifications

	Mathematics			Reading		
	Elementary	Middle	High	Elementary	Middle	High
			R^2			
Imputed persistence	0.07-0.10	0.02-0.04	0.06-0.08	0.04-0.08	0.03-0.05	0.06-0.11
Lagged dependent variable	0.57-0.70	0.51-0.65	0.54-0.71	0.56-0.66	0.56-0.62	0.48-0.59
Annual gain	0.08-0.11	0.02-0.06	0.02-0.05	0.06-0.13	0.02-0.03	0.03-0.07
Instrumental variable	0.49-0.61	0.51-0.63	0.48-0.67	0.50-0.60	0.55-0.59	0.45-0.58
Net growth	0.09-0.12	0.03-0.08	0.03-0.04	0.07-0.11	0.03-0.05	0.03-0.06
			Percent reduction in degrees of freedom			
Imputed persistence	none	None	none	none	none	none
Lagged dependent variable	none	None	none	none	none	none
Annual gain	none	None	none	none	none	none
Instrumental variable	0.25-0.32	0.15-0.19	0.17-0.19	0.32-0.34	0.16-0.19	0.16-0.18
Net growth	none	None	none	none	none	none