Title:
Financial Incentives to Promote Teacher Recruitment and Retention: An Analysis of the Florida Critical Teacher Shortage Program*

Authors and Affiliations:

Li Feng
Department of Finance and Economics
McCoy College of Business Administration
Texas State University
San Marcos, TX 78666
Email: Li.Feng@txstate.edu

Tim R. Sass (**Presenter**)
Department of Economics
Andrew Young School of Policy Studies
Georgia State University
Atlanta, GA 30303
Email: tsass@gsu.edu

* This study is supported by an Efficacy and Replication grant (R305A110697) from the Institute of Education Sciences in the U.S. Department of Education. We are grateful to the Florida Department of Education for providing the data for this analysis. We alone are responsible for any errors in analysis or interpretation. The results reported herein do not necessarily reflect the views of the Florida Department of Education or our funder.

Background

Staffing problems are pervasive in certain subject areas, such as secondary math and science and special education, where the combination of training requirements and relatively high alternative wages makes it difficult to attract and retain high-quality teachers. Ingersoll and Perda (2009) find that roughly 3 to 4 times as many secondary schools report significant difficulty in filling positions in mathematics, special education and science relative to English or social studies. The problems with staffing such "high need" areas are exacerbated in urban schools and schools serving high proportions of low-income students, since teachers tend to migrate toward schools with high achieving students from affluent backgrounds and avoid schools serving primarily minority students, low-achieving students, and students with disciplinary problems (Hanushek, Kain and Rivkin (2004), Boyd, et al. (2005), Scafidi, Sjoquist and Stinebrickner (2007), Feng (2009)).

In an attempt to promote recruitment and retention of teachers in high-need areas, at least 40 states offer some kind of loan forgiveness or scholarship program for teachers (American Federation of Teachers (2009)). However, there is scant research on their efficacy. There is limited evidence of the success of differential-salary initiatives in California and North Carolina (Steele et al. (2009), Clotfelter, Glennie, Ladd, and Vigdor (2008)). A single descriptive study of recruitment bonuses exists (Fowler (2003)) and there has been no systematic evaluation of tuition reimbursement/loan forgiveness programs. In order to broaden the understanding of targeted incentives in the teacher labor market we analyze one of the earliest and longest-running incentive programs, the Florida Critical Teacher Shortage Program (FCTSP).

The FCTSP was established in 1984 by the Florida legislature to increase the supply of teachers in particular certification areas. The FCTSP had two components. The tuition reimbursement program compensated teachers for tuition expenditures on undergraduate and graduate education courses taken to satisfy certification requirements in a designated critical teacher shortage area. Eligible teachers could receive payments of up to $78 per credit hour, for a maximum 9 hours per award year or $702 per year. The maximum total amount eligible applicants could receive was $2,808 for up to 36 credit hours. Awards were prorated based on the number of eligible applicants and the annual appropriation provided by the Legislature. The loan forgiveness program enhanced the compensation of eligible Florida teachers by repaying student loans if they continued teaching in a designated critical shortage area. Relative to the tuition reimbursement program, the potential compensation was much more generous. For undergraduate loans the maximum allowable award was $2,500 dollars per year for up to four years; for graduate loans the maximum was $5,000 per year for up to two years. As with the tuition reimbursement program, actual compensation varied annually with the number of applicants and the legislative appropriation. Funding for the programs was relatively stable until 2002, with loan forgiveness payouts averaging $2,000-3,000 per teacher and tuition reimbursement hovering just under $500 per teacher. The 2002 legislature slashed funding for the programs, resulting in a nearly 48% reduction in funding and a drastic decrease in payments per teacher. Funding was eliminated by the 2010 legislature. Annual numbers of participants and average payments for both the loan forgiveness and tuition reimbursement programs are provided in Tables 1 and 2.

