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**NAVAL
POSTGRADUATE
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MONTEREY, CALIFORNIA

THESIS

**AN ANALYSIS OF SAILORS' ACADEMIC SUCCESS IN
THE NAVY COLLEGE PROGRAM DISTANCE
LEARNING PARTNERSHIP (NCPDLP) SCHOOLS**

Akif Onder

March 2012

Thesis Co-Advisors:

Stephen L. Mehay
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**AN ANALYSIS OF SAILORS' ACADEMIC SUCCESS IN THE NAVY
COLLEGE PROGRAM DISTANCE LEARNING PARTNER (NCPDLP)
SCHOOLS**

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Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF SCIENCE IN MANAGEMENT
(MANPOWER SYSTEMS ANALYSIS)**

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ABSTRACT

This thesis analyzes the Sailors' academic success in the TA-funded courses taken in the Navy College Program Distance Learning Partnership (NCPDLP) Program partner institutions. This study also investigates the effect of institutional characteristics on the academic success of students. The data files obtained from Navy Education and Training Command (NETC) and Integrated Postsecondary Education Data System are merged to generate the data set used in the analysis. The analysis suggests that Sailors who take courses via Distance Learning (DL) methods in the NCPDLP partner schools have lower course completion rates and lower grade point averages than Sailors who take DL courses in other types of schools. The analysis also indicates that Sailors who enroll in private for-profit schools receive higher grades in TA-funded courses than Sailors who enroll in public or private nonprofit schools.

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LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|--------|--|
| DL | Distance Learning |
| GPA | Grade Point Average |
| IPEDS | Integrated Postsecondary Education Data System |
| MOU | Memorandum of Understanding |
| NCPDLP | Navy College Program Distance Learning Partnership |
| NETC | Naval Education and Training Command |
| TA | Tuition Assistance |

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I. INTRODUCTION

A. PURPOSE OF THE STUDY

This study will investigate the characteristics of institutions that participate in the Navy College Program Distance Learning Partnership (NCPDLP) Program. It will examine the effects of institutional characteristics on the success of the Sailors who take classes via tuition assistance (TA) in terms of course completion and grade point average. A detailed analysis of course-level data from the Navy's TA program will be conducted to find out afore mentioned effects.

B. BACKGROUND

The Navy provides financial assistance to Sailors who wish to enroll in college-level classes via a program called Tuition Assistance. Through this program, Sailors take courses in an off-duty status in a college, university or vocational institution. The regional or national accreditations of the schools in which Sailors take courses are recognized by the U.S. Department of Education. The Navy's TA program pays for both classroom and distance learning courses (U.S. Navy, 2012).

In an effort to make it easy for Sailors to use Tuition Assistance (TA), since 1999, the Navy has collaborated with some institutions to provide Sailors with a rating-relevant academic education via Distance Learning (DL) methods (McLaughlin, 2010). Starting the program with 5 schools in 1999, the Navy is now partnering with 43 institutions as of February 2012 (U.S. Navy, 2012). There has been no study conducted on the effectiveness of the NCPDLP Program. This study will analyze the success of Sailors in the courses taken in NCPDLP schools.

In the analysis, the method of instruction will also be taken into account to separate the effect of DL and traditional methods used in TA courses. Previous studies investigated the effects of individual characteristics on Sailors' success in the courses taken via TA. This thesis will incorporate institutional characteristics that are likely to influence students' academic success.

Institutional characteristics affect students' success in courses, whether it is taught via DL or traditional methods. Some of the features of the schools that offer Sailors courses will be taken into account to find out if they have a systematic relationship with student success. For example, the recent rapid growth of for-profit colleges in the United States has fueled several controversies about the quality of education received in these institutions. The thesis examines differences in student academic performance between for-profit schools and public or private nonprofit schools.

C. RESEARCH QUESTIONS

The primary research questions dealt with in this thesis are:

- What is the effect of taking TA-supported courses in NCPDLP schools on the academic success of Sailors?
- Do NCPDLP schools do better in courses taught via DL methods or via traditional instructional methods?
- How do the institutional characteristics affect Sailors' academic success in TA courses? In particular, does student success differ in for-profit postsecondary institutions?

The secondary research questions are presented below:

- Does Sailors' success differ by course subject?

D. SCOPE, LIMITATIONS, AND ASSUMPTIONS

The course-level data are provided by Naval Education and Training Command. Data on institutions are obtained from the National Center for Educational Statistics Integrated Postsecondary Education Data System (IPEDS). In an effort to merge these two data files, a new data file consisting of the names and identification codes of the institutions is generated by hand using a spreadsheet.

Institutions partnered with the Navy via the NCPDLP Program are identified and coded by hand using the information provided at the Navy College Center web site. There were five NCPDLP partner schools until 2004. In 2004, the number of schools increased to 17 partners.

The sample consists of courses taken by enlisted personnel between 1994 and 2007 in schools offering undergraduate education. Since NCPDLP partner institutions are chosen by the Navy among the ones that offer two or more years of education, courses taken in schools that offer less than two years of education are dropped from the analysis.

This study assumes that schools partnering with the Navy via the NCPDLP Program are different from the institutions that do not partner with the Navy. The Navy and the schools that participate in NCPDLP Program sign a Memorandum of Understanding (MOU). By accepting the terms and conditions the Navy declares, partner schools are assumed to differ from other schools. This thesis tests whether these differences impact

E. ORGANIZATION

This thesis includes five chapters. Chapter II of the thesis gives detailed information on the history and background of NCPDLP program. Then, the literature on method of instruction, Distance Learning (DL) versus traditional methods, is reviewed briefly. Highlights of the studies conducted on the impact of DL methods on course completion and performance conclude the chapter.

The data used in the analysis is discussed in Chapter III. In this chapter, dependent and independent variables are described briefly. Summary statistics of the analysis variables are also provided to better understand the data. The summary statistics provide a basis to the multivariate regression models introduced in the next chapter.

The methodology of the analysis and the fixed effects multivariate model used in the thesis is discussed in Chapter IV. The regression model provides us with an understanding of the systematic relationships between the dependent and explanatory variables. Finally, regression results on the successful completion of courses and course grade point averages (GPA) are reported. Findings of the study are presented in this chapter.

Conclusions and recommendations are presented in Chapter V.

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II. BACKGROUND AND LITERATURE REVIEW

A. NAVY COLLEGE PROGRAM DISTANCE LEARNING PARTNERSHIP (NCPDLP)

The Navy College Program Distance Learning Partnership (NCPDLP) was introduced in 1999 as a pilot program partnering with five other Distance Learning (DL) programs. The programs offered were directly related to a Sailor's rating or job field. Since then, the NCPDLP has been revamped to offer Sailors more choices (McLaughlin, 2010).

In 2004, more degrees were added to the program in order to cover all of the Navy's ratings. Thus, the program allowed a Sailor to pursue a career-enhancing degree in the Sailor's career field. In that same year, the Navy partnered with 17 academic institutions offering 96 degrees, each of which was linked to one or more Navy enlisted ratings (McLaughlin, 2010).

In 2007, the program was revamped to offer Sailors more flexibility. Since then, Sailors have not been required to take courses that are directly related to their career field. In 2010, 34 fully accredited academic institutions participated in the program. They offered 264 degree programs at the associate and baccalaureate level. A Memorandum of Understanding (MOU) about the features of the program must be signed by the participating schools (McLaughlin, 2010). As of February 2012, the Navy is currently partnered with 43 institutions (U.S. Navy, 2012). A complete listing of schools can be found in Table 1.

