Patterns of Retirement and Return Employment of Pennsylvania's Professional School Personnel: 1984-2006

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1.0 Introduction

The purpose of this paper is to characterize the choice made by retired professional school personnel in Pennsylvania to return to work in public education. This paper builds on earlier studies[2] of the market for teachers and administrators in Pennsylvania. In this paper we describe retiring teachers, administrators and coordinators as "retirees," and describe such persons who return to work in public education post-retirement as "returnees." In order to understand the choice, we describe the incentives to return to education that retirees have faced over time, describe the evolution of the general market for education personnel in public education in Pennsylvania, and then characterize in considerable detail retirees and returnees over the last quarter century. Pennsylvania is relatively unique among the states in that it has a very stable level of school enrollment of about 1.8 million students, is the second largest teacher preparation states by count of institution, and has been a long-term net exporter to other states of teachers and administrators.

The research takes advantage of an unusually rich set of administrative records, obtained under signed confidentiality agreements, of the personnel records of the Pennsylvania Department of Education and the retirement records maintained separately by the Pennsylvania School Employees' Retirement System (PSERS) over the period 1984-2007.

By way of summary, we find over the period 1984-2005 that the decision to return to public school employment *after* retiring is relatively rare. The overall return *rate*, the percentage of retirees in a given year who return later, varied between .4% and 2.8%. As a group, these returnees tended to be more highly educated, and more often administrators, retired about 9 years earlier than retirees who did not return, earned about $1,300 less in inflation-adjusted salary compared to retirees who did not return, and worked about 8 to 9 years less at time of retirement. More than 1/3 of returnees went back to work in a district other than the one they retired at, and More than ½ went back to work in a different school than the one they retired at. However, only 10% returned to a different Metropolitan Statistical Area than the one they retired at. In choosing where to return to, returnees showed a statistically significant preference for working in districts and schools that scored higher on Pennsylvania standardized tests than the districts and schools where they retired at. Such chosen districts were substantially less poor, and more white as well.

The paper is organized as follows. Section 2 describes the current general financial setting of PSERS; Section 3 describes the evolution of the retirement system over the last quarter century in order to provide a broad understanding of the incentives facing a retiree. It also compares federal-state-local after-tax incentives to work or not work another year. Section 4 describes historical data on the aggregate and regional market for teacher and educational services in Pennsylvania. Section 5 examines retirees and returnees to ascertain if there are

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[2] See Furgeson, Strauss, and Vogt (2006) for a behavioral modeling of the classroom teacher retirement decision, Strauss and Strauss (2003) for a behavioral modeling of the market for substitute classroom teachers in Southwest Pennsylvania, and Strauss(2003) for an analysis of the market for public school administrators in Pennsylvania.

unique characteristics of returnees, and presents preliminary econometric modeling of the decision to become a returnee. Section 6 concludes.

2.0 General Background Information on the Pennsylvania School Employees Retirement System and its Members

Pennsylvania has operated a state-wide, defined benefit retirement plan for its public school employees since 1917. The Pennsylvania Public School Employees' Retirement System (PSERS) currently has about one half million contributors and beneficiaries. As of the close of June, 2008, there were approximately 279,000 contributors with an active payroll of $11.9 billion, and 176,000 beneficiaries who received a total of $3.8 billion in annual annuity and related withdrawal benefits. Beneficiaries averaged annual retirement benefits of $21,653 in 2007-8. Total assets for post-employment retirement and health benefits fell from $67.5 billion to $62.7 billion, or 7 %, at the close of June 2008 across the prior 12 months.

Volatility in financial markets and the generosity of the defined benefit plan had led PSERS actuaries to project in June 30, 2003, that, beginning in 2012, the local, employer contribution rate, currently 6.46% would be required to rise to 27.7%. The employee contribution rate is currently 7.5%, and employees are members of the federal Social Security system. Favorable investment returns of between 11 and 13% until recently led PSERS actuaries to a lower projected employer contribution rate of 17% to begin in 2012 or about $1.9 billion at current payroll levels compared to current employer contributions of $765.7 million.[3] As of June, 2007, the most recent time for a complete actuarial valuation, PSERS was determined overall to be funded 85.8% by its actuaries. It seems likely that declines in financial markets since July 1, 2008 will be reflected in a lower level of funding that in turn will require an increase in the projected employer contribution rate to begin in 2012[4]

Membership and participation is mandatory for full time employees of school districts and other publicly supported or publicly created local education administrative units; 739 local units made contributions in fiscal year 2007-8; however, only the 501 school districts of the 739 LEAs have the authority to levy property and local income taxes.[5]

Figure 1 displays the PSERS ratio of benefit to assets over time; it peaked at 123% in 1999, and has declined to about 81% in 2006.

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[3] PSERS(2008), p. 9-10.
[4] PSERS(2008), p. 33.
[5] The local units are composed of 501 school districts, 29 regional or intermediate units, 73 area vocational schools, and 136 charter schools.

Figure 1

PSERS Funding Ratio Over Time: 1988-2006
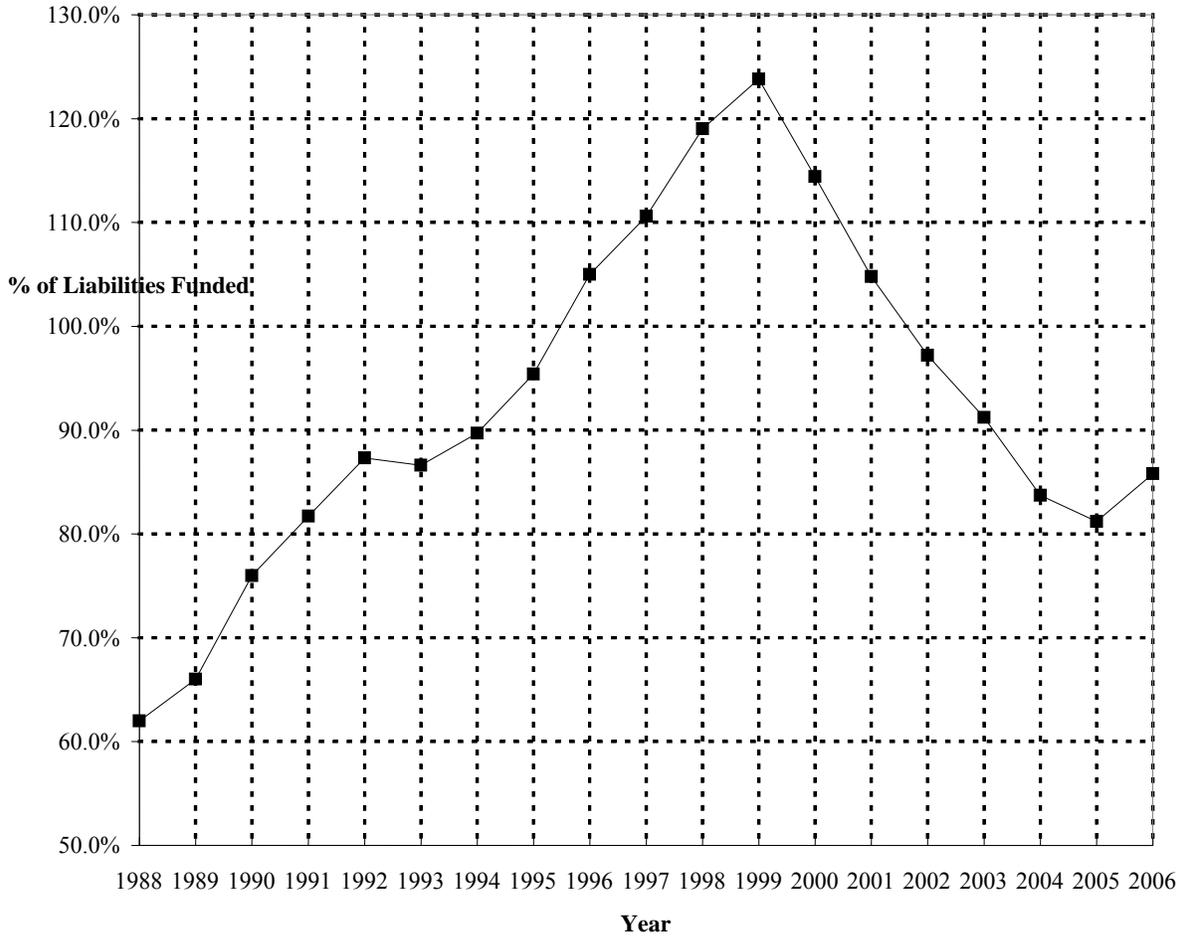
Source: PSERS, *Annual Reports.*

3.0 Evolution of Defined Benefits, Cost of Living Adjustments, and Related Provisions for Professional Pennsylvania School Personnel

3.1 Early Period

Between 1919 and 1933, membership in PSERS nearly doubled from 37,503 to 54,968. Investments were exclusively in Pennsylvania's state and local bonds. By 1950, membership was 91,000 and assets were $567.7 million. The first cost of living adjustment was granted in 1967, and again in 1974, 1979, 1984 and 1989. In 1970 the basic benefit formula was raised to 2% of final average salary.

3.2 The Modern Era: 1975 Act 96 Retirement Code and Subsequent Legislative Provisions

The 1975 amendments to PSERS represented a major overhaul of the entire system. Governance was re-established through an independent administrative board, and authority to invest in common stock was increased. Lump sum withdrawal of accumulated employee contributions was established, and part time school employees became eligible to join the system. Eligibility for early retirement with an actuarial benefit reduction was enabled after 10 years of services. Previously, 25 years of service was required. Also, eligibility due to disability was lowered from 10 years to 5 years of total service.

In 1982 liberalization of investments in common stock was broadened to 50% of total assets at book value of common stock. The number of days an annuitant could return to work without loss of annuity was changed from 60 to 75 days in a school year. The first retirement window was enacted in 1982. In 1983 the employee contribution rate was raised from 5.25% to 6.25%.

In 1985, the state made its final payment of $90 million owed PSERS for under funding in 1970-1973. No interest was charged to the state for these loans. In 1989, PSERS membership was 195,000 and retirees were 96,000. Assets were $14 billion.