The FCTSP legislation required the Florida State Board of Education to identify critical teacher shortage areas each year. The Florida Commissioner of Education provided a list of recommended areas to the board, based on: (i) current vacancies in the discipline, (ii) positions filled by teachers lacking proper certification in the relevant field, (iii) the projected supply of

future graduates in the relevant area from state approved teacher preparation programs. Thus the designated shortage areas changed over time. A matrix of covered subjects by year is provided in Table 3.

In addition to the loan forgiveness and tuition reimbursement programs, bonuses for recruitment and retention of teachers in critical-need areas were also used in Florida for a brief period. In 2000 the Florida legislature allocated $60 million for a Teacher Recruitment and Retention Fund (TRRF). The fund provided for a bonus of up to $1200 to both new and experienced middle and high school teachers in critical shortage areas. In 2001 the legislature increased the Teacher Recruitment and Retention Fund to $152 million, providing an $850 retention bonus to all full-time instructional personnel (regardless of subject area). After allotting the retention bonus, districts could also offer $850 recruitment bonuses with any remaining funds. The TRRF was eliminated by the 2002 Florida legislature. However, a few districts continued to provide recruitment/retention bonuses in subsequent years.

The inter-temporal changes in subject area coverage and loan forgiveness/tuition reimbursement funding provide an opportunity for uncovering the causal impacts of these programs. The large and abrupt changes in funding for loan forgiveness and bonuses can be viewed as plausibly exogenous events that can be used to identify the effects of varying compensation on the recruitment and retention of teachers in high-needs areas. While the subject area designations were influenced by anticipated supply and demand conditions, the discrete changes in subject area coverage from one year to the next can also be used to identify the impacts of the programs.

Purpose and Research Questions

This project will evaluate the impacts of the FCTSP and TRRF on the supply of new teachers and the retention of teachers in high-need areas such as special education, math and science. More specifically, our research will address the following specific research questions. Unless otherwise specified, questions pertain to all three programs (loan forgiveness, tuition reimbursement and recruitment/retention bonuses).

Program Participation

a. For each subject area, how many teachers participated in the program? What is the length of program participation?
b. For each subject area, are the observable characteristics of teachers who enter targeted areas when assistance is available different in their demographic characteristics, their qualifications, the kind of schools they work in, and their effectiveness (value-added) than the characteristics of those who enter when financial incentives do not exist?

Impacts on Recruitment, Retention and Teacher Quality

c. How does the existence and size of recruitment bonuses affect the number of certified teachers entering a subject area?
d. How does the program affect retention rates for participating teachers and how does the impact vary with the level of assistance provided? Are these teachers more likely to stay in their initial placement schools? Are they more likely to stay in teaching?
e. Does the program lead to increased retention of high quality teachers (as measured by value-added)?

f. Are there different effects of the loan forgiveness and tuition re-imbursement programs across subject areas? For example, are reading teachers' mobility decisions more responsive than math and science teachers?
g. For the loan forgiveness program, was the high intensity period in the 1990s, characterized by a low participation rate and a high average payout per teacher, more effective in increasing the supply of teachers than the low intensity period since 2002 (low average payout and high participation)?

Setting

This study uses individual-level statewide longitudinal data from Florida public schools for 1995/96 through 2012/13.

Population

The analysis will include all Florida public school teachers and their students from 1995/96 through 2012/13.

Intervention

The research team will investigate the causal effects of the programs and also address questions related to the general characteristics of the program and participating teachers. Components of the programs were in place from 1984 to 2010 and provided a variety of incentives to become fully certified to teach in hard-to-staff disciplines like math, science and special education. The FCTSP provided loan forgiveness to teachers who teach in designated shortage disciplines (e.g., middle and high school mathematics, special education, and English for speakers of other languages (ESOL). The program also compensated teachers for the tuition cost of courses to become certified in a designated shortage area. In addition, for one year the TRRF provided recruitment and retention bonuses to Florida teachers in designated critical-need subjects and then to all teachers in a second year. After the statewide program ended in 2002, a handful of school districts have continued to offer bonuses to teachers in critical-need subject areas. The areas of staff specialization that were eligible for the financial incentives changed periodically throughout the course of this study.