According to the information given on its Internet site, the Navy College Program (NCP) has developed partnerships with colleges and universities to provide rating-relevant degrees via distance learning to Sailors everywhere (U.S. Navy, 2012). These education partners offer associate and bachelor's degree programs. In order to enable Sailors to pursue a degree from any location, courses are also offered via distance learning. The Navy College Program Distance Learning Partnership (NCPDLP) Schools aim to accommodate the Sailor's mobile lifestyle and goals with rating-relevant degree programs (U.S. Navy 2012).

B. DISTANCE LEARNING VS. TRADITIONAL EDUCATION

Hogan (1997) conducted a study to compare the success rates of students who take distance learning classes and traditional courses at South Carolina’s Technical College of the Low country. In this study, the average grades, completion rates, and withdrawal rates of students in 11 courses taught in distance-learning sections were compared to success rates of the same courses, taught by the same instructor, in traditional settings the previous fall. Hogan found that students taking distance learning courses had higher grades and course completion rates, compared to those taking traditional courses (Hogan, 1997).

Table 1. NCPDLP List of Participating Institutions
(After Navy College Center, 2012)

| Name of the School | Name of the School |
|---------------------------------------|---|
| American Military University | Norfolk State University |
| Berkeley College | Old Dominion University |
| Bismarck State College | Olympic College |
| Brandman University | Regent University |
| Central Texas College | Roger Williams University |
| Charter Oak State College | Saint Joseph’s College of Maine |
| City University of Seattle | Saint Leo University |
| Coastline Community College | San Diego City College |
| Columbia College | Southern New Hampshire University |
| Dallas TeleCollege | Strayer University |
| DeVry University | Thomas Edison State College |
| ECPI University | Tidewater Community College |
| Empire State College | Trident Technical College |
| Excelsior College | Trident University International |
| Florida National College | Troy University |
| Florida State College At Jacksonville | University Of Maryland University College |
| Fort Hays State University | University of Oklahoma |

| | |
|--------------------------------|----------------------------------|
| Governors State University | University of Phoenix |
| Hawaii Pacific University | University of the Incarnate Word |
| Jones International University | Upper Iowa University |
| Liberty University | Vincennes University |

McLaughlin (2010) investigated the effect of course-delivery methods on the promotion and retention of Sailors who took classes via the Navy’s Tuition Assistance Program. He compared the performance of students who took classes via distance learning (DL) with those who took classes via traditional instructional methods.

McLaughlin (2010) used Navy data on all classes taken through the Tuition Assistance (TA) program from 1995 to 2007. His study restricts the data to enlisted personnel in pay grades between E1 and E9 who enrolled in undergraduate college-level classes (McLaughlin, 2010). According to the descriptive statistics provided in the study, senior personnel tend to participate in the DL classes at higher rates than junior personnel.

McLaughlin (2010) found that Sailors who enroll in DL classes during their first term of service are less likely to be promoted. However, if Sailors enroll in DL classes in the year in which they are eligible for promotion, they are more likely to get promoted than Sailors who take face-to-face classes. According to McLaughlin, the “Navy prizes the skills and maturity demonstrated by Sailors enrolling in DL classes” (McLaughlin, 2010). He also found that senior Sailors become more homogenous and the method of instruction does not affect promotion in these ranks.

McLaughlin found that the method of instruction is associated with the retention behaviors of the Sailors. According to the study, Sailors who take DL classes are more likely to reenlist than those who participate in traditional classes. The author attributes this mainly to the NCPDLP program, which is highly advertised to Sailors who are interested in enrolling in the TA program. This program is designed to provide the Sailors with an opportunity to earn a degree that is related to their rating (McLaughlin, 2010). Because of this relation, it can be inferred that Sailors display a tendency to stay in the Navy by participating in this program.

C. IMPACT OF DISTANCE LEARNING ON COURSE COMPLETION AND PERFORMANCE

Mehay and Pema (2010) investigated the differences in the methods of instruction using the data on Navy TA classes. They compared the course and job performances of the Sailors who take traditional and DL classes in order to find out if there are any differences. To overcome selection bias, they formed a natural control group, noncompleters, from the TA participants. Because both completers and noncompleters have volunteered to enroll in TA courses, they are assumed to have the same unobservable individual characteristics that may affect their decision to participate in TA (Mehay & Pema, 2010).

Mehay and Pema (2010) used course completion rates and course grades (GPA) as indicators of academic performance of students. The results of their individual fixed effects models indicate that taking a DL class is associated with a completion rate that is 6.5 percentage points lower than that of a traditional class. In the GPA models, the results seem to be similar. On a 1.0 to 4.0 scale, taking a DL class is associated with a 0.26 points lower letter grade.

Pema and Mehay find that passing a TA course improves reenlistment rates. Sailors who take and pass DL courses are more likely to reenlist than ones who take traditional courses. Also, they are less likely to make short-term extension contracts.

Mehay and Pema also found that TA users who take DL courses are more likely to be promoted to E-5 before the end of their first term of service. According to the study, the effect of taking and passing a traditional class on promotion is statistically insignificant (Mehay & Pema, 2010). They argue that the positive effect of taking DL courses on promotion may be due to Sailors' time-management skills. Sailors who take DL courses may keep their job performance up by studying after-hours (Mehay & Pema, 2010).

Mehay and Pema (2010) investigated individual fixed effects, but did not account for institutional fixed effects. Sim (2011) used the same dataset to analyze the course completion rates and course grades of Sailors by taking institutional fixed effects into account. He found that controlling for institutional characteristics lowers course

completion rates and course grades. According to his study, unobserved characteristics of institutions are likely to be correlated and have positive impact on student success (Sim, 2011).

D. COMPARISON OF ACADEMIC SUCCESS IN PUBLIC AND PRIVATE SCHOOLS

The recent rapid growth of for-profit colleges in the United States has sparked several controversies. The main issue concerns the quality of education received by students in for-profit institutions. Deming et al. (2011) find that students who attended for-profit institutions had higher unemployment rates and lower earnings six years after entering those programs than students from public or private nonprofit schools. Cellini and Chaudhary (2011) find that students who complete associate's degrees in private two-year schools (most of which are for-profit institutions) experience earnings gains that are similar to those who graduate from public community colleges. However, the tuition costs of for-profit schools are much higher than public schools suggesting that the cost of for-profit schools to students may outweigh the benefits.

This controversy suggests that the quality of education received by a sailor may be affected by the type of school attended by Sailors in the TA program. Thus, this thesis also investigates the type of school on academic success measures to shed some light on this issue in military context.

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III. DATA AND VARIABLE DESCRIPTION

A. INTRODUCTION

This chapter presents an overview of the data used in the multivariate analyses. This chapter also describes the variables used in these analyses. Dependent variables and key explanatory variables are explored to better understand the relationships among them, and summary statistics are presented and discussed.