In 1991, the number of days a returnee could work without loss of benefits was increased from 75 to 95 days in a school year, and credits for military leave, maternity leave and nursing service corps was extended. Health benefits were accorded to pre-Medicare retirees, and legislators became voting members of the Board. In 1992, Act 186 provided an early retirement incentive by according 10% additional years of service for members aged 55 and older.

In 2002, the 2% factor in the retirement formula was increased permanently to 2.5% or a 25% increase in the replacement rate. Thus under pre-2001 law, 30 years of service resulted in a replacement rate of .02 * 30 or 60% while upon 2002 and thereafter, 30 years of service resulted in a replacement rate of .025 * 30 or 75%. At 35 years of service the respective replacement rates are 70% and 87.5%. In both cases these replacement rates do not take into

account Social Security benefits which a retiree would be eligible for as Pennsylvania professional school personnel are under the Social Security system.

3.3 Recent (2002) Current Law Incentives to Retire

Table 1 displays the after-tax incentives facing a classroom teacher with respectively 35 of service in 2002, under 2%, the pre-2002 factor, and 2.5% factor in the defined benefit retirement formula. Table 2 shows the same calculations with 30 years of service in 2002. Remarkably, a teacher with 35 years of service earning $65,300/ year (the median classroom salary in 2002) could be better off, after-tax, upon retiring. This is because she would no longer be paying non-deductible FICA, state and local income taxes (11.6%), would not be contributing 7.1% of income to the PSERS retirement plan and retirement benefits are not taxable under Pennsylvania state and local income tax law. This result obtains even though most of Social Security benefits were taxable under 2002 federal income tax law. Both Table 1 and Table 2 presume pre-tax Social Security benefits of $15,000/year.

Under these assumptions we see that under 30 or 35 years of service scenarios at time of retirement, with either the old or new annual replacement rate factor of 2% or 2.5%, the decision to retire leaves this hypothetical retiree with more after-tax income than if she were to continue to work. Under 35 years of service at retirement, the replacement rate, measuring retirement benefits in after-tax dollars to after tax income from working in the last year, goes from 123% to 143%. (See last row of Table 1). Under 30 years of service at retirement, the respective replacement rates at 2% and 2.5% are 111% and 129%. (See last row under Table 2).

Figure 2

PSERS Contributions Rates: 1982-2007
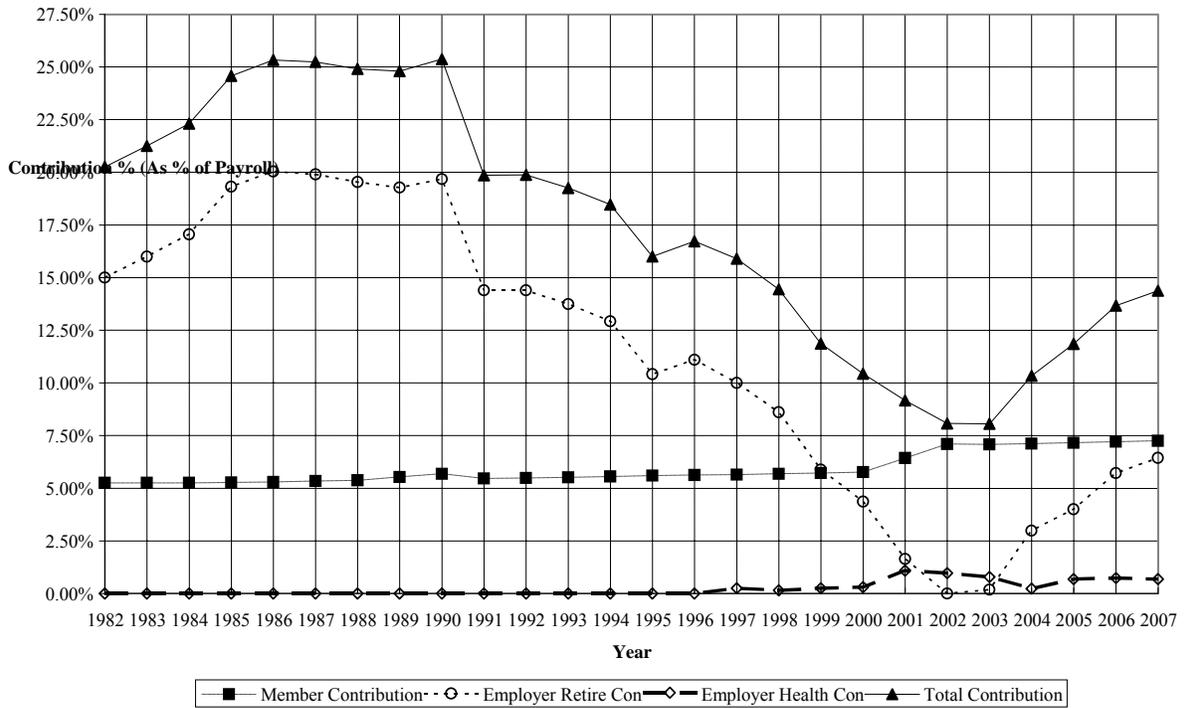
Source: PSERS, *Annual Reports.*

Figure 3
Pennsylvania State Employees Retirement System
Median Actual Replacement Rates (Benefit/Last Year's Income)
By Type of Retirement: 1986-2005
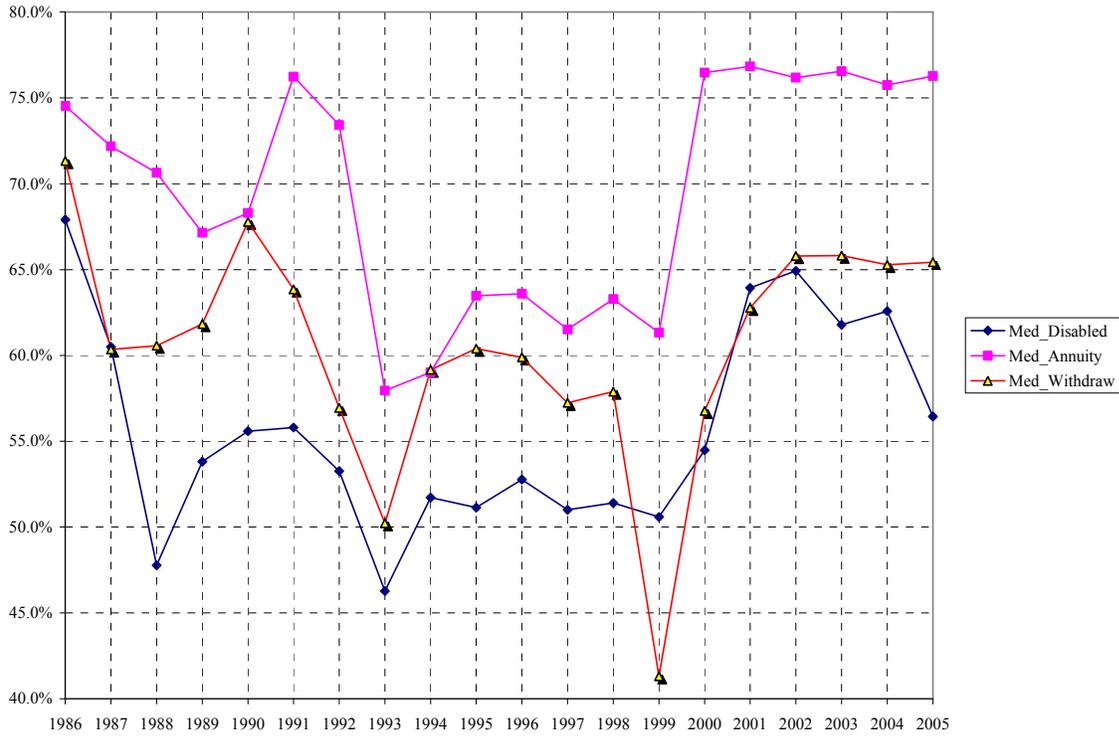
Table 1
After-Tax Income Incentives to Retire
for Pennsylvania Professional Personnel in 2002
35 Years of Service

Federal, State, Local Taxes and PSERS Contribution Rates		Income		
		Working Last Year	Retirement @2%	Retirement @2.5%
Salary 1/ or State Retirement Benefit	Tax Rate	$65,300	$45,710	$57,138
FICA- Employee or Social Security Benefit	0.075	-$4,898	$15,000	$15,000
State Income Tax	0.031	-$2,024	$0	$0
Local Income Tax	0.01	-$653	$0	$0
Member PSERS Contribution	0.071	-$4,636	$0	$0
Federal Income Tax	Turbo Tax 2002	-$11,905	-$10,055	-$13,133
After Tax Income		$41,184	$50,655	$59,005
Ratio of After Tax Retirement Income to After Tax Work Income		NA	123.0 %	143.2%

1/ Median classroom salary at Retirement for Annuitants in 2002 was about $65,300 in Pennsylvania. Benefit calculations assume average salary at 3 high years is equal to last year's salary. Federal income tax calculation assumes single person, non- itemizer.

Table 2
After-Tax Income Incentives to Retire
for Pennsylvania Professional Personnel in 2002
30 Years of Service

Federal, State, Local Taxes and PSERS Contribution Rates		Income from:		
		Work Last Year	Retirement @2%	Retirement @2.5%
Salary or State Retirement Benefit	Tax Rate	$65,300	$39,180	$48,975
FICA-Employee Tax or Social Security Benefit	0.075	-$4,898	$15,000	$15,000
State Income Tax	0.031	-$2,024	$0	$0
Local Income Tax	0.01	-$653	$0	$0
Member PSERS Contribution	0.071	-$4,636	$0	$0
Federal Income Tax	Turbo Tax 2002	-$11,905	-$8,287	-$10,933
After Tax Income		$41,184	$45,893	$53,042
Ratio of After Tax Retirement Income to After Tax Work Income		NA	111.4%	128.8%

1/ Median teachers salary at retirement for annuitants in 2002 was $65,300 in Pa.
Benefit calculations assume average salary at 3 high years is equal to last
year's salary. Federal income tax calculation assumes single person, non- itemizer.