Research Design and Methods

A statistical analysis of secondary data will be carried out. The data will be drawn from the Florida Education Data Warehouse augmented with data from the Office of Student Financial Assistance. These data files contain teacher-level records on FCTSP participants, award amounts, and information from the annual Critical Teacher Shortage Areas List published by the Florida Department of Education. The analysis will first measure teacher quality using various value-added methodologies. These measures will be used to investigate the effects of the FCTSP tuition assistance/loan forgiveness program and the Teacher Recruitment and Retention Fund on teacher quality. The project will investigate how teacher quality changes in different subject areas as disciplines change from untargeted to targeted status and back. Specifically, it will determine if highly effective teachers are recruited and retained as a result of the incentives embedded in the FCTSP and TRRF programs. In addition, the project will use a difference in difference estimator to evaluate the impact of these programs on teacher mobility and retention.

Control Condition

The teaching fields identified to receive incentives varied over time and the availability of recruitment and retention bonuses varied over time and across school districts. These variations will be used compare differences between bonus recipients and non-recipients.

Key Measures

Key measures include employment in Florida public schools, subject area of certification, courses taught and impact on student test scores (“value-added”). Student achievement is measured by Florida's state reading and math tests in each of grades 3 through 10, called the "Sunshine State Standards" Florida Comprehensive Achievement Test (FCATSSS). In addition to test scores, the data includes an extensive set of student characteristics. For teachers, data collected identifies the base salary for each teacher, and also the amount of every type of supplemental compensation received, including the TRRF bonuses.

Data Analytic Strategy

Simple pre-post tallies will show whether the incentives, individually and collectively, resulted in a larger number of applicants and full-time-equivalent teachers for the targeted hard-to-staff areas. To investigate whether the programs impacted student achievement in the targeted areas, the researchers will employ a variety of quasi-experimental methods in a three-part strategy. First, researchers will estimate models of student achievement that include teacher fixed effects in order to derive "value-added" estimates of teacher quality. In the second stage of the analysis, the teacher value-added scores will be inserted into multinomial logit hazard models to investigate whether the FCTSP incentives and related bonuses encourage entry of high quality teachers into covered disciplines. The final part of the analysis will use instrumental variable and difference-in-difference (DID) techniques to determine the causal impacts of FCTSP incentives on teacher recruitment and retention in designated "critical need" subject areas.

Preliminary Findings

Our initial descriptive analysis indicates that FCTSP teachers tend to be of lower quality (as measured by value-added) than non-participants. They also tend to be less experienced and teach more challenging (lower achieving, less well-behaved) students. Analysis of mobility patterns revealed that participants are more likely to switch schools than non-participants. However, participants are also less likely to exit public school teaching.

Conclusions

While our preliminary analysis revealed some interesting patterns, much work remains to be done. Newly received data will allow us to greatly expand our sample so that it will cover the period from 1995/96 through two years after the termination of the FCTSP, 2012/13. With this expanded sample we will identify causal average program treatment effects, using an instrumental variables technique. Exogenous changes in program coverage and funding will allow us to also estimate difference-in-differences models to evaluate the effects of FCTSP on teacher retention and to determine the effects of changes in the magnitude of incentives on the supply of teachers in critical shortage areas. Future work will also include an analysis of the effects of recruitment and retention bonuses, which were only in effect for two years, 2000/01 and 2001/02.

Appendices

Not included in page count.

Appendix A. References

American Federation of Teachers (2009).“Tools for Teachers – Loan Forgiveness Programs.”Availableat http://www.aft.org/tools4teachers/loan-forgiveness.htm

Angrist, J., and S. Pischke (2009) *Mostly Harmless Econometrics: An Empiricists' Companion.*Princeton University Press, Princeton, NJ.

Baldi, Stephane, Ying Jin, and Melanie Skemer (2007).“Highlights From PISA 2006: Performance of U.S. 15-Year-Old Students in Science and Mathematics Literacy in an International Context,” U.S. Department of Education NCES.