B. DESCRIPTION OF COURSE-LEVEL DATASET

In this study, I used data that were supplied by NETC to McLaughlin (2010) for his thesis. The data set contains information on all classes taken via TA from 1994 through 2007. The original data set contained 1,837,279 course-level observations for all active-duty personnel. McLaughlin restricted the data to include only undergraduate college-level courses taken by enlisted personnel in pay grades E1 through E9. After this restriction, the data set contained 1,336,878 observations. He also dropped observations missing information on key variables such as gender, race, and TA course type (DL or not). The final data set used for the analysis had 1,296,223 observations (McLaughlin, 2010).

Sim (2011) obtained further data from the National Center for Educational Statistics Integrated Postsecondary Education Data System (IPEDS) on post-secondary institutions. The data files downloaded from the IPEDS included information on completion, enrollment, finance, educational offerings, instructional staff salaries, and administrative characteristics of all of the post-secondary institutions from 1994 through 2007.

The data files from the IPEDS Data Center included a unique identifier (UNITID) for each post-secondary institution. Since there is no matching identifier between both data sets, Sim manually matched institutions in the two datasets. In the course-level data provided by NETC, 1921 different institutions are represented. However, the data obtained from the IPEDS Data Center provides information on 1785 different institutions.

Therefore, some of the observations did not merge. After dropping the observations that could not be merged, the data contains 1,225,273 course-level observations.

For the purposes of this thesis, the variables drawn from the IPEDS database were merged with data from NETC. After merging the two data sets and dropping the observations that did not merge correctly, the combined data set consists of 1,225,273 course-level observations.

As of February 2012, there are 43 NCPDLP participant institutions. Since our data set stops in 2007, we identified and coded schools for each year between the years 2000 and 2007. The first institutions participated in the program in 2000. There were 7 NCPDLP schools until 2004. In 2004, the number of schools increased to 17, with the addition of 10 new partner institutions. The number of schools remained the same until 2008. These institutions are coded in the data as NCPDLP schools, according to the information from the IPEDS database.

C. DESCRIPTION OF VARIABLES

Table 2 provides the descriptions of variables used in the fixed effects multivariate analysis. We use a dummy variable to identify the NCPDLP schools. Another dummy variable (DUMDL) is added to the model to account for the effect of method of instruction on the success of the Sailors.

The only individual characteristics added into the model are pay grades of enlisted personnel who participate in the TA program. Including pay grades into the model controls for the work demands of Sailors. Other individual characteristics, such as demographics, are excluded since they do not change over time, and would drop out of fixed effects estimations.

Institutional characteristics are also included in the fixed effects regression model to observe their effects on the Sailors' success in courses taken in TA program. This thesis is interested in the effect of duration of education an institution offers on the course success. Another point of interest is the type of control under which the institution is. The model is set up to see the differential effects of public and private schools' instructional environment on Sailors' success.

Table 2. Variable Descriptions

| VARIABLE | DESCRIPTION |
|-----------------|--|
| dum_ncpdlp | =1 if course taken in an NCPDLP school, = 0 otherwise |
| dumdl | =1 if DL course, = 0 otherwise |
| fy94-fy07 | Year dummies |
| s_course | =1 if the Sailor is successful, = 0 otherwise |
| gpa | Grade Point Average (0-4) |
| e1-e9 | Enlisted pay grades |
| business | =1 for Business courses, = 0 otherwise |
| math | =1 for Math courses, = 0 otherwise |
| nat science | =1 for Natural Sciences courses, = 0 otherwise |
| phys science | =1 for Physical Sciences courses, = 0 otherwise |
| it | =1 for IT courses, = 0 otherwise |
| humanities | =1 for Humanities courses, = 0 otherwise |
| english | =1 for English courses, = 0 otherwise |
| misc | =1 for Miscellaneous courses, = 0 otherwise |
| medical | =1 for Medical courses, = 0 otherwise |
| vocational | =1 for Vocational courses, = 0 otherwise |
| law cj | =1 for Law courses, = 0 otherwise |
| libfac | =1 if the school has a library, = 0 otherwise |
| Inst 4yr plus | =1 if the school is for 4 or more years, = 0 otherwise |
| public | =1 if the school is under public control, = 0 otherwise |
| private nfp | =1 if the school is under private nonprofit control, = 0 otherwise |

1. Summary Statistics of Dependent Variables

a. *Grade Point Average*

The data set contains two variables that indicate the success of Sailors in courses. One of the variables is the grade point average (GPA) assigned on a 0.0 to 4.0 scale. GPA is used as a dependent variable in the multivariate models to evaluate the success of Sailors who receive a letter grade from their courses. In our data set 1,101,938 observations have a GPA value.

Table 3. Course-Level GPA Tabulation by NCPDLP Variable

| GPA | NCPDLP Schools | | Non-NCPDLP Schools | |
|--------------------|-----------------------|---------|---------------------------|---------|
| 0 | 11,354 | 6.39% | 20,494 | 3.42% |
| 1 | 5,721 | 3.22% | 12,610 | 2.10% |
| 2 | 26,870 | 15.12% | 70,832 | 11.81% |
| 3 | 57,418 | 32.31% | 186,593 | 31.11% |
| 4 | 76,333 | 42.96% | 309,255 | 51.56% |
| Total | 177,696 | 100.00% | 924,242 | 100.00% |
| Average GPA | 3.022 | | 3.207 | |

Table 3 displays the distribution of grade point averages of courses—according to the participation of the institutions in the NCPDLP program. Judging by the percentages given in Table 3, Sailors who attend NCPDLP schools do slightly worse than Sailors who take classes in other institutions. Almost 25% of Sailors get 0, 1.0, or 2.0 in terms of GPA in NCPDLP schools, while 17% of Sailors who take classes in other institutions get the same grades. In NCPDLP schools, 43% of Sailors get 4.0, which is 8 percentage points lower than the percentage of their counterparts in non-NCPDLP schools.

Table 4 presents the GPA distribution of courses in NCPDLP schools and other schools by method of instruction. According to Table 4, 72% of courses taken via DL in NCPDLP schools are completed by Sailors who earn a GPA of 3.0 or 4.0. The percentage of Sailors who earn 3.0 or 4.0 in DL courses in other schools is almost 7 points higher. From the courses taught in traditional instructional settings in non-NCPDLP schools, approximately 83% of Sailors receive a GPA of 3.0 or 4.0. This value is 4.5 percentage points higher than the percentage of Sailors who receive a GPA of 3.0 or 4.0 from the courses in NCPDLP schools taken via similar methods. Although it is impossible to draw any statistical conclusions from these tables, it can be inferred that Sailors do better in non-NCPDLP schools in terms of GPA under both instructional techniques.

Table 4. Distribution of GPA of Courses Taken in All Schools by Method of Instruction

| GPA | NCPDLP Schools | | | | Non NCPDLP Schools | | | |
|--------------|----------------|---------|------------|---------|--------------------|---------|------------|---------|
| | DL GPA | | Non DL GPA | | DL GPA | | Non DL GPA | |
| | Freq. | Percent | Freq. | Percent | Freq. | Percent | Freq. | Percent |
| 0 | 7,933 | 8.80 | 3,421 | 3.91 | 6,926 | 5.43 | 25,419 | 3.19 |
| 1 | 3,553 | 3.94 | 2,168 | 2.48 | 4,437 | 3.48 | 17,025 | 2.14 |
| 2 | 13,733 | 15.23 | 13,137 | 15.01 | 16,979 | 13.31 | 102,598 | 12.88 |
| 3 | 28,430 | 31.54 | 28,988 | 33.11 | 40,550 | 31.79 | 259,396 | 32.56 |
| 4 | 36,500 | 40.49 | 39,833 | 45.50 | 58,661 | 45.99 | 392,251 | 49.24 |
| Total | 90,149 | 100.00 | 87,547 | 100.00 | 127,553 | 100.00 | 796,689 | 100.00 |

b. Successful Courses

Another indicator of academic success of Sailors in courses is measured using a binary variable on passing or failing (PASS). If a Sailor completes a course by receiving a grade of A, B, C, D, Pass, or Satisfactory, the binary variable takes on a value of 1 (McLaughlin, 2010). If a Sailor receives any grades other than the above, such as fail, withdrawal or incomplete, he/she is assumed to have failed the course and is coded a zero.