From 1991 through 2003, a retired teacher could work 91 days or ½ of an academic year without incurring any reduction in retirement benefits. On the 92nd day, retirement benefits would be "paused" until the close of the academic year, and a new safe haven for 91 days

would be available again. This would have the effect of reducing state retirement benefits by 50%. During the 91 day safe haven, the returnee would of course be subject to FICA and state and local income taxation on all earnings, and a portion of Social Security would become taxable. Beginning in 2004, the 91 safe-haven was increased to 181 days or an entire academic year so that state retirement benefits would continue unabated.

Table 3 works through the after-tax incentives for the decision to return to work in 2002 for a teacher who retired that year under the assumption of 35 years of service, and shows the effect of this 2004 liberalization in penalty for returning to teaching. Were the returning teacher to begin working at the old salary, the replacement rates, compared to not having retired, are quite substantial. Consider, for example, the returnee with 35 years of service who retired at 2.5%/year, and was able to experience no retirement penalty from earning $65,300. Gross economic income (see column (8) of Table 3) would now be $137,438 rather than just $65,300 had retirement never occurred. On an after tax basis, take home pay from returning to work would be $117,114 rather than $41,184 had retirement never occurred, or 284% larger.

Table 3
Comparison of After Tax Incentives to Retire
And Return to Teaching for Retiree with 35 Years of Service in 2002

Assumptions	Income from Just Working	Income from Just Retiring at 2%	Income from Retiring and Returning to Work at 2%		Income from Retiring and Returning to Work at 2.5 %		
	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Working Days Excluded from Penalty	0	0	91	180	0	91	180
Salary from Teaching	$65,300	$0	$65,300	$65,300	$0	$65,300	$65,300
Retirement Benefit @35 Years of Service	$0	$45,710	$22,855	$45,710	$57,138	$28,569	$57,138
Social Tax or Security Benefits	-$4,636	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
Gross Economic Income	$65,300	$60,710	$103,155	$126,010	$72,138	$108,869	$137,438
State Tax	-$2,024		-$2,024	-$2,024		-$2,024	-$2,024
Local Tax	-$653		-$653	-$653		-$653	-$653
Federal Tax	-$11,905	-$10,055	-$22,283	-$30,133	-$13,133	-$30,133	-$22,283
Retirement Contribution	-$4,636	$0	-$4,636	-$4,636	$0	$4,636	$4,636
After-tax Economic Income	$41,184	$50,655	$73,558	$88,563	$59,005	$80,695	$117,114
Ratio of after tax income from retirement to after tax work income		123.0%	178.6%	215.0%	143.3%	195.9%	284.4%
Marginal Change in After Tax Replacement Rate	NA		45.2%	20.4%	NA	36.8%	45.1%

4.0 Characteristics of the Supply and Demand for Public School Professional Employees

The primary justification for the liberalization over time in the retirement benefit penalty for returning to work was to increase the supply of hard-to-find certificates. We explore here the relationship between the annual production of fully qualified new teachers from Pennsylvania's 95 approved teacher preparation programs and the observed pattern of employment of newly trained teachers. This juxtaposition of supply and demand indicates that

Pennsylvania has never experienced a "shortage" of fully qualified new teachers in every area of teacher certification, and that the ratio of salary for newly hired teachers has been substantially above their counterparts who wound up in other than teaching jobs as reflected on state tax returns.

4.1 Demand and Supply in the Aggregate

It is well known that Pennsylvania is a net exporter of classroom teachers each year.[6] Given the aging of Pennsylvania's teacher force, the total number of new hires has exceeded 10,000 classroom teachers/year for the past several years for which administrative records are available. (See Figure 4). Hires of inexperienced, or newly trained teachers, have numbered only about 4,000 to 5,000/year with the difference reflecting the hiring of experienced teachers who are either moving from other public districts or from private educational settings to public education.

The production of fully qualified teachers, e.g. those with Instructional I certificates which is our measure of supply, has far exceeded hiring needs. Since adding another or specialty certificate also entails the awarding of another Instructional I certificate, care must be exercised in distinguishing between the total number of certificates issued/year, the total number a unique person holds, and the total number of unique persons per year to earn a certificate. Figure 5 indicates that there have been better than 10,000 of each type of certificate produced over the 1985-2006 period. At the end of this period there have been better than 14,000 unique persons certified each year compared to new hires that have ranged between 4,000 to 5,000. (See Figure 4 and Figure 5 below).

There is evidence in a 2006 survey[7] that Pennsylvania school superintendents believe that various secondary science and mathematics certification areas are difficult to fill. A long-run comparison between the numbers actually hired and the number of Instructional I certificates produced does not support this perception for Biology, Chemistry, Mathematics, and Physics certification areas. Figure 6 through Figure 13 display the annual production of each of these Instructional I certificates, and compares them to the number of inexperienced hires, and to the number of inexperienced hires who were *ever* subsequently hired for at least one year. The number of Instructional I Biology certificates has grown from 282 per year in 1996 to 345 per year in 2006. Inexperienced hires grew from 48 in 1996 to 121 in 2006 (See Figure 6). Figure 7 calculates the initial and lifetime employment rates. Biology displays a slow upward trend in initial employment rate from 17% in 1996 to 33% in 2006. Interestingly, most of the improvement in employment prospects occurred by 2001 which was the first year in which Biology Praxis minimum passing scores were substantially increased. It thus appears that the increased content knowledge standards did not materially disadvantage prospective Biology teachers. The reader will note roughly similar patterns for Chemistry, Mathematics, and Physics. The situation for Elementary Education has been substantially more difficult, and employment rates of inexperienced prospective teachers have never exceeded 25%.

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[6] See *Final Report of the Governor's Commission on Training America's Teachers.* (Harrisburg, Pennsylvania, July 2006).
[7] See Strauss, Strauss, Gorman and Liu(2008).

It is often suggested that part of the difficulty in locating science and mathematics teachers has to do with more favorable starting salaries in other, non-teaching occupations. To examine the validity of this conjecture, the Pennsylvania Department of Revenue matched single, non-teachers who had earned Instructional I certificates and provided back the median income of such individuals. We see in Figure 14 that the median starting teacher salary from 2000 through 2003, compared to the non-teacher counterpart, was always greater than 1.5 in the first year, and over time did not fall below 1.45. Separate testing for differences in Praxis test scores of the two groups did not reveal material differences between them, so one can rule out differences in content knowledge or presumed productivity as explaining why teachers, who work 9 months/year compared to a typical work year in the private sector of 11 or 12 months, earned substantially more. It is likely that these very favorable wage differentials encourage many to elect to train to become teachers; however, as we have seen, the employment rates of newly trained teachers rarely is above 40% in the first year of job search.

Figure 4
Annual New Hires of Pennsylvania's Classroom Teachers: 1985-2006
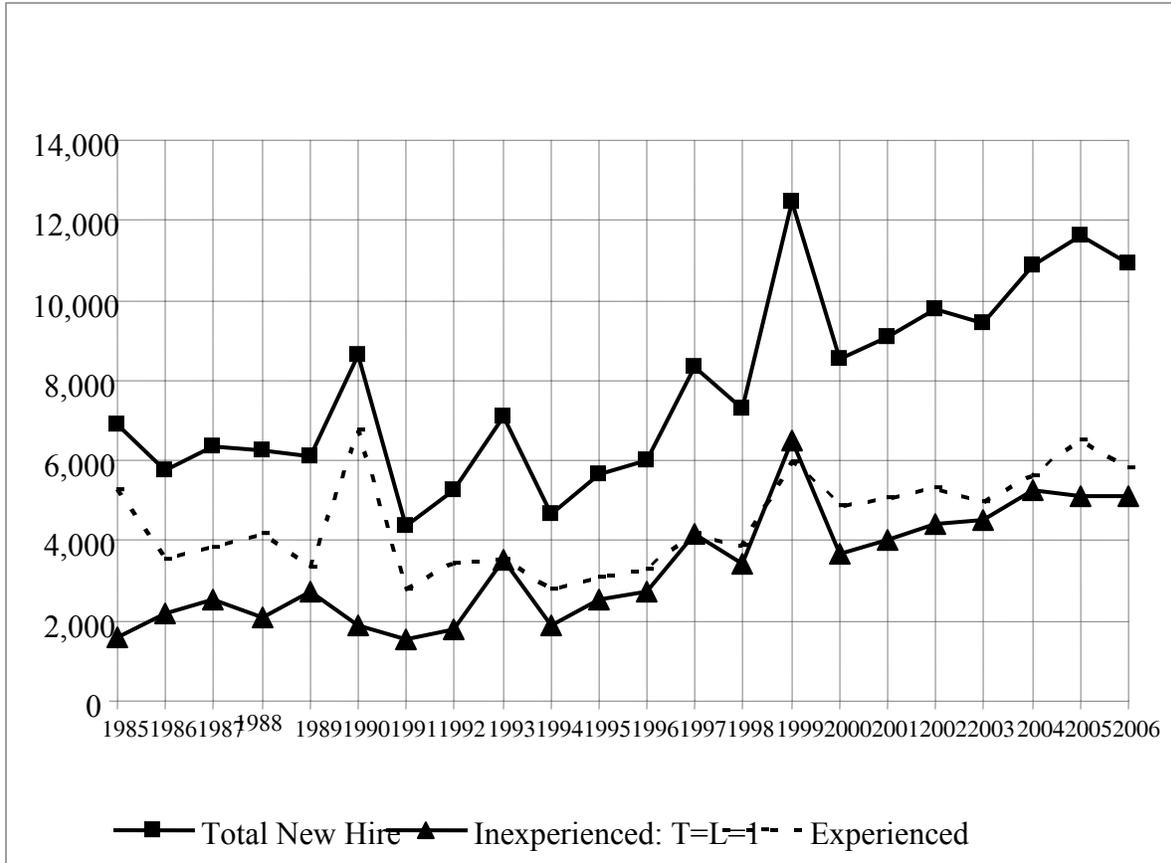
Source: tabulations of Professional Personnel database.