Beaudin, Barbara Q. (1993).“Teachers Who Interrupt Their Careers: Characteristics of Those Who Return to the Classroom,” *Educational Evaluation and Policy Analysis* 15(1): 51–64.

Billingsley, Bonnie, Anna-Maria Fall, and Thomas Williams (2006).“Who is teaching students with emotional disorders? A profile and comparison to other special educators,” *Behavioral Disorders* 31(1): 252-264.

Boe, Erling E., Lynne H. Cook, and Robert J. Sunderland (2006).“Attrition of beginning teachers: Does teacher preparation matter?,”(Research Report No. 2006-TSDQ2): Center for Research and Evaluation in Social Policy, Graduate School of Education, University of Pennsylvania, Philadelphia, PA.

Boyd, Don, Hamp Lankford Susanna Loeb, and Jim Wyckoff (2005).“Explaining the Short Careers of High-Achieving Teachers in Schools with Low-Performing Students,” *American Economic Review* 95(2): 166-171.

Boyd, Don, Pam Grossman, Hamp Lankford, Susanna Loeb, and Jim Wyckoff (2007).“Who Leaves?Teacher Attrition and Student Achievement.”Unpublished.Albany, NY:SUNY - Albany.

Boyd, D., Grossman, P., & Lankford, H. (2008). Who Leaves? Teacher Attrition and Student Achievement.

Brewer, Dominic J. (1996).“Career Paths and Quit Decisions: Evidence from Teaching,” *Journal of Labor Economics* 14(2): 313-339.

Clotfelter, Charles T., Helen F. Ladd, and Jacob Vigdor (2005).“Who Teaches Whom? Race and the Distribution of Novice Teachers,” *Economics of Education Review* 24(4): 377-392.

Clotfelter, Charles T., Helen F. Ladd and Jacob L. Vigdor (2007).“Teacher Credentials and Student Achievement in High School:A Cross-Subject Analysis with Student Fixed Effects.”Working Paper #11.Washington, DC:National Center for Analysis of Longitudinal Data in Education Research.

Clotfelter, Charles T., Elizabeth Glennie, Hellen F. Ladd, and Jocob L. Vigdor (2008).“Would Higher Salaries Keep Teachers in High-Poverty Schools?Evidence From a Policy Intervention in North Carolina,” *Journal of Public Economics* 92: 1352-1370

Dieterle, S., & Guarino, C. (2012). How do Principals Group and Assign Students to Teachers? Finding Evidence in Administrative Data and the Implications for Value-added. …*for Education Finance* …. Retrieved from http://aefpweb.org/sites/default/files/webform/20120228-Teacher Group Assign-AEFP-Draft.pdf

Feng, Li (2009). “Opportunity Wages, Classroom Characteristics, and Teacher Mobility,” *Southern Economic Journal* 75(4): 1165-1190

Feng, Li, and Tim R. Sass, (2008). “Teacher Quality and Teacher Mobility,” Unpublished manuscript. Tallahassee, FL:Florida State Unversity.

Feng, Li, and Tim R. Sass, (2010).“What Makes Special-Education Teachers ‘Special’?Teacher Training and Achievement of Students with Disabilities,” Unpublished manuscript. Tallahassee, FL:Florida State Unversity.

Feng, L., & Sass, T. (2011). Teacher Quality and Teacher Mobility. *National Center for Analysis of Longitudinal Data in Education Research Working Paper*, *57*, 1–30.

Field, Erica (2009). “Educational Debt Burden and Career Choice: Evidence from a Financial Aid Experiment at NYU Law School,” *American Economic Journal: Applied Economics* 1(1): 1-21.

Florida Department of Education, Office of Student Financial Assistance. (various years) *Annual Report to the Commissioner.* Tallahassee, FL: Author. Retrieved from http://www.floridastudentfinancialaid.org/SSFAD/home/StateProgramLinks.htm.

Florida Department of Education, Office of Student Financial Assistance. (various years) *Critical Teacher Shortage Student Loan Forgiveness 2001-2002.* Tallahassee, FL: Author. Retrieved from http://www.floridastudentfinancialaid.org/SSFAD/home/ StateProgram Links.htm.