Table 5 exhibits percentages of successful courses by method of instruction in NCPDLP-participating institutions and in nonparticipating schools. Proportions of successful courses are lower in courses taken via DL methods in all categories. Unlike the difference observed in grade point averages, percentages of successful courses are almost the same in NCPDLP schools and other school for classes taken via traditional methods. Sailors who take DL courses in NCPDLP schools do worse than other Sailors by 2.5 percentage points.

Table 5. Percent Distribution of Successful Courses by Method of Instruction

| | | Observation | Percentage of Successful Courses |
|-----------------------|--------|-------------|----------------------------------|
| Overall | | 1,225,273 | 87.96% |
| Overall DL | | 250758 | 82.43% |
| Overall Non DL | | 974515 | 89.38% |
| NCPDLP | DL | 105232 | 81.05% |
| | Non DL | 94607 | 89.85% |
| Non NCPDLP | DL | 145526 | 83.42% |
| | Non DL | 879908 | 89.33% |

2. Summary Statistics of Key Explanatory Variables

Table 6 displays the number of courses taken in NCPDLP-participant and nonparticipant schools by method of instruction. A total of 561,973 courses were attended by Sailors in NCPDLP schools. This represents 45.87% of all courses. According to these numbers, 250,758 courses were taken via DL methods. These courses account for 20.47% of all courses taken via the Tuition Assistance Program. DL courses are taught both in NCPDLP and non-NCPDLP institutions. About 26.4% of all courses taken in NCPDLP schools are delivered via DL. By contrast, DL courses make up only 15.4% of all courses taken by Sailors in other institutions.

Table 6. Tabulation of Courses by NCPDLP Participation and Method of Instruction

| | DL Course | Traditional Course | Total |
|---------------------------|-----------|--------------------|-----------|
| Non-NCPDLP School: | 102,359 | 560,941 | 663,300 |
| NCPDLP Schools | 148,399 | 413,574 | 561,973 |
| Total | 250,758 | 974,515 | 1,225,273 |

NCPDLP schools are more preferred by Sailors if they choose to take DL courses. Alternatively, NCPDLP schools have better selection and availability of DL courses. As seen in the table, this is not the case for courses delivered by traditional methods.

Table 7. Number of Courses by Method of Instruction and Number of DL Courses Taken in NCPDLP Schools

| Year | DL Courses | | Traditional Courses | | Number of DL Courses in NCPDLP schools |
|--------------|---------------------|---------------------|---------------------|---------------------|--|
| | (Number-Percentage) | (Number-Percentage) | (Number-Percentage) | (Number-Percentage) | |
| 1994 | 1 | 0.012% | 7,860 | 99.88% | - |
| 1995 | 26 | 0.028% | 90,137 | 99.72% | - |
| 1996 | 61 | 0.072% | 84,327 | 99.28% | - |
| 1997 | 907 | 1.12% | 80,995 | 98.88% | - |
| 1998 | 3,010 | 3.4% | 85,569 | 96.6% | - |
| 1999 | 4,959 | 5.32% | 88,215 | 94.68% | - |
| 2000 | 7,099 | 7.52% | 87,360 | 92.48% | 740 |
| 2001 | 11,203 | 11.41% | 86,979 | 88.59% | 1,409 |
| 2002 | 17,084 | 16.33% | 87,525 | 83.67% | 2,769 |
| 2003 | 26,320 | 27.09% | 70,817 | 72.91% | 4,462 |
| 2004 | 39,101 | 36.81% | 67,104 | 63.19% | 19,290 |
| 2005 | 48,321 | 45.48% | 57,917 | 54.52% | 26,335 |
| 2006 | 27,168 | 51.81% | 25,266 | 48.19% | 14,048 |
| 2007 | 65,498 | 54.6% | 54,444 | 45.4% | 36,179 |
| Total | 250,758 | 20.46% | 974,515 | 79.54% | 105,232 |

Table 7 shows the number of courses taken via DL and traditional methods throughout the years. As displayed in the table, the number of DL courses has increased significantly since 1994. In 1994, the number of DL courses was only 1, constituting only 0.012% of all the courses taken in that year. Until 2006, the number of DL courses kept

increasing, although the number of courses taken via traditional methods always exceeded the number of traditional courses. In 2006, for the first time the number of DL courses exceeded the number of traditional courses, comprising 51.81% of all courses. In 2007, the percentage of courses taken via DL rose to 54.6%.

Table 8. Tabulation of Institutions by Financial Control and Duration of Education

| | Overall Courses | Overall DL Courses | Non DL Courses | NCPDLP Schools | Non NCPDLP Schools |
|---------------------------|------------------------|---------------------------|-----------------------|-----------------------|---------------------------|
| Public | 61% | 49.6% | 64.0% | 76.8% | 58% |
| Private Non Profit | 32.3% | 31.3% | 32.5% | 23.2% | 34% |
| Private For-Profit | 6.7% | 19.1% | 3.5% | 0.01% | 8% |
| 4 Years or More | 66% | 76.3% | 63.3% | 64.8% | 66.2% |
| 2-4 Years | 34% | 23.7% | 36.7% | 35.2% | 33.8% |

Most of the Sailors choose to take courses in public schools, according to the percentages shown in Table 8. Only 6.7% of all courses taken by Sailors through TA are delivered in private for-profit institutions. Table 8 also shows that most of the courses are taken in institutions that offer at least 4 years of education. Thirty-four percent of overall courses are taken in schools that offer 2 to 4 years of education. Another result that draws attention is the proportion of DL courses taken by Sailors in private for-profit institutions. Almost 20% of all DL courses take place in private for-profit schools.

It is noteworthy that almost all of NCPDLP partner schools are either public or private nonprofit institutions. Out of the courses taken in NCPDLP schools, 76.8% are attended in public schools, according to Table 8. The percentage of courses taken in public non-NCPDLP schools is 58%. Only .01 percent of the courses taken in NCPDLP schools are in private institutions. Out of the courses in Non-NCPDLP schools, 8% are taken in private schools.

As seen in Table 9, the average number of instructors teaching in NCPDLP schools is 40 percent more than the number of instructors teaching in non-NCPDLP schools. The partner institutions of NCPDLP pay more to their instructional staff. The average salary of the instructors in NCPDLP schools is \$10,000 more than their counterparts in other schools.