Figure 5
Production of Teaching Certificates in Pennsylvania: 1970-2007
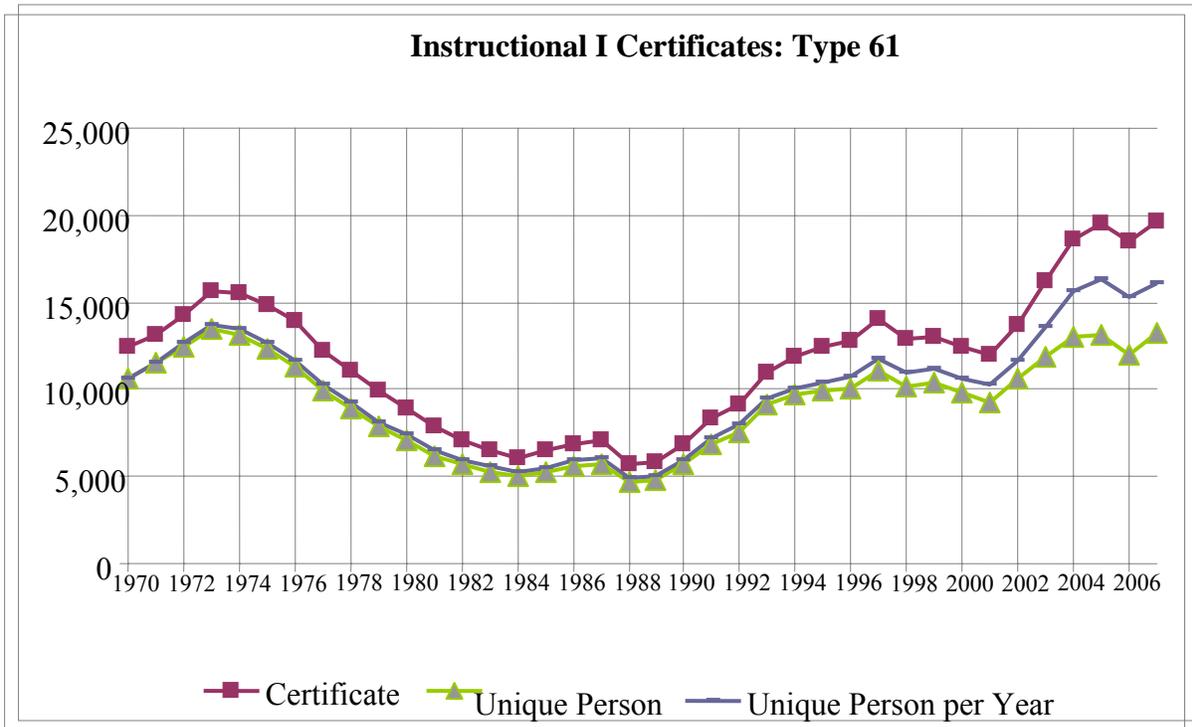
Source: Tabulations of Pennsylvania Department of Education Teacher Certification Files

Figure 6
Initial and Lifetime Employment Levels for
Fully Qualified Biology Teachers in Pennsylvania: 1996-2006
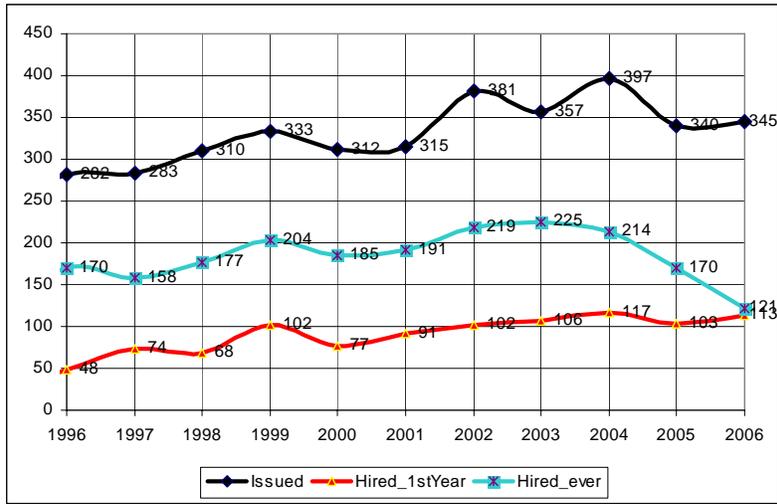
Source: authors' tabulations of PDE certification and personnel files.

Figure 7
Initial and Lifetime Employment Rates for
Fully Qualified Biology Teachers in Pennsylvania: 1996-2000
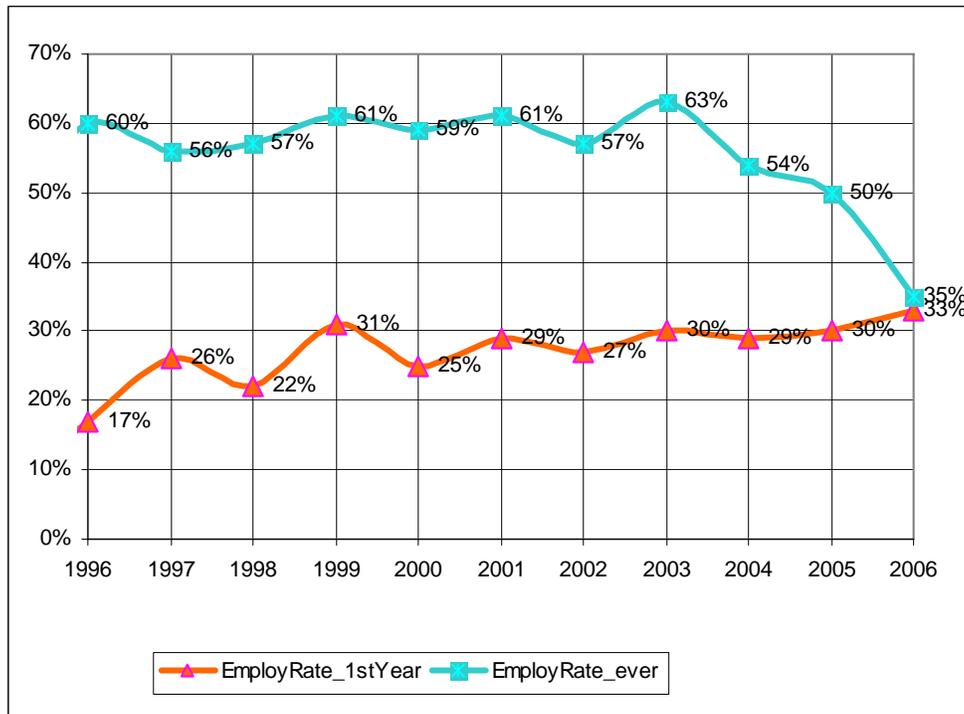
Source: authors' tabulations of PDE certification and personnel files.

Figure 8
Initial and Lifetime Employment Levels for
Fully Qualified Chemistry Teachers in Pennsylvania: 1996-2006
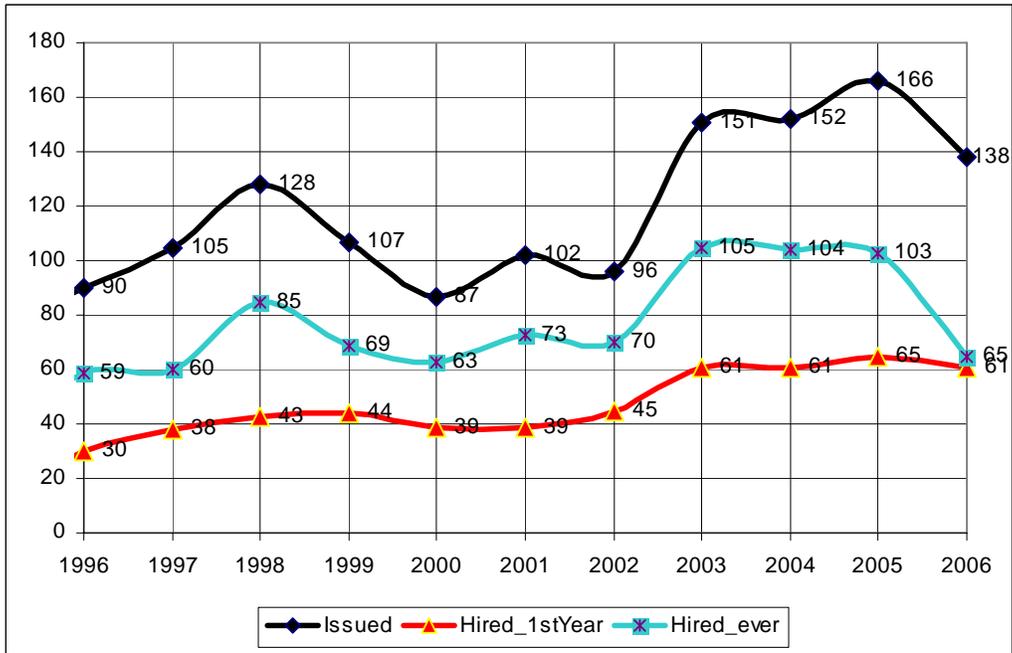
Source: authors' tabulations of PDE certification and personnel files.

Figure 9
Initial and Lifetime Employment Rates for
Fully Qualified Chemistry Teachers in Pennsylvania: 1996-2006
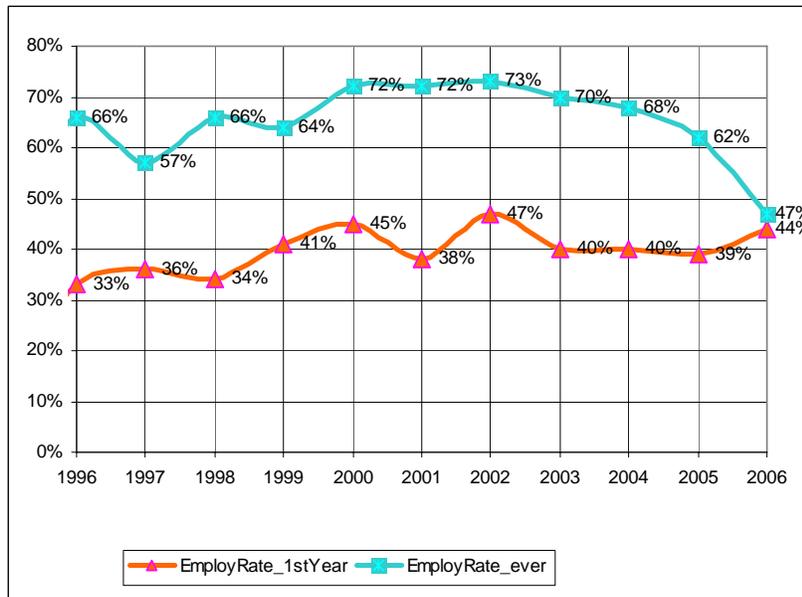
Source: authors' tabulations of PDE certification and personnel files.