Florida Department of Education, Office of Student Financial Assistance. (various years) *Critical Teacher Shortage Student Tuition Reimbursement 2001-2002.* Tallahassee, FL: Author. Retrieved from http://www.floridastudentfinancialaid.org/SSFAD/home/ StateProgram Links.htm.

Florida Department of Education, Office of Research and Evaluation (2008) Critical Teacher Shortage Areas 2009-2010. Tallahassee, FL: Author. Retrieved from http://www.fldoe.org/evaluation/teachdata.asp

Florida Department of Education, Office of Research and Evaluation, Accountability, Research and Measurement (2009) New Hires in Florida Public Schools Fall 2000 through Fall2009. Tallahassee, FL: Author. Retrieved from http://www.fldoe.org/evaluation/ teachdata.asp

Fowler, R. Clarke (2003), "The Massachusetts Signing Bonus Program for New Teachers: A Model of Teacher Preparation Worth Copying?," *Education Policy Analysis Archives* 11(13):(April 22).

Goldhaber, Dan, Bethany Gross, and Daniel Player (2007). "ArePublic Schools Really Losing Their "Best"?: Assessing the Career Transitions of Teachers and Their Implications for the Quality of the Teacher Workforce,"Working Paper #12.Washington DC:National Center for Analysis of Longitudinal Data in Education Research.

Goldhaber, D., Gross, B., & Player, D. (2011). Teacher career paths, teacher quality, and persistence in the classroom: Are public schools keeping their best? *Journal of Policy Analysis and Management*, *30*(1), 57–87. doi:10.1002/pam

Grismmer, David W., and Sheila N. Kirby (1992). "Patterns of Attrition Among Indiana Teachers: 1965–1987," Santa Monica, Calif.: RAND Corporation, R-4076-LE.

Gritz, Mark, and Neil D. Theobald (1996)."The Effects of School District Spending Priorities on Length of Stay in Teaching," *Journal of Human Resources 31*(3): 477-512.

Guarino, C. M., Reckase, M. D., & Wooldridge, J. M. (2012). Can Value-Added Measures of Teacher Education Performance Be Trusted? Retrieved from http://education.msu.edu/epc/library/documents/Guarino-Reckase-Wooldridge-May-2012-Can-Value-Added-Measures-of-Teacher-Performace-Be-Truste.pdf

Hannaway, Jane, Zeyu Xu, Tim Sass, David Figlio and Li Feng (2009)."Value Added of Teachers in High-Poverty Schools and Lower Poverty Schools:Implications for Management and Policy.Unpublished.Washington, DC:Urban Institute.

Hanushek, Eric A., John F. Kain, and Steven G. Rivkin (2004). "Why Public Schools Lose Teachers," *Journal of Human Resources 39*(2): 326-354.

Hintze, J. (2008). Number Cruncher Statistical Software and Power and Sample Size System. [Computer software]. Kaysville, UT.

Hosmer, D., & Lemeshow, S. (1999). Applied Survival Analysis. John Wiley & Sons, New York, NY.

Ingersoll, Richard M. (2001).“Teacher Turnover and Teacher Shortages: An Organizational Analysis,” *American Educational Research Journal* 38(3): 499–534.

Ingersoll, Richard M., and David Perda (2009).“The Mathematics and Science Teacher Shortage: Fact and Myth.”CPRE Research Report #RR-62.

Imazeki, Jennifer (2005). “Teacher Salaries and Teacher Attrition,” *Economics of Education Review* 24(4): 431-449.

Kane, Thomas J., Jonah E. Rockoff and Douglas O. Staiger (2008).“What Does Certification Tell Us About Teacher Effectiveness?Evidence from New York City.”*Economics of Education Review* 27: 615-631.

Kreig, John (2006). “Teacher Quality and Attrition,” *Economics of Education Review* 25: 13-27.