Table 9. Financial Information of Institutions

| | Overall | NCPDLP | Non-NCPDLP |
|--|-------------|-------------|-------------|
| Mean Number of Instructors | 645.72 | 850.56 | 608.38 |
| Average Salary (\$) | \$ 49,794.9 | \$58,127.13 | \$48,223.53 |
| Funds and Revenues (Million \$) | \$118 | \$139 | \$113 |
| Instructional Expenses | \$84.2 | \$49.6 | \$93 |
| (Million \$) | | | |
| Scholarship Expenses (Million \$) | \$7.47 | \$6.15 | \$7.8 |

According to the table, there is a significant difference between the average revenues and expenses of schools in different categories. On average, NCPDLP schools collect more revenues and funds than their counterparts that are not part of NCPDLP. Non-NCPDLP schools' instructional and scholarship expenses are much higher than NCPDLP schools, on average. Based on this information, it can be concluded that non-NCPDLP schools generate less revenues, but spend more money on educational activities than NCPDLP partner schools.

D. CHAPTER SUMMARY

This chapter provides the summary statistics of the key variables in order to better understand the data. According to the data, 16.3% of all courses are taken in NCPDLP partner institutions. 52% of the courses taken in NCPDLP partner schools were delivered via DL methods between 2000 and 2007.

The average GPA for the courses taken in NCPDLP partner schools was 3.02, while it was 3.20 for the courses that were taken in other institutions. Instead of the difference observed in this index, the percentage of successful courses was very close for both types of schools. Non-NCPDLP schools were better by only 3 percentage points in terms of successful courses.

Examining the data closely using descriptive statistics helps us build the econometrics model to analyze the causal relationships between the variables. The differences presented in this chapter are not necessarily causal or statistically significant. The next chapter will investigate these differences in more depth.

IV. METHODOLOGY, MULTIVARIATE MODELS AND RESULTS

A. INTRODUCTION

This chapter will discuss the estimated effects of institutional and course characteristics on the successful completion of the courses and grade point averages received in those courses. First, the methodology used in the analysis will be presented. Second, multivariate models for the successful course completion analysis will be discussed and results will be reported. Finally, multivariate models used to analyze GPA will be discussed and the results obtained from the regressions will be presented.

B. METHODOLOGY AND MODELS

Fixed effects regression methods will be used in this analysis. Fixed effects methods help to minimize the bias in estimated coefficients by dropping the variables that do not change over time. Fixed effects estimator uses a transformation to eliminate the unobserved effects that do not change over time, before the estimation. Any time-constant explanatory variables are removed along with these unobserved factors (Wooldridge, 2009).

The course completion and GPA models are estimated by using the models presented in Table 10. In the analysis, we used five fixed effects multivariate regression models. Full regression results can be found in Appendix A and Appendix B. The first model is the baseline model. In order to see the effect of DL methods on the Sailors' academic success, a dummy variable representing DL added to the model. The primary focus of this thesis is to find out how Sailors do in courses taken in NCPDLP partner institutions via TA program. Therefore, a dummy variable denoting NCPDLP schools is added to the second model.

As discussed in Chapter II, the NCPDLP Program is designed to provide Sailors with an opportunity to take courses in partner schools via DL methods. Therefore, an interaction of NCPDLP and DL variables is added to the third model to observe their joint effect on the dependent variables. The fourth model is formed by adding interaction

terms for NCPDLP and course subjects. We hypothesize that academic success of Sailors is associated with the characteristics of the schools in which they take courses. To test this hypothesis, variables representing institutional characteristics are included in the last model.

Table 10. Equations Used to Estimate the Multivariate Fixed Effects

| Model | Equation |
|-------|---|
| 1 | $Y_{it} = \alpha + \beta_1 DL_{it} + \beta_2 Subject_{it} + \beta_3 Paygrade_{it} + \beta_4 FY_t + a_i + u_{it}$ |
| 2 | $Y_{it} = \alpha + \beta_1 NCPDLP_{it} + \beta_2 DL_{it} + \beta_3 Subject_{it} + \beta_4 Paygrade_{it} + \beta_5 FY_t + a_i + u_{it}$ |
| 3 | $Y_{it} = \alpha + \beta_1 NCPDLP_{it} + \beta_2 DL_{it} + \beta_3 (NCPDLP_{it} \times DL_{it}) + \beta_4 Subject_{it} + \beta_5 Paygrade_{it} + \beta_6 FY_t + a_i + u_{it}$ |
| 4 | $Y_{it} = \alpha + \beta_1 NCPDLP_{it} + \beta_2 DL_{it} + \beta_3 (NCPDLP_{it} \times DL_{it}) + \beta_4 Subject_{it} + \beta_5 (NCPDLP_{it} \times Subject_{it}) + \beta_6 Paygrade_{it} + \beta_7 FY_t + a_i + u_{it}$ |
| 5 | $Y_{it} = \alpha + \beta_1 NCPDLP_{it} + \beta_2 DL_{it} + \beta_3 (NCPDLP_{it} \times DL_{it}) + \beta_4 Subject_{it} + \beta_5 (NCPDLP_{it} \times Subject_{it}) + \beta_6 Paygrade_{it} + \beta_7 Institutional\ Characteristics_{it} + \beta_8 FY_t + a_i + u_{it}$ |

In the equations in Table 10, Y_{it} denotes the dependent variables which are either course completion or GPA. Dependent variable coding is displayed in Table 11. NCPDLP variable is a dummy variable that represents an institution's participation in the Navy program. The DL binary variable is included in the model to control for the effect of method of instruction. We hypothesized that success in the courses taken in NCPDLP schools may differ according to the method of instruction. Therefore, an interaction of NCPDLP and DL dummy variables is incorporated into the model. Dummy variables for course subjects are also included in the equation to observe their independent effects on the success of Sailors. We also add interaction variables of course subjects and an NCPDLP dummy to test whether the effect of different subjects differs for NCPDLP and other schools. Institutional characteristics in the model include the type of the school (public, private nonprofit and private for-profit) and the duration of education (2–4 years or 4 years or more) offered at the institutions. “Public” and “2–4 years” are the base

categories. Fiscal Year dummies (FY_t) represent the fiscal year the course was taken. Year dummies control for the yearly effects that may influence the Sailors' success, while a_i represents the individual unobserved fixed effects, such as ability and motivation that does not change over time and " u_{it} " is the error term.

Table 11. Dependent Variable Coding

| Grade Received | Course Completion | GPA |
|--------------------------|--------------------------|------------|
| A | 1 | 4 |
| B | 1 | 3 |
| C | 1 | 2 |
| D | 1 | 1 |
| F | 0 | 0 |
| Incomplete | 0 | 0 |
| No Grade Assigned | 0 | Dropped |
| Pass | 1 | Dropped |
| Satisfactory | 1 | Dropped |
| Withdrawal | 0 | Dropped |

Some of the individual characteristics are not included in the model. These are demographic and other variables that do not change over time. Since these variables do not change over time, they would drop out in the fixed effects estimation.

Table 10 displays the coding of dependent variables. According to the table, if a Sailor gets an F from a course, the course is considered as not completed. Other categories of courses that are coded as not completed are "No Grade Assigned," "Incomplete," and "Withdrawal." GPA is coded according to the letter grades received

from the courses. Since it is very hard to assign a numeric value to them, if an observation is coded as “No Grades Assigned,” “Pass,” “Satisfactory,” or “Withdrawal,” it is dropped from the data set.