Figure 10
Initial and Lifetime Employment Levels for
Fully Qualified Math Teachers in Pennsylvania: 1996-2006
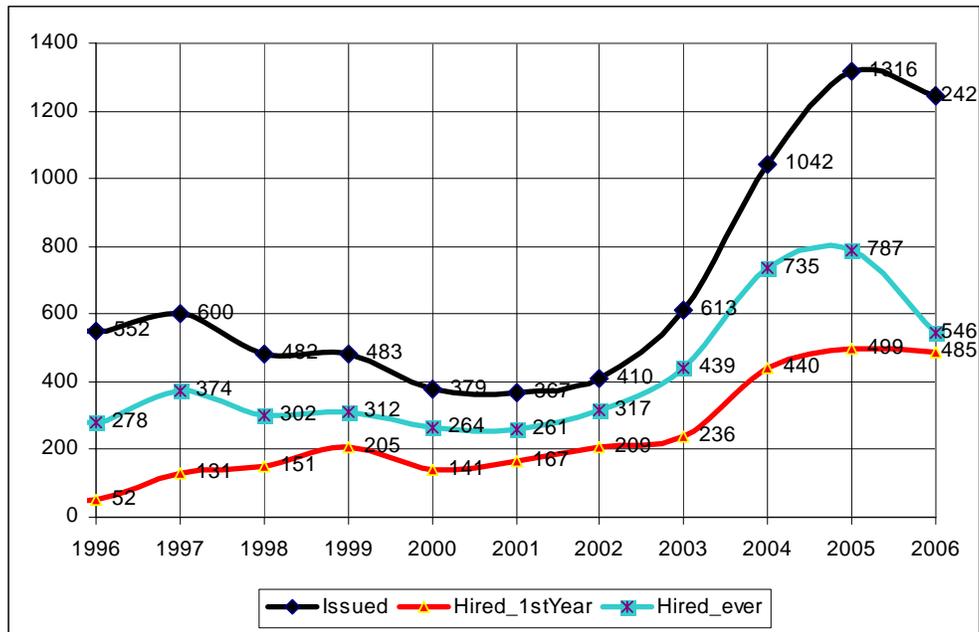
Source: authors' tabulations of PDE certification and personnel files.

Figure 11
Initial and Lifetime Employment Rates for
Fully Qualified Math Teachers in Pennsylvania: 1996-2006
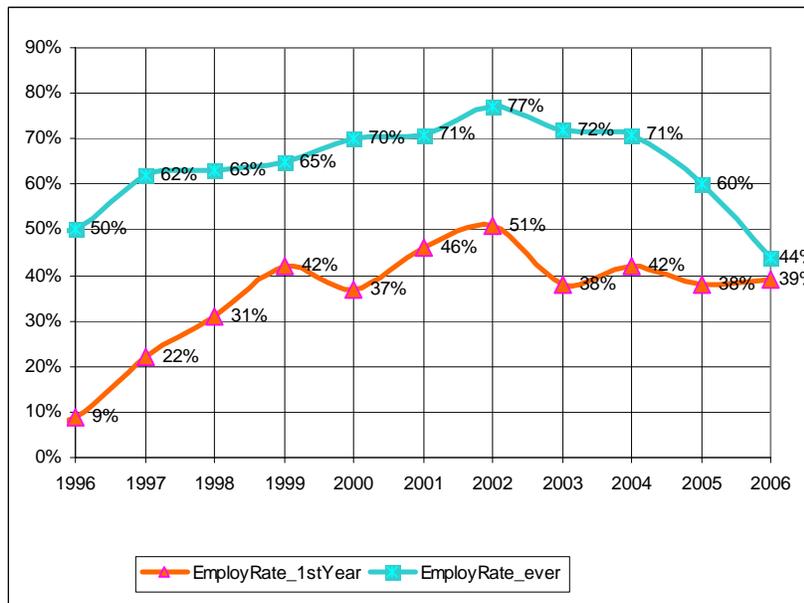
Source: authors' tabulations of PDE certification and personnel files.

Figure 12
Initial and Lifetime Employment Levels for
Fully Qualified Physics Teachers in Pennsylvania: 1996-2006
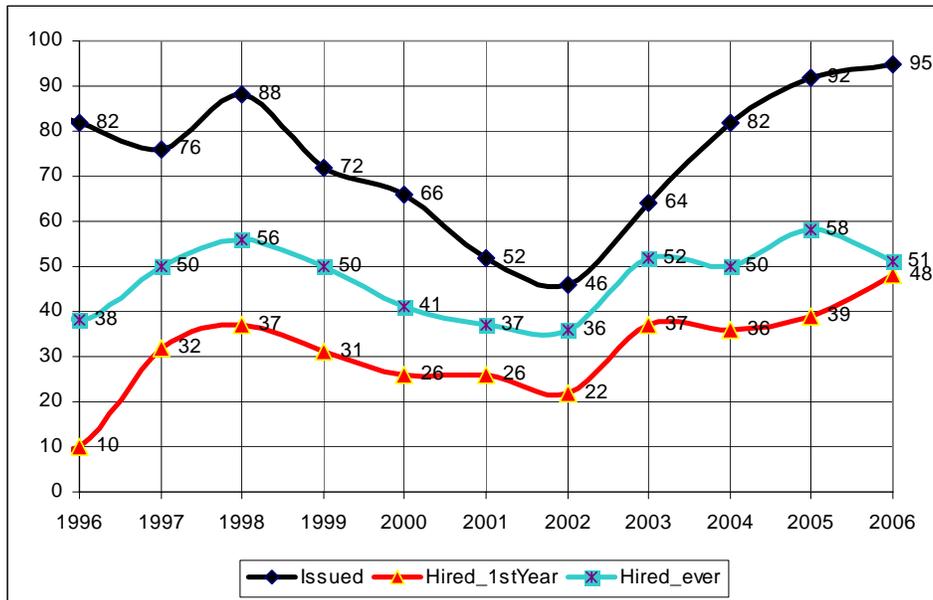
Source: authors' tabulations of PDE certification and personnel files.

Figure 13
Initial and Lifetime Employment Rates for
Fully Qualified Physics Teachers in Pennsylvania: 1996-2006
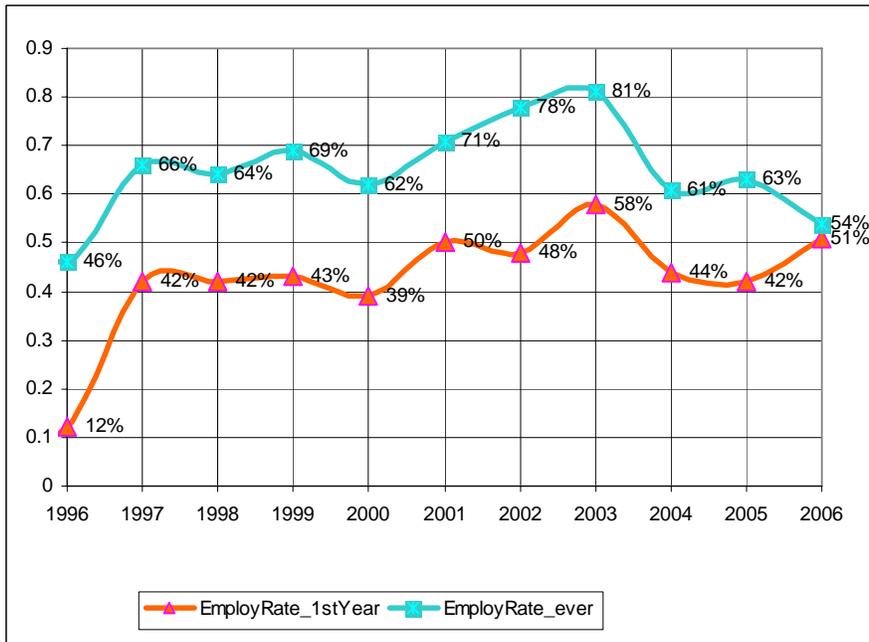
Source: authors' tabulations of PDE certification and personnel files.

Figure 14
Ratio of Median Compensation of Fully Qualified Teachers
To Fully Qualified Teachers Who Did Not Get Teaching Jobs
For 1ˢᵗ, 2ⁿᵈ and 3ʳᵈ Year of Employment
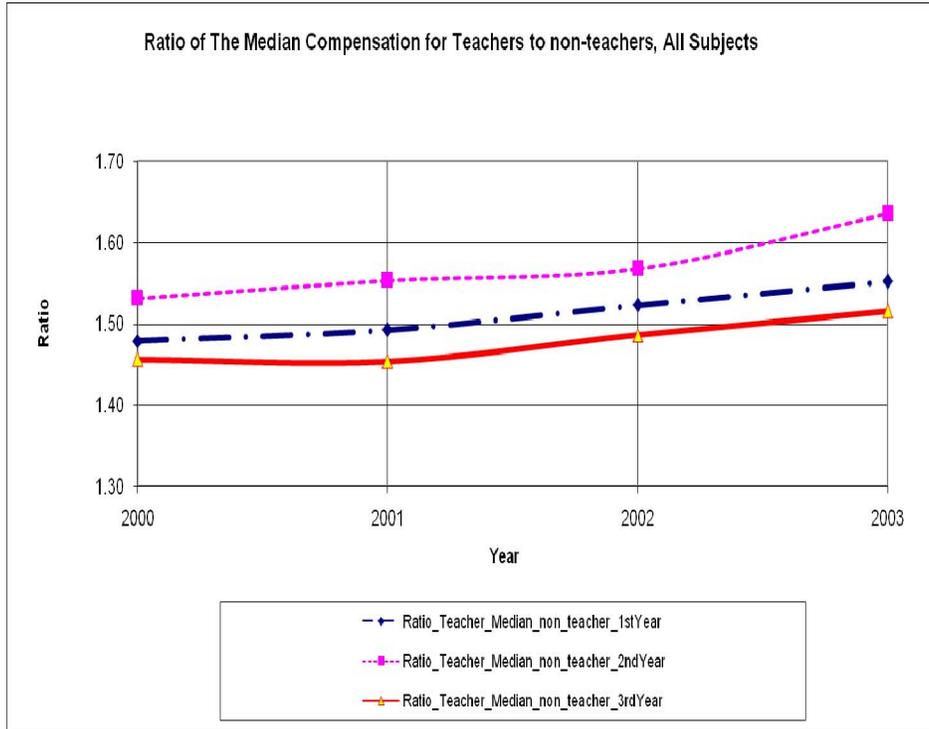
Source: Pennsylvania Department of Revenue Match of Teacher Certification records to individual
Income tax records.