Lankford, Hamilton, Susanna Loeb, and James Wyckoff(2002).“Teacher Sorting and the Plight of Urban Schools. A Descriptive Analysis,” *Educational Evaluation and Policy Analysis* 24(1): 37–62.

Liang, KY., and SL Zeger(1986) *Longitudinal data analysis for discrete and continuous outcomes.* Biometrics. 42(1):121–130.

Liu, Xiaofeng, Jessica Spybrook, Richard Congdon and Stephen Raudenbush (2001).Optimal Design for Multilevel and Longitudinal Research, Version 3.5 [Computer Software]. Survey Research Center of the Institute of Social Research at the University of Michigan.

Martin, Anne (2007).“The Use of Diversified Compensation Systems to Address Equitable Teacher Distribution,” Education Commission of the States. The Joyce Foundation.

Miller, David M., Mary T. Brownell, and Stephen W. Smith (1999).“Factors that predict teachers staying in, leaving, or transferring from the special education classroom,” *Exceptional Children* 65(2): 201-218.

Murnane, Richard J. and Randy Olsen. 1990. "The Effects of Salaries and Opportunity Costs on Length of Stay in Teaching: Evidence from North Carolina."*Journal of Human Resources* 25(1):106-124.

Murnane, RichardJ., and Randall J. Olsen (1989a). “The Effects of Salaries and Opportunity Costs on Duration in Teaching: Evidence from Michigan,” *TheReview of Economics and Statistic* 71(2): 347–352.

Murnane, Richard J., and Randall J. Olsen (1989b).”Will There Be Enough Teachers?,” *American Economic Review: Papers and Proceedings of the Hundred and First Annual Meeting of the American Economic Association, LXXIX*, 242–246.

Murnane, Richard J., Judith D. Singer, John B. Willett, James J. Kemple, and Randall J. Olsen (1991).“Who Will Teach?Policies That Matter,” Cambridge, Mass.: Harvard University Press.

Pathman, Donald E., Thomas R. Konrad, Tonya S. King, Donald H. Taylor Jr., and Gary G. Koch (2004).‘‘Outcomes of States’ Scholarship, Loan Repayment, and Related Programs for Physicians,’’ *Medical Care* 42(6): 560–8.

Piantadosi, S. (1997). Clinical Trials: A Methodological Perspective. New York, NY: Wiley Series in Probability and Statistics.

Reise, S. & Duan, N. (2003). Multilevel modeling: Methodological advances, issues, and applications. Mawah, NJ: Lawrence Erlbaum.

Rickman, Bill D., and Carl D. Parker (1990).“Alternative Wages and Teacher Mobility: A Human Capital Approach,” *Economics of Education Review* 9(1): 73–79.

Sass, T. R., Semykina, A., & Harris, D. N. (2014). Value-added models and the measurement of teacher productivity. *Economics of Education Review*, *38*, 9–23. doi:10.1016/j.econedurev.2013.10.003

Scafidi, Benjamin, David L. Sjoquist, and Todd R. Stinebrickner (2007).“Race, Poverty, and Teacher Mobility,” *Economics of Education Review* 26(2): 145-159.

Shen, Jianping (1997).“Teacher retention and attrition in public schools: evidence from SASS91,” *The Journal of Educational Research 91*(2): 81-88.

Smith, Thomas M., and Richard M. Ingersoll (2004).“What are the Effects of Induction and Mentoring on Beginning Teacher Turnover?,” *American Educational Research Journal* 41(3): 681–714.

Steele, Jennifer L.,Richard J. Murnane, and John B. Willett (2009)."Do Financial Incentives Help Low-Performing Schools Attract and Keep Academically Talented Teachers? Evidence from California," NBER Working Papers 14780, National Bureau of Economic Research, Inc.