C. COURSE COMPLETION

Fixed effects regression results for course completion are displayed in Table 12. Full regression results are displayed in Appendix A. According to the results, method of instruction has a significant effect on course completion. Holding everything else constant, a course taken via DL methods is 7–8 percentage points less likely to be completed successfully by Sailors. This result is consistent with the literature discussed in Chapter II.

Table 12. Results for Fixed Effects Regression Models of Successful Course Completion

| Explanatory Variables | Dependent Variable-Successful Course Completion | | | | |
|---|---|-------------------|-------------------|-------------------|-------------------|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
| DL Method | -0.08 (0.00)** | -0.08 (0.00)** | -0.07 (0.00)** | -0.07 (0.00)** | -0.08 (0.00)** |
| NCPDLP Schools | --- | 0.00 (0.00) | 0.01 (0.00)** | 0.03 (0.01)** | 0.05 (0.01)** |
| Interaction of DL and NCPDLP | --- | --- | -0.04 (0.00)** | -0.04 (0.00)** | -0.03 (0.00)** |
| Institutions Offering 4 Years of Education | --- | --- | --- | --- | -0.02 (0.00)** |
| Private Nonprofit Schools | --- | --- | --- | --- | 0.07 (0.00)** |
| Private For-Profit Schools | --- | --- | --- | --- | 0.11 (0.00)** |

* significant at 5% level; ** significant at 1% level

According to the results of the first model, Sailors who take courses via DL methods are 8 percentage points less likely to complete them successfully than Sailors who take courses via traditional methods. The second model is set up to observe the

success of Sailors in the NCPDLP schools. The variable denoting NCPDLP schools turns out to be statistically insignificant. We cannot infer any relationship between NCPDLP schools and academic success of Sailors.

The third model includes an interaction between the DL and NCPDLP variables. The coefficients of this interaction are statistically significant at 1% level (see row 3 of Table 12). Sailors who take courses via traditional methods in NCPDLP schools are 1 percentage points more likely to complete them successfully, and this coefficient is now statistically significant. Results also suggest that, DL courses taken in NCPDLP schools are 4 percentage points less likely to be completed successfully by sailors.

The fourth model is formed by adding an interaction term between NCPDLP and course categories. The coefficient of NCPDLP differs in this model from the previous one. The likelihood of successful course completion of Sailors who take courses via traditional methods in the NCPDLP schools are associated with a 2 points increase, compared to the results of the previous model.

The last model includes institutional characteristics. The coefficients are statistically significant, as seen on the Table 12. The findings show that while NCPDLP has a negative effect on completion, this effect is mainly driven by DL courses. Sailors who take courses in NCPDLP partner institutions that are taught via traditional methods are 5 percentage points more likely to complete those courses than their counterparts taking classes in other types of schools, *ceteris paribus*. The coefficients of the (DL*NCPDLP) interaction term and the DL dummy suggest that DL courses taken in an NCPDLP institution are 3 percentage points less likely to be completed by Sailors, on average. These results support the summary statistics exhibited in Chapter III.

Other important variables added into the model are institutional characteristics. These variables denote the type of the institutions, and the length of the education offered in an institution. Results suggest that Sailors are 2 percentage points less likely to complete a course successfully in a school that offers 4 years of education than in a school of 2–4 years of education, holding everything else constant. When compared to the courses delivered in public schools, courses taken in private nonprofit schools are

7 points less likely to be finished by getting a passing grade. Sailors also do better in private for-profit schools than in public schools by 11 percentage points, according to regression results.

D. GRADE POINT AVERAGE

The other dependent variable on which we conducted a fixed effects multivariate analysis is GPA. The fixed effects regression is estimated using the same independent variables as in the course completion regression. Summary results of the five regressions are presented in Table 13. Full regression results are presented in Appendix B.

Table 13. Fixed Effects Regression Results for Grade Point Average

| Explanatory Variables | Dependent Variable-GPA | | | | |
|---|------------------------|-------------------|-------------------|-------------------|-------------------|
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
| DL Method | -0.27 (0.00)** | -0.26 (0.00)** | -0.23 (0.01)** | -0.23 (0.01)** | -0.27 (0.01)** |
| NCPDLP Schools | | -0.09 (0.01)** | -0.03 (0.01)** | 0.00 (0.03) | 0.04 (0.03) |
| Interaction of DL and NCPDLP | --- | --- | -0.13 (0.01)** | -0.14 (0.01)** | -0.10 (0.01)** |
| Institutions Offering 4 Years of Education | --- | --- | --- | --- | -0.12 (0.01)** |
| Private Nonprofit Schools | --- | --- | --- | --- | 0.11 (0.01)** |
| Private For-Profit Schools | --- | --- | --- | --- | 0.45 (0.01)** |

* significant at 5% level; ** significant at 1% level

It is observed in the first model that the GPA of Sailors who take DL courses is .27 points lower than the GPA of other sailors, *ceteris paribus*. The second model suggests that courses taken in the NCPDLP schools are associated with a .09 points lower GPA. The third model includes an interaction variable of NCPDLP and DL dummy variables. According to the results of this model, the GPA of Sailors who take courses via

traditional methods in the NCPDLP schools is .03 points lower than the GPA of Sailors who take courses via traditional methods in other types of schools. Fourth model is generated by adding an interaction between NCPDLP and course categories. The coefficient of NCPDLP is statistically insignificant in this model.

The results of the last model show that Sailors who take courses in an NCPDLP-participating school receive a GPA that is .04 points higher than Sailors who take courses in other types of schools. This result is contrary to the descriptive statistics provided in the previous chapter. However, the coefficient of the NCPDLP variable is not statistically significant.

Compatible with the results discussed in the literature review above, Sailors who complete courses taken via DL methods receive lower GPA-s. Results of the fixed effects multivariate analysis suggest that GPA is 0.27 points lower in non-NCPDLP schools in courses delivered via DL methods. In NCPDLP schools there is an additional 0.10 points gap on top of the 0.27 points gap observed in DL courses in other types of schools. The coefficients of both of these two variables are significant at 1% level.

Sailors who participate in courses in institutions offering 4 or more years of education receive GPAs that are 0.12 points lower than Sailors who take courses in schools offering 2–4 years of education. It is possible that schools offering 4 or more years of education are more demanding than others. Since NCPDLP schools are chosen by the Navy among the institutions offering 2-or-more years of education, schools that do not conform to this requirement were dropped from the data.

Regression results suggest that courses taken in public schools are completed with 0.45 points lower grades than courses taken in private for-profit schools, *ceteris paribus*. This is almost half a letter grade gap between these two types of schools. Differences in GPA are smaller between public and private nonprofit institutions. The difference is 0.11 points out of 4.0. We can conclude that Sailors are more successful at the courses delivered in private for-profit schools. This outcome is consistent with the course completion regression results.

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V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

This thesis analyzes Sailors' course success and grades received (GPA) in courses taken in schools partnering with the Navy in the NCPDLP Program. Methods of instruction (DL vs. traditional methods) are also taken into account to observe their effects on sailors' success in courses delivered in different types of institutions. Institutional characteristics such as type of institution (name types) and degrees offered (2-year or 4-year institutions) are important in predicting course success. Therefore, we looked at these features in an effort to understand if there is a systematic relationship between institutional characteristics and Sailors' success in the courses taken in those institutions. For example, we analyzed differences in student academic success between for-profit and other schools.