5.0 Characteristics of Pennsylvania Professional School Personnel Retirees and Returnees

We now turn to examine empirically how important the phenomena of those teachers who return to teaching after retiring is. Data on 77,314 retirees from PSERS were obtained and represented all those who had retired on or before February 1, 2009. This group was merged to a panel from the Professional Personnel File from 1984-2006.   We describe in this section the basic characteristics of retirees and returnees.

5.1 Retirees

Over the period 1984-2005, retirement rates have generally been about 4%. Administrators tend to have higher retirement rates than Coordinators who in turn tend to have higher retirement rates than classroom teachers. (See Figure 15). However, there have been several notable overall spikes in retirement rates. In 1992 the retirement rate for Administrators jumped from 4% to over 12%, and the teacher retirement rate jumped from 2% to 5%. In 1992, as noted above, there were early retirement incentives put in place, and they had the intended effect. Other high retirement rate years were 1996 and 1998.[8]

Figure 16 examines retirement rates by gender and ethnicity for the same time period. Generally, men have somewhat higher retirement rates than women.

5.2 Returnees

Returnees are, however, rather infrequent, as shown in Figure 17. The percentage of annual retirees who return to public school employment has never exceeded 3% overall (See Figure 17), and has fallen dramatically since 2000 to between .4% and .5%. This is quite surprising in light of the incentives that liberalization has created, as shown in Tables 1-3. When we disaggregate returnees, we begin to note some differences. (See Table 4). Over the entire period, women are more likely to return to teaching than men, and Hispanic and African American retirees are more likely to return to teaching than men. Administrators and those with PhD's are more likely to return to school employment than primary or secondary classroom teachers.

When we compare returnees to those retirees who do not return, we find that returnees retire about 9 years earlier than retirees, and earn about $1,338 less in inflation adjusted terms at time

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[8] See Furgeson, Strauss and Vogt(2006) for an econometric analysis of the classroom retirement decision in Pennsylvania and the estimated effects of working conditions as well as economic incentives.

of retirement than those who do not return. Also, returnees have about 8.9 *less* years of total public education experience than non-retirees, and about 9.3 *less* years of LEA working experience at the district that they retire from. Each of these differences is very statistically significant. (See Table 6).

Returnees turn out to be rather mobile; 50% are found in a different school than from which they retired; 35% who return do so in another district, and 21% who return find employment in a different county than the one they were in at retirement. (See Table 6). Only 9.9% returned to a different metropolitan area. Finally, the vast majority (93%) did not interrupt their return employment. Table 8 and Table 9 examine the characteristics of the origin school or district compared to the destination school or district for returnees. Destinations generally had higher student performance, lower rates of student poverty, and lower rates of minority enrollment. We take these patterns to mean that returnees are selective about their working conditions.

Figure 15
Retirement Rates of
Pennsylvania Professional School Personnel: 1984-2005
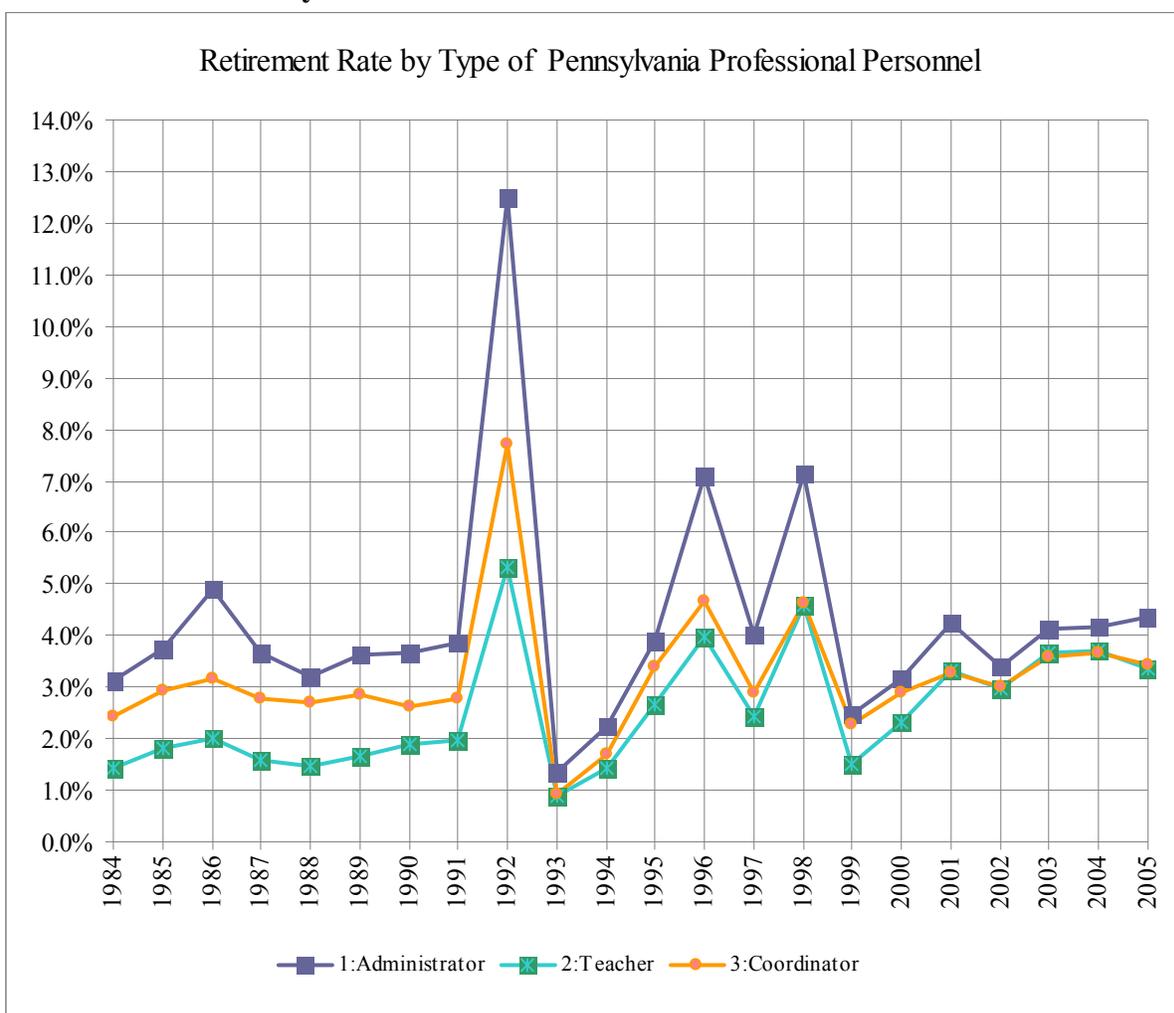
Figure 16
Retirement Rates of Pennsylvania Professional School Personnel
By Gender and Ethnicity: 1984-2005

Retirement Rates by Gender and Ethnicity
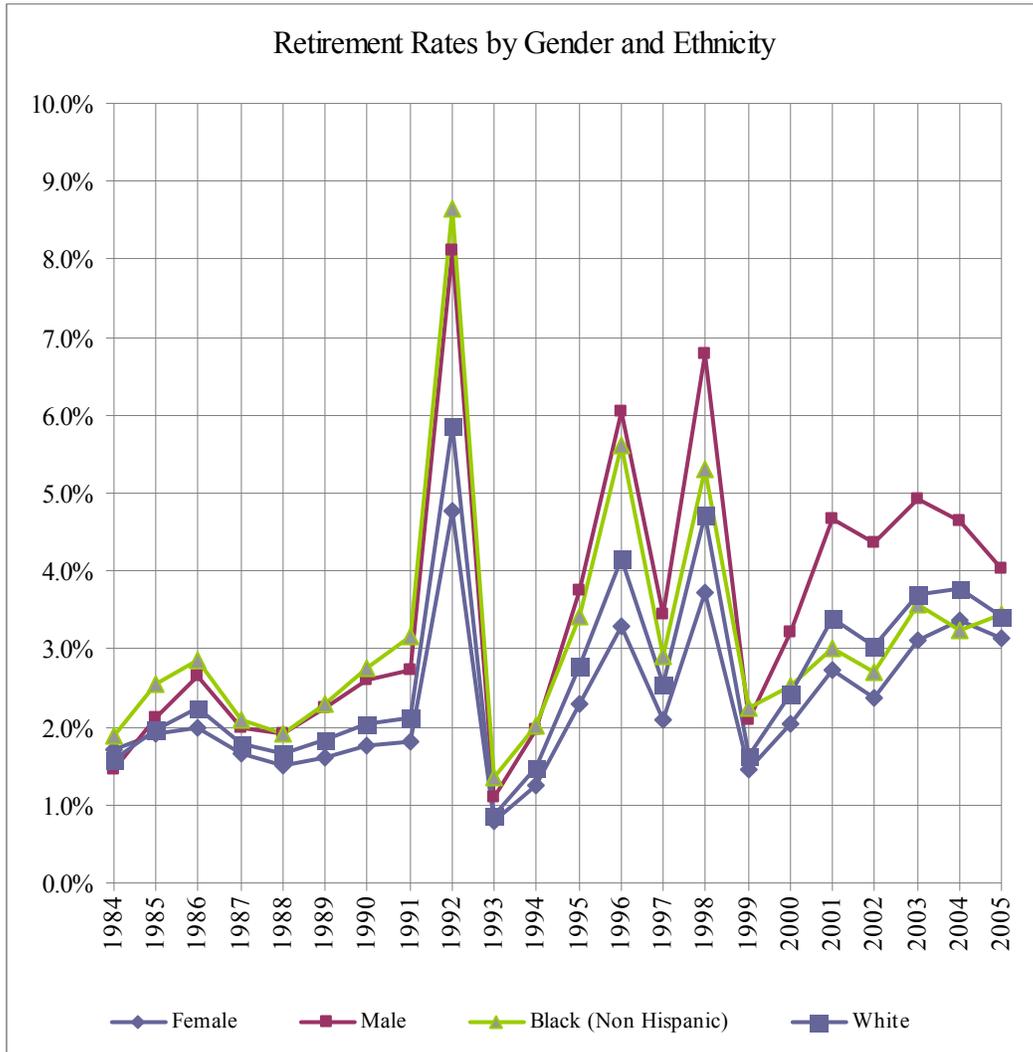
Source: authors' tabulations of PDE professional personnel file and PSERS retirement data.