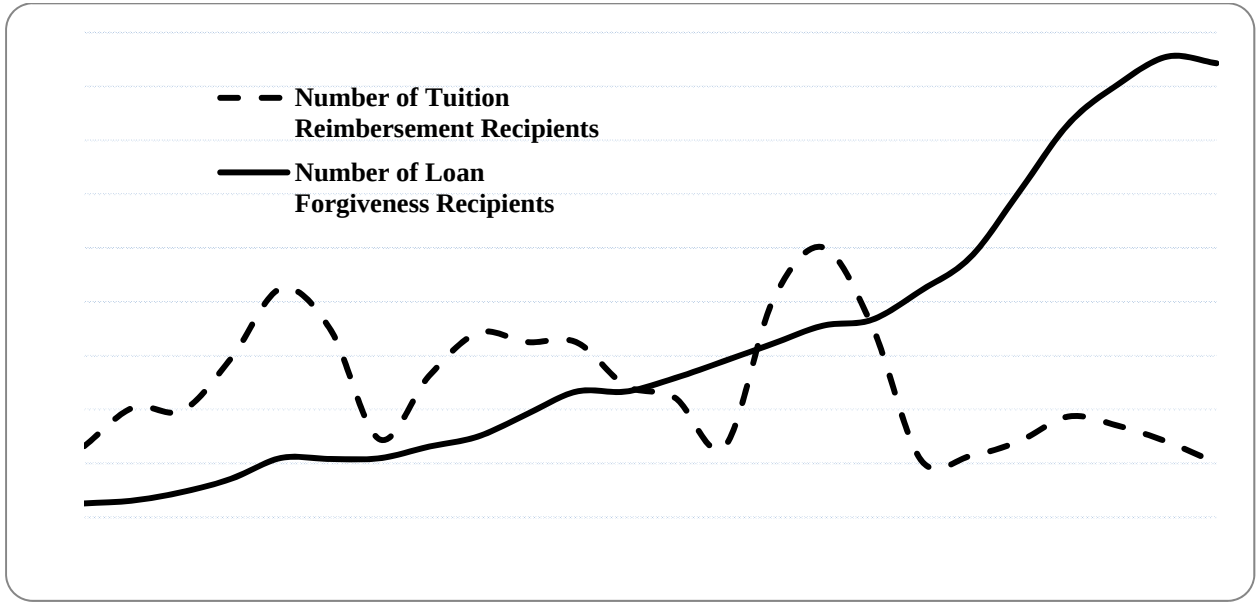
Stinebrickner, Todd R. (1998).“An Empirical Investigation of Teacher Attrition,” *Economics of Education Review* 17(2): 127-136.

U.S. Department of Education.(n.d.).Office of Special Education Programs, Data Analysis System. Table AC2: Number of special education teachers serving students ages 6–21, by state. Available at http://www.ideadata.org/tables26th/ar_ac2.htm

Wei, Ruth C., Linda Darling-Hammond, Alethea Andree, Nikole Richardson, and SteliosOrphanos (2009).“Professional Learning in the Learning Profession: A Status Report on Teacher Development in the United States and Abroad,” Dallas, TX.National Staff Development Council.