McLaughlin (2010) investigated course-level data to find out the relationship between method of instruction and academic success of Sailors. He accounted for individual fixed effects in his thesis. Sim (2011), in his term paper, used the same data for his analysis. The difference between the two studies was that Sim took into account institutional fixed effects. This study is different from the previous ones in two ways: First, the data used in this thesis includes institutional characteristics obtained from IPEDS data base. Secondly, NCPDLP schools are identified with the help of Sim. These two features provided us with an opportunity to do the analysis.

1. **Course Success of Sailors in the NCPDLP Schools**

One of the indicators of Sailors' academic performance in the courses they take via the TA program is successful course completion. Fixed effects regression results suggest that Sailors who take classes in NCPDLP partner schools via traditional methods are 5 percentage points more likely to complete courses than Sailors who take classes in non-NCPDLP institutions. Courses taken via DL methods in NCPDLP schools are 3 points less likely to be completed successfully, *ceteris paribus*. The results point out a negative correlation between the DL method and successful course completion.

Almost 93% of courses taken via TA are pursued in a public or private nonprofit school. Only 6.7% of classes are taken in a private for-profit school. According to the results obtained from the fixed effects multivariate model, Sailors are more successful in private for-profit or private nonprofit schools than they are in public schools in terms of course completion. Courses taken in public schools are 7 percentage points less likely to be completed successfully than in for-profit schools. Sailors are more successful in the courses they take in private for-profit schools by 11 points as compared to public schools.

Another institutional characteristic that is considered to be an important factor affecting Sailors' success is duration of the education programs. Two different types of institutions are coded in according to the duration of education they offer:

- Institutions offering education between 2 years and up to 4 years (but 4 years)
- Institutions offering education for 4 or more years

According to our analysis, Sailors are 2 percentage points more likely to complete courses successfully in the schools offering less than 4 years of education.

2. GPA of Sailors in the NCPDLP Schools

Another indicator of course success is the course grade received by Sailors. Sailors taking courses in NCPDLP schools receive a GPA that is 0.04 points higher in courses delivered via traditional methods of instruction. Courses taken via DL methods yield negative results compared to other types of courses. A Sailor who takes a DL course in a non-NCPDLP school receives a GPA that is .27 points lower than other courses he takes in non-NCPDLP schools. The gap increases in NCPDLP partner institutions. Sailors taking DL courses in NCPDDL schools receive a GPA that is .37 points lower.

When it comes to the effect of institutional control on GPA students earn, we observe a similar trend as in course completion analysis. Sailors who take courses in private for-profit schools receive higher grades than Sailors taking courses in public schools by 0.45 points (out of 4.0 points). The GPA earned in public schools is .11 points lower than the GPA in private nonprofit schools.

The longer duration of education is associated with a lower GPA, holding everything else constant. Sailors' GPAs in courses taken in schools that offer 4 or more years of education are 0.12 points lower than GPAs of other Sailors. It can be inferred that it is hard to get high grades in schools offering baccalaureate and higher degrees to their students. These schools may be more demanding than other schools, making it more difficult for Sailors to satisfy their requirements when they take courses in off-duty status.

NCPDLP schools are associated with lower rates of success. This may be due to either more rigorous standards NCPDLP schools have, or their lack of ability to transfer knowledge. Both of the hypotheses are valid. We cannot distinguish given the data.

B. RECOMMENDATIONS

The NETC database should be updated to include the institutional characteristics. Although the data set provided by NETC is sufficient to identify the method of instruction used to deliver the courses, NCPDLP identifier is not put in the data. The courses taken in NCPDLP partner institutions are identified manually. The NETC data files on TA program should include an NCPDLP identifier in order to generate more accurate and up-to-date data on the NCPDLP program.

The Navy partnered with schools to offer Sailors courses via DL method under NCPDLP program. But the Sailors are more successful in other types of schools in DL courses, according to the analysis conducted in this thesis. More research needs to be conducted on the effectiveness of the NCPDLP Program.

The following areas are recommended for further research on NCPDLP Program:

- Conduct an analysis of effect of institutional characteristics on course success to find out which institutional features foster success. The Navy may choose the best schools to partner with.
- Conduct an analysis of promotion and retention of Sailors who take courses in NCPDLP Partner schools. The Navy benefits from the program if Sailors taking courses in NCPDLP schools are more successful on the job.

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**APPENDIX A. FULL FIXED EFFECTS REGRESSION RESULT
FOR SUCCESSFUL COURSE COMPLETION**

| | (1) | (2) | (3) | (4) | (5) |
|----------------|----------|----------|----------|----------|----------|
| | s_course | s_course | s_course | s_course | s_course |
| dumdl | -0.08 | -0.08 | -0.07 | -0.07 | -0.08 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy95 | -0.02 | -0.02 | -0.02 | -0.02 | -0.02 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy96 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy97 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy98 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy99 | -0.07 | -0.07 | -0.07 | -0.07 | -0.07 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy00 | -0.07 | -0.07 | -0.07 | -0.07 | -0.08 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy01 | -0.08 | -0.08 | -0.08 | -0.08 | -0.09 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy02 | -0.08 | -0.08 | -0.08 | -0.08 | -0.09 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| fy03 | -0.08 | -0.08 | -0.08 | -0.08 | -0.10 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| fy04 | -0.08 | -0.08 | -0.08 | -0.08 | -0.10 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| fy05 | -0.08 | -0.08 | -0.08 | -0.08 | -0.10 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| fy06 | -0.08 | -0.08 | -0.08 | -0.08 | -0.10 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| fy07 | -0.09 | -0.09 | -0.09 | -0.09 | -0.11 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| business | 0.05 | 0.05 | 0.05 | 0.06 | 0.05 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| history | 0.04 | 0.04 | 0.04 | 0.05 | 0.05 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| math | 0.00 | 0.00 | 0.00 | 0.01 | 0.00 |
| | (0.00) | (0.00) | (0.00) | (0.00)** | (0.00) |
| nat_science | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| o.phys_science | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|-------------------|----------|----------|----------|----------|----------|
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| it | 0.06 | 0.06 | 0.06 | 0.06 | 0.05 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| humanities | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| english | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| misc | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| medical | 0.06 | 0.06 | 0.06 | 0.07 | 0.07 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| vocational | 0.06 | 0.06 | 0.06 | 0.07 | 0.07 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| law_cj | 0.08 | 0.08 | 0.08 | 0.08 | 0.08 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| e4 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| e5 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| e6 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 |
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| e7 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| e8 | 0.09 | 0.09 | 0.09 | 0.09 | 0.08 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| e9 | 0.11 | 0.11 | 0.11 | 0.11 | 0.11 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| dum_ncpdlp | | 0.00 | 0.01 | 0.03 | 0.05 |
| | | (0.00) | (0.00)** | (0.01)** | (0.01)** |
| dl_ncpdlp | | | -0.04 | -0.04 | -0.03 |
| | | | (0.00)** | (0.00)** | (0.00)** |
| ncpdlp_bus | | | | -0.02 | -0.02 |
| | | | | (0.01)** | (0.01)** |
| ncpdlp_english | | | | -0.02 | -0.01 |
| | | | | (0.01)* | (0.01) |
| ncpdlp_his | | | | -0.03 | -0.03 |
| | | | | (0.01)** | (0.01)** |
| ncpdlp_humanities | | | | -0.02 | -0.02 |
| | | | | (0.01)** | (0.01)* |
| ncpdlp_it | | | | -0.01 | 0.00 |
| | | | | (0.01) | (0.01) |
| ncpdlp_law | | | | -0.02 | -0.02 |
| | | | | (0.01)** | (0.01)* |
| ncpdlp_mat | | | | -0.04 | -0.04 |