Figure 17
Percentage of Annual Pennsylvania Professional School Personnel Retirees
Returning to Public School Employment by Year of Retirement: 1984-2005
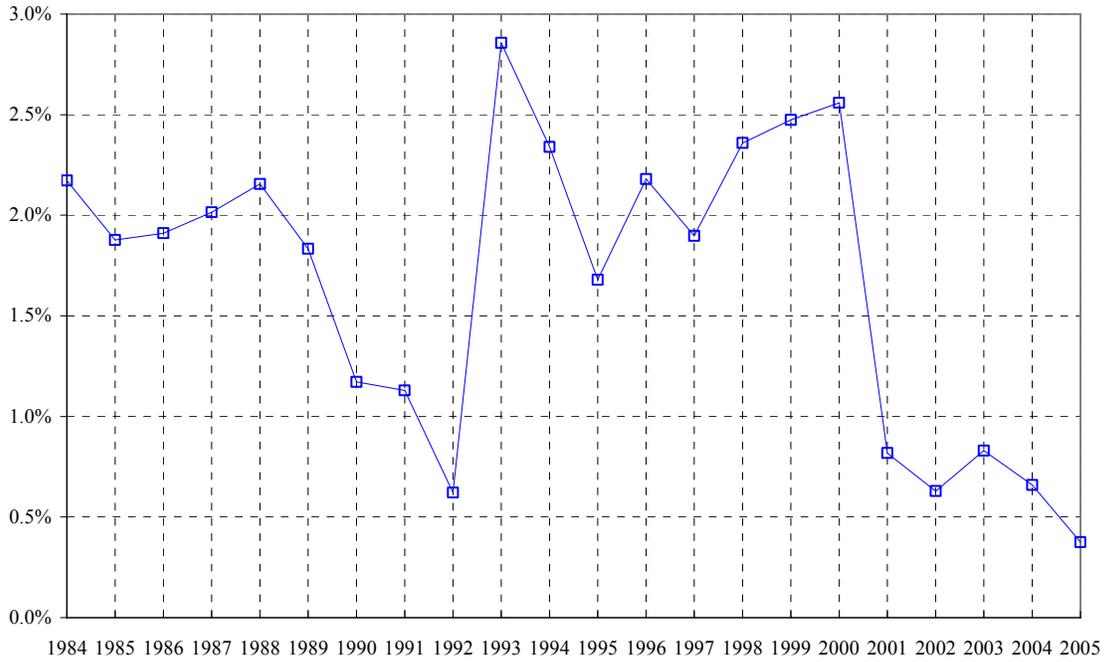
Source: Tabulations of Professional Personnel File

Table 4
Demographic Characteristics of Returnees in Pennsylvania:
Return Rates by Gender, Ethnicity, Education and Position: 1984-2005

Gender	Number of Retirees Not Returning	% Not Returning	Number of Returnees	Return Rate
Female	42,469	98.5%	646	1.50%
Male	33,728	98.6%	471	1.40%
Ethnicity				
American Indian or Alaskan Native	20	95.2%	1	4.80%
Asian or Pacific Islander	107	98.2%	2	1.80%
Black, Not of Hispanic Origin	4,961	95.8%	218	4.20%
Hispanic	198	93.0%	15	7.00%
White, Not of Hispanic Origin	70,911	98.8%	881	1.20%
Education level				
Bachelor and less	25,480	98.8%	311	1.20%
Master s degree	48,744	98.5%	740	1.50%
Doctoral degree	1,973	96.8%	66	3.20%
Position				
Administrator	5,771	96.7%	196	3.30%
Primary Teacher	24,199	99.0%	255	1.00%
Secondary Teacher	28,507	99.1%	266	0.90%
Other Teachers	7,482	97.8%	169	2.20%
Coordinator	10,238	97.8%	230	2.20%

Table 5
Return Rates by Detailed Assignment Code of
Pennsylvania Professional Personnel: 1984-2005

Assignment	Number of Retirees (Non Returnee)	Non Returnees as % of All Retirees	Number of Returnees	Return Rate
Admin/Supervisory	5869	96.8%	192	3.20%
Agriculture	97	99.0%	1	1.00%
Alternative Education	38	100.0%	.	.
Art	1615	99.0%	17	1.00%
Biology	1177	98.9%	13	1.10%
Business Education	1850	99.2%	15	0.80%
Chemistry	586	98.3%	10	1.70%
Coordinate Services	6977	98.8%	84	1.20%
Driver Education	335	99.4%	2	0.60%
ESL	2	100.0%	.	.
Early Childhood	747	98.7%	10	1.30%
Earth/Space	566	99.1%	5	0.90%
Eng as a 2nd Lang	123	96.1%	5	3.90%
English	4865	99.1%	46	0.90%
French	489	98.2%	9	1.80%
General Elementary	21400	99.0%	216	1.00%
General Science	1374	98.8%	17	1.20%
German	242	97.6%	6	2.40%
Gifted	524	98.7%	7	1.30%
Health/Phys Education	3277	99.0%	34	1.00%

Assignment	Number of Retirees (Non Returnee)	Non Returnees as % of All Retirees	Number of Returnees	Return Rate
Hearing Impaired	94	96.9%	3	3.10%
Home Economics	1217	99.0%	12	1.00%
Industrial Arts	1501	99.5%	8	0.50%
Mathematics	4147	99.0%	41	1.00%
Mental/Phys Handicap	2339	96.3%	89	3.70%
Music	2149	98.7%	28	1.30%
Not Listed Elsewhere	1850	93.2%	134	6.80%
Other Handicap	6	100.0%	.	.
Other Languages	134	97.1%	4	2.90%
Other Science	66	100.0%	.	.
Physics	323	99.4%	2	0.60%
Reading Specialist	2268	98.8%	27	1.20%
Social Studies	4698	99.5%	23	0.50%
Spanish	753	97.9%	16	2.10%
Special Education	239	98.8%	3	1.20%
Speech/Lang Impair	337	96.3%	13	3.70%
Visually Impaired	68	97.1%	2	2.90%
Vocational Education	1456	99.0%	15	1.00%
Vocational Health Occupation	99	100.0%	.	.
Vocational Tech Education	300	97.4%	8	2.60%

Table 6
Comparison of Mean Characteristics of Retirees vs. Returnees: 1984-2005

	Retirees		Returnees		Difference between Means	t Value
Variable Compared	N	Mean	N	Mean		
Mean Age at Retirement	77,070	57.525	1,145	48.384	9.1403	59.29
Mean Total Teaching Experience at Retirement	77,070	29.814	1,140	20.919	8.889	42.35
Mean LEA Working Experience at Retirement	77,070	27.41	1,145	18.075	9.33	40.55
Mean Salary at Retirement	77,070	$54,004	1,145	$50,654	$3,341	6.19
Mean Average of 3 High Years Salaries	77,070	$52,525	1,145	$49,171	$3,354	6.68
Mean Inflation Adjusted Salary at Retirement	77,070	$46,252	1,140	$44,914	$1,338	3.68
Mean Inflation Adjusted 3 High Years at Retirement	77,070	$45,026	1,140	$43,688	$1,338	4.3
Mean Replacement Rate at Retirement	77,070	0.6178	1,140	0.5677	0.0501	9.4

Table 7
Characteristics of Returnees:
District, School, County, Assignment Mobility and Duration: 1984-2005

Returnee District Compared to District at Retirement	Frequency	Percent
Same	739	64.43
Different	408	35.57
Returnee School Compared to School At Retirement		
Same	570	49.69
Different	577	50.31
Returnee County Compared to County at Retirement		
Same	904	78.81
Different	243	21.19
Metro Area of Returnee vs. Metro Area at Retirement		
Same	1033	90.06
Different	114	9.94
Returnee Assignment vs. Assignment at Retirement		
Same	492	42.89
Different	655	57.11
Interrupted Spell of Return Employment		
No Interruption	1071	93.37
Interrupted	76	6.63

Table 8
Characteristics of Destination School Districts of Returnees:
Destination School Districts vs. Origin School Districts at Time of Retirement

	Difference in District Student Test Score (as % of State Mean)	Difference in District Free and Reduced Lunch %	Difference In District % White Enrollment
Destination – Origin Mean Measure	1.51%	-17.7%	11.05%
t – Statistic	1.84	-6.04	2.88
Degrees of Freedom	257	123	240

Table 9
Characteristics of Destination School of Returnees:
Destination School vs. Origin School at Time of Retirement

	Difference in School Student Test Score (as % of State Mean)	Difference in School Free and Reduced Lunch %	Difference in School % White Enrollment
Destination – Origin Mean Measure	1.97%	-15.6%	2.91%
T – Statistic	2.59	-4.52	2.88
Degrees of Freedom	253	116	252

6.0 An Exploratory Multinomial Logit Model of Post-Retirement Return Employment

Given that we have a significant, extended time period in the panel data set, it is possible to estimate a behavioral model of the decision to return to teaching post-retirement. While we have obtained actual retirement benefit information for those alive as of February, 2009 from PSERS, we do not have actual benefits that began for those who retired during our panel period but have passed away. Since we are interested in estimating the marginal effects of various pecuniary and non-pecuniary factors at the time of retirement, and do have panel information on the date of retirement and the salary history, we are able to estimate the retirement benefit at time of retirement for those no longer in the retirement system as of February 2009. [9]

We conjecture that the decision to return to teaching post-retirement varies by the type of financial position the retiree had, whether or not Social Security eligible, whether or not the educator chose to retire in 2002 or later (which reflects the change in the annual retirement factor from 2% to 2.5% per year of service), the relative salary compared to BEA county personal per-capita income at time of retirement (as a proxy for the relative standard of living at time of retirement), gender, ethnicity, type of position at time of retirement, educational attainment, the *total replacement rate* defined as the ratio of initial retirement benefits, reported by PSERS, divided by the average of the top three years of income, as reported on the professional personnel file, educational attainment, and metropolitan statistical area.