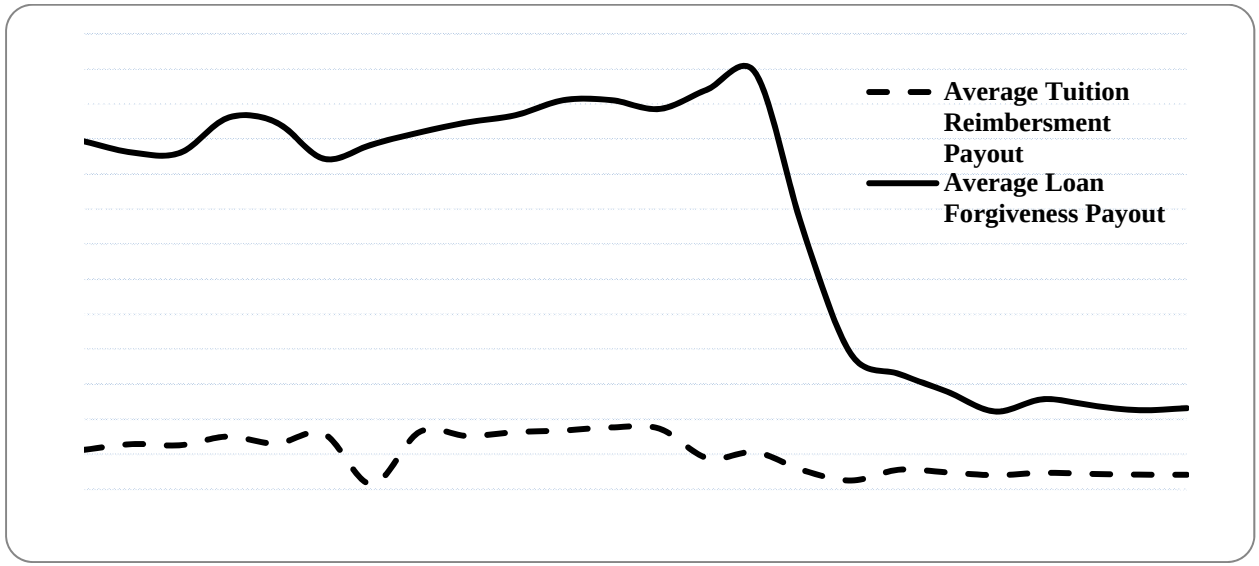
Appendix B. Tables and Figures

Table 1:Number of Teachers ReceivingTuition Reimbursement and Loan Forgiveness Payments by Year, 1986/87-2009/10



Source:Florida Department of Education, Critical Teacher Shortage Reports

Table 2:Average Payment per Recipientin Tuition Reimbursement and Loan Forgiveness Programs by Year, 1986/87-2009/10



Source:Florida Department of Education, Critical Teacher Shortage Reports

Table 3:Designated Critical Teacher Shortage Areas, 1984/85 – 2009/10

	Math	Science	Middle and High Science	Middle and High Math	Speech Ther-apy	Emo-tion-ally Handi-capped	ESE ("Han-dicap-ped")	ESE (Special Ed.)	Foreign Lang-uages	English	Middle and High English	Read-ing	ESOL	Tech. Ed./ Indus-trial Arts	School Psychol -ogists
1984-1985	x	x			x	x			x					x	
1985-1986	x	x				x			x	x					
1986-1987	x	x				x			x	x					
1987-1988	x	x				x			x						
1988-1989	x	x				x			x	x					
1989-1990			x	x			x		x		x				
1990-1991			x	x			x		x		x				
1991-1992			x	x			x		x		x				
1992-1993			x	x				x					x		
1993-1994								x					x		
1994-1995								x					x		
1995-1996								**x**					**x**		
1996-1997								**x**					**x**	**x**	
1997-1998								**x**					**x**	**x**	
1998-1999								**x**					**x**	**x**	
1999-2000								**x**					**x**	**x**	
2000-2001			**x**	**x**				**x**					**x**	**x**	
2001-2002			**x**	**x**				**x**	**x**				**x**	**x**	
2002-2003			**x**	**x**				**x**	**x**			**x**	**x**	**x**	**x**
2003-2004			**x**	**x**				**x**	**x**			**x**	**x**	**x**	**x**
2004-2005			**x**	**x**				**x**	**x**			**x**	**x**	**x**	**x**
2005-2006			**x**	**x**				**x**	**x**			**x**	**x**	**x**	**x**
2006-2007			**x**	**x**				**x**	**x**			**x**	**x**	**x**	**x**
2007-2008			**x**	**x**				**x**	**x**			**x**	**x**	**x**	**x**
2008-2009			**x**	**x**				**x**	**x**		**x**	**x**	**x**	**x**	
2009-2010			**x**	**x**				**x**	**x**		**x**	**x**	**x**	**x**	

Source: Florida Department of Education, Critical Teacher Shortage Reports - Various Years.In School Year 1992-1993, Middle and High Level Science was specifically labeled Middle and High Level Physical Sciences. In all years where Industrial Arts appears, except 1984-1985, it appears as Technology Education/Industrial Arts. Thus, they are listed as a combined area.