| | | | | | |
|---|----------|----------|----------|----------|----------|
| | | | | (0.01)** | (0.01)** |
| nepdlp_medical | | | | -0.03 | -0.03 |
| | | | | (0.01)** | (0.01)** |
| nepdlp_ns | | | | 0.00 | 0.00 |
| | | | | (0.01) | (0.01) |
| nepdlp_ps | | | | 0.01 | 0.01 |
| | | | | (0.01) | (0.01) |
| nepdlp_vocational | | | | -0.02 | -0.03 |
| | | | | (0.01) | (0.01)** |
| o.nepdlp_misc | | | | 0.00 | 0.00 |
| | | | | (0.00)** | (0.00)** |
| inst_4yr_plus | | | | | -0.02 |
| | | | | | (0.00)** |
| private_fp | | | | | 0.11 |
| | | | | | (0.00)** |
| private_nfp | | | | | 0.07 |
| | | | | | (0.00)** |
| Constant | 0.88 | 0.88 | 0.88 | 0.88 | 0.88 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| Observations | 1225273 | 1225273 | 1225273 | 1225273 | 1225273 |
| Number of ssn | 207759 | 207759 | 207759 | 207759 | 207759 |
| * significant at 5% level; ** significant at 1% level | | | | | |

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**APPENDIX B. FULL FIXED EFFECT REGRESSION RESULTS
FOR GPA**

| | (1) | (2) | (3) | (4) | (5) |
|----------------|----------|----------|----------|----------|----------|
| | gpa | gpa | gpa | gpa | gpa |
| dumdl | -0.27 | -0.26 | -0.23 | -0.23 | -0.27 |
| | (0.00)** | (0.00)** | (0.01)** | (0.01)** | (0.01)** |
| fy95 | -0.04 | -0.04 | -0.04 | -0.04 | -0.04 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| fy96 | -0.05 | -0.05 | -0.05 | -0.05 | -0.05 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| fy97 | -0.02 | -0.02 | -0.02 | -0.02 | -0.03 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01)* |
| fy98 | 0.00 | 0.00 | 0.00 | 0.00 | -0.01 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| fy99 | 0.02 | 0.02 | 0.01 | 0.01 | 0.00 |
| | (0.01) | (0.01) | (0.01) | (0.01) | (0.01) |
| fy00 | 0.06 | 0.07 | 0.06 | 0.06 | 0.05 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| fy01 | 0.09 | 0.09 | 0.09 | 0.09 | 0.07 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| fy02 | 0.09 | 0.10 | 0.09 | 0.09 | 0.07 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| fy03 | 0.13 | 0.13 | 0.12 | 0.12 | 0.10 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| fy04 | 0.15 | 0.18 | 0.17 | 0.17 | 0.13 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| fy05 | 0.16 | 0.19 | 0.18 | 0.18 | 0.14 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| fy06 | 0.20 | 0.23 | 0.22 | 0.22 | 0.18 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| fy07 | 0.17 | 0.20 | 0.19 | 0.20 | 0.16 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| business | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| history | 0.12 | 0.12 | 0.12 | 0.12 | 0.12 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| math | -0.07 | -0.07 | -0.07 | -0.06 | -0.06 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| nat_science | 0.07 | 0.07 | 0.07 | 0.05 | 0.05 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| o.phys_science | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

| | | | | | |
|-------------------|----------|----------|----------|----------|----------|
| | (0.00)** | (0.00)** | (0.00)** | (0.00)** | (0.00)** |
| it | 0.25 | 0.26 | 0.26 | 0.24 | 0.23 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| humanities | 0.21 | 0.21 | 0.21 | 0.22 | 0.21 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| english | 0.16 | 0.16 | 0.16 | 0.17 | 0.16 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| misc | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| medical | 0.24 | 0.24 | 0.24 | 0.24 | 0.25 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| vocational | 0.26 | 0.26 | 0.26 | 0.27 | 0.29 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| law_cj | 0.29 | 0.29 | 0.29 | 0.28 | 0.28 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| e4 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| e5 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| e6 | 0.15 | 0.16 | 0.15 | 0.15 | 0.15 |
| | (0.01)** | (0.01)** | (0.01)** | (0.01)** | (0.01)** |
| e7 | 0.14 | 0.15 | 0.15 | 0.15 | 0.14 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| e8 | 0.14 | 0.14 | 0.14 | 0.14 | 0.14 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| e9 | 0.12 | 0.12 | 0.12 | 0.12 | 0.13 |
| | (0.03)** | (0.03)** | (0.03)** | (0.03)** | (0.03)** |
| dum_ncpdlp | | -0.09 | -0.03 | 0.00 | 0.04 |
| | | (0.01)** | (0.01)** | (0.03) | (0.03) |
| dl_ncpdlp | | | -0.13 | -0.14 | -0.10 |
| | | | (0.01)** | (0.01)** | (0.01)** |
| ncpdlp_bus | | | | -0.03 | -0.03 |
| | | | | (0.03) | (0.03) |
| ncpdlp_english | | | | -0.03 | -0.03 |
| | | | | (0.03) | (0.03) |
| ncpdlp_his | | | | -0.02 | -0.02 |
| | | | | (0.03) | (0.03) |
| ncpdlp_humanities | | | | -0.07 | -0.07 |
| | | | | (0.03)** | (0.03)** |
| ncpdlp_it | | | | 0.06 | 0.07 |
| | | | | (0.03)* | (0.03)** |
| ncpdlp_law | | | | 0.04 | 0.04 |
| | | | | (0.03) | (0.03) |
| ncpdlp_mat | | | | -0.10 | -0.10 |

| | | | | | |
|---|----------|----------|----------|----------|----------|
| | | | | (0.03)** | (0.03)** |
| nepdlp_medical | | | | -0.05 | -0.07 |
| | | | | (0.03) | (0.03)* |
| nepdlp_ns | | | | 0.06 | 0.06 |
| | | | | (0.03)* | (0.03)* |
| nepdlp_ps | | | | -0.04 | -0.04 |
| | | | | (0.03) | (0.03) |
| nepdlp_vocational | | | | -0.10 | -0.13 |
| | | | | (0.03)** | (0.03)** |
| o.nepdlp_misc | | | | 0.00 | 0.00 |
| | | | | (0.00)** | (0.00)** |
| inst_4yr_plus | | | | | -0.12 |
| | | | | | (0.01)** |
| private_fp | | | | | 0.45 |
| | | | | | (0.01)** |
| private_nfp | | | | | 0.11 |
| | | | | | (0.01)** |
| Constant | 2.87 | 2.87 | 2.87 | 2.86 | 2.90 |
| | (0.02)** | (0.02)** | (0.02)** | (0.02)** | (0.02)** |
| Observations | 1101938 | 1101938 | 1101938 | 1101938 | 1101938 |
| Number of ssn | 192583 | 192583 | 192583 | 192583 | 192583 |
| * significant at 5% level; ** significant at 1% level | | | | | |

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