From the initial investigation of characteristics of those who return to work after retirement compared to those who retire in Section 5 above, we see that the returnees tend to be significantly younger, have less total and LEA experience, earn less at retirement, and have lower replacement rates than those who do not return to work. (See Table 6 above). Returnees also are less often classroom teachers at retirement. The operant question that a multinomial logit model can address is which of these various factors is most important in predicting the return of a retired professional educator.

Table 10 presents the descriptive statistics for these explanatory variables. It should be noted that the total replacement rate can exceed 100% for those who elected to take a lump sum distribution for retirement. These are, however, a relative small proportion (.99 %) overall. Table 11 presents the Binomial logit estimation results on 77, 329 retires across 1984-2005. The overall fit is reasonably strong for this kind of estimation; the pseudo-R^2 is .27 and 98.5% of the returnees are correctly predicted using a 50%+ scoring rule

Table 11 analyzes the model by changing various explanatory variables' values, and in the case of continuous variables, it also reports the implied elasticity. For a white male, 57 years old, with a masters degree who retired before 2002 so that benefits were calculated at 2% per year of service, and who retired with a replacement rate of 61.7% and from a non-metropolitan area, the predicted odds of being a returnee were .3227 % or rather low. If instead age 62, the odds of returning decline by 75% and imply an extremely large implied elasticity of -8.02 with

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[9] The correlation between the initial actual monthly benefit reported by PSERS and that estimated from the PDE professional personnel file is .88.

respect to age. If Social Security eligible and age 62, the odds of returning decline by 76% compared to this base case. If a female instead of a male, the odds of returning decline by 51.6%, and if Black or Hispanic rather than White, the odds of returning increase dramatically by over 145%. If the replacement rate were 79.7 % rather than 61.7%, the odds of returning would increase by 65% and imply an elasticity of 2.28. We also observe that the partial effect of doubling of the number of days that can be worked without a pause in pension benefits *decreases* the odds of returning to public education and implies a rather large *negative* elasticity of -2.4. By contrast, a higher final, relative economic position at time of retirement increases the odds of returning with an implied elasticity of 2.2.

7.0 Summary and Conclusion

We have explored a unique data set of professional school employees over the period 1984-2005 to ascertain how frequently those who retire subsequently return to public school employment. We find that such return employment is rather rare, never over 3% of retirees in a cohort year, and that those who return are substantially younger, and also rather selective in where they choose to return to in terms of district. Because such returnees are younger, their retirement benefits at time of retirement, in terms of replacement rate, are lower than those who do not return. The returnees tend to be better educated, and more likely to have been administrators or coordinators. Incentives to encourage more returnees were justified by the perception of teacher shortages. However, an examination of long-run supply and demand for classroom teachers in Pennsylvania indicates that employment rates overall, in specialty areas often associated with inadequate supply such as science and mathematics, are in fact quite low --- never over 40% for first year upon graduation. Moreover, salaries for classroom teachers compared to their counterparts who do not get teaching jobs are 50% higher and this differential persists for the years that data were available.

While return employment is a relatively infrequent event, we do find, based on binomial logit modeling, that different demographic groups and metropolitan areas display sometimes rather large, differential patterns of return. Teachers of color are far more likely to return than white teachers. It appears that the effect of age at retirement is the strongest deterrent for a retiree to contemplate returning to public education, and that the growing generosity of defined benefit plans in terms of final replacement rate has made retiring without returning more and more likely. Given that the number of fully qualified new classroom teachers being endorsed each year is twice or more the number of new, inexperienced hires, districts should not have difficulty in finding replacement teachers.

Whether or not the pattern of behavior for returnees that we observe in Pennsylvania can be presumed to apply in other states is unclear, because Pennsylvania has been, and continues to be, a substantial exporter of professional education personnel. Also, Pennsylvania's level of remuneration and recent salary replacement rates at time of retirement, about 70% *before* taking Social Security into account, are quite generous. On an after-tax basis, retirees in Pennsylvania are able to retire well above 100% of their after-tax income from working.

Table 10
Descriptive Statistics for Multinomial Model Variables

Variable	N	Mean	Standard Deviation
Returnee or Not	78303	0.0147	0.1202
Age at Retirement	78233	57.3911	5.2932
Social Security Eligible	78,303	0.2024	0.4018
Retired in 2002 or Later	78,303	0.2570	0.4370
Male =1,Female-0	78,233	0.4430	0.4967
Other Race	78,303	0.0017	0.0410
Black	78,303	0.0666	0.2493
Hispanic	78,303	0.0027	0.0522
Relative Salary	77,329	2.1390	0.4280
Administrator	78,303	0.0783	0.2687
Coordinator	78,303	0.1351	0.3418
Total Replacement Rate	77,871	0.6171	0.1856
High School	78,233	0.0141	0.1178
BA	78,233	0.3158	0.4648
MA	78,233	0.6436	0.4789
PhD	78,233	0.0265	0.1606
Allentown MSA	78,303	0.0466	0.2108
Altoona MSA	78,303	0.0113	0.1058
Beaver MSA	78,303	0.0167	0.1283
Erie MSA	78,303	0.0239	0.1528
Harrisburg MSA	78,303	0.0505	0.2190
Johnstown MSA	78,303	0.0207	0.1422
Lancaster MSA	78,303	0.0335	0.1798
Philadelphia MSA	78,303	0.2897	0.4536
Pittsburgh MSA	78,303	0.1900	0.3923
Reading MSA	78,303	0.0306	0.1722
Scranton MSA	78,303	0.0543	0.2266

Sharon MSA	78,303	0.0131	0.1136
State College MSA	78,303	0.0074	0.0857
Williamsport MSA	78,303	0.0118	0.1080
York MSA	78,303	0.0361	0.1866

Table 11
Binomial Logit Model of Retired Professional Personnel
Returning to Public Education in Pennsylvania: 1984-2005

Explanatory Variable	Logit Coefficient	Robust Standard Error	Z-Statistic
Constant	6.4719	0.4201	15.4
Male=1, Female=0	-0.0457	0.0726	-0.63
Ethnicity Compared to White: Other	-1.1328	1.1472	-0.99
Black	0.9138	0.0996	9.18
Hispanic	0.9509	0.4043	2.35
Education Compared to BA < BA	-0.0098	0.3368	-0.03
Masters	0.0295	0.0854	0.34
PhD	0.4581	0.1663	2.75
Age at Retirement	-0.2513	0.0105	-24.02
Social Security Eligible at Retirement	0.5644	0.1641	3.44
Retired before 2002	-0.7739	0.1449	-5.34
Work Days without Penalty when Retired	-0.0047	0.0021	-2.22
Position at Retirement Compared to Teacher: Administrator	1.0433	0.1117	9.34
Coordinator	1.0319	0.0895	11.53
Replacement Rate at Retirement	2.7991	0.4314	6.49
Relative Salary at Retirement	0.3938	0.0917	4.29
Metro Area at Retirement: Allentown	0.5384	0.1849	2.91
Altoona	0.9070	0.2749	3.3
Beaver	0.1292	0.3225	0.4
Erie	-0.1315	0.3023	-0.44
Harrisburg	0.4699	0.1854	2.53
Johnstown	-0.4384	0.3620	-1.21
Lancaster	0.3715	0.2115	1.76
Philadelphia	0.8609	0.1252	6.87
Pittsburgh	0.1055	0.1430	0.74
Reading	0.0949	0.2455	0.39

Scranton	0.1326	0.1897	0.7
Sharon	-0.3809	0.4390	-0.87
State College	0.7680	0.3784	2.03
Williamstown	-2.0494	0.9685	-2.12
York	0.3233	.2083	1.55
Number of Observations	77,329		
Pseudo R^2	.2734		
Correctly Classified %	98.53%		

Table 12
Change in Probability of A Recent Retiree Returning to Public Education
Due to Change in Explanatory Variable in Model

Policy Base Odds or Policy Change	Odds in % of Returning to Public Education 3/	% Change in Odds due to Hypothetical Change	Implied Elasticity
Base Model 1/	0.3227 %	NA	
From 57 years old to 62 2/	0.0921 %	-71.5 %	-8.15
SS Eligible and 65	0.0762 %	-76.4 %	
After 2002 Decision	0.0441%	-86.8 %	
Female	0.1561 %	-51.6%	
Black (compared to White)	0.8010%	148.2 %	
Hispanic (compared to White)	0.8310%	157.5%	
Relative Salary Rises from 2.14 to 2.57 of County Per-capita Income 2/	0.3961%	6.20%	.915
Replacement Rate increases from 61.7% to 81% 2/	0.5526 %	65.10 %	2.28
Free Days Increase from 91 to 180 and after 2004	0.0978 %	-69.7 %	-2.44
Allentown	0.5716 %	70.2 %	
Altoona	0.8248 %	145.6 %	
Harrisburg	0.5343 %	60.0 %	
Philadelphia	0.7880 %	135.4 %	
State College	0.7185 %	114.7 %	
Williamstown	0.0432 %	-87.1 %	

1/ White, male teacher, 57 years old , not Social Security eligible,
From Non-Metro Area, retired before 2002, with Masters Degree, 91 penalty free workings days,
with a replacement rate at retirement of 63%, and a relative salary of
2.14 times the county per-capita personal income.
2/ Change is a one standard deviation change in the variable.
3/ Odds of Returning = $e^{X\beta}$ / $(1 + e^{X\beta})$ where X is the mean from Table 10 and β, the estimated logit
coefficient, is from Table 11 (Note: calculations in stata_logit_model_5_30_09.xls)

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