Patterns of Homework Initiation for Web-based Activities in Economics: A Study of Academic Procrastination

Richard C. Schiming[1]

Abstract

This study investigates the impact that certain demographic and academic characteristics have on the degree of academic procrastination by college students in a Principles of Macroeconomics course. The study employs an objective measure of academic procrastination (homework initiation) rather than the self-reported measures typically employed in the literature. The empirical results indicate that students who procrastinate less are academically stronger, non-traditionally aged, or had a previous college level course in economics. Upper level students tend to procrastinate more. The amount of academic procrastination varied during the term for each student but procrastination generally worsened as the academic term progressed.

Key Words: academic procrastination, principles of macroeconomics

JEL Classification: A22

Introduction

Academic procrastination has long been an issue in higher education. The research in this paper examined the pattern of homework initiation in a variety of web-based homework activities in principles courses in economics. By comparing the day on which students first began a web-based assignment to the date it was due, certain academic and demographic characteristics were found to affect the degree of academic procrastination that students exhibited. The research also uncovered a consistent pattern of student homework initiation at this institution.

Review of the Literature

As befits such a perennial issue in education, academic procrastination has been widely studied in the research literature. Pychl et al. (2000) estimated that over 70 percent of college students procrastinate to some degree. Most of the literature focuses on the personal characteristics and attitudes of the students that affect periodic or persistent academic procrastination. A smaller subsection of the literature discusses the characteristics of a given course or assignment that may encourage or discourage timely completion of course assignments.

Student Attitudes and Academic Procrastination

In terms of student attitude, typical studies found that the largest single explanatory variable for the variances in students' self-reported academic procrastination was the fear of

[1] Professor of Economics, Minnesota State University, Mankato. The author wishes to thank Kate Hansen, Alexander Teney, and the referees for their helpful comments and suggestions.

failure. Another powerful characteristic found by Solomon and Rothblum (1984) was the aversiveness (sic) of the assigned task. Ferrari et al. (2000) added fear of social disapproval as a significant cause of academic procrastination. Reasinger and Brownlee (1996) listed the significant causes (or at least predictors) of academic procrastination as perfectionism, a lack of external motivation, and an external attributional style. According to Senegal et al. (1995), the two most significant variables explaining variations in academic procrastination were the student's self-characterization as a procrastinator and blaming others for the assigned task. Students who were intrinsically motivated by the assigned material were less likely to procrastinate than students who felt the assignment was a burden imposed on them that they must complete.

Other psychological phenomena have been associated with academic procrastination. One common explanation was the use of "self-handicapping" by students whereby they deliberately delayed their study efforts to use that delay as a plausible explanation for their poor performance. Rather than have to admit that they are not as intelligent as they wish and that the lack of intelligence caused their poor academic performance, they blamed their procrastination as the only reason that they did not do as well as they had hoped. Beck et al. (2000) found that this self-handicapping behavior was present in studying for examinations.

Shame and guilt were important in the determination of academic procrastination as well. Fee and Tangnez (2000) found overall feelings of shame were more closely associated with procrastination than were task specific feelings about failure. Pychyl et al. (2000) delineated a typical pattern whereby declining motivation led to academic procrastination that led to increasing shame that led to more academic procrastination.

Perfectionism was also frequently mentioned as a cause of student procrastination. This perfectionism was found in two dimensions: self-imposed perfectionism where the student's own goal was to achieve perfection and socially-imposed perfectionism where the student believed that societal norms expected perfection. Onwuegbuzie (2000) found that overall academic procrastination was positively related to socially imposed perfectionism and that the fear of failure promoted the individual response of academic procrastination to both socially and self-imposed perfectionism. Fee and Tangnez (2000) discovered that the mix of shame and socially imposed perfectionism was an especially potent link to overall procrastination.

Student Demographics and Academic Procrastination

In terms of basic demographic characteristics, there were some common variables that were frequently discussed in the literature. However, the impacts of some of these major demographic characteristics were often ambiguous. In terms of gender, four of the studies (Reasinger and Brownlee (1996); Prohaska et al. (2000); Senegal et al. (1995); and Brownlow and Reasinger (2000)) found that women procrastinate less than men, while Owens and Newbegin (2000) found that there was no significant difference in the degree of academic procrastination between men and women.

In terms of student age, the evidence was also contradictory. Hill et al. (1978) found that older students procrastinated more but Prohaska et al. (2000) found that older students reported less academic procrastination. That discrepancy might well be due to the different measures of age and population samples, since the former study measured academic procrastination in traditional age students while the latter examined non-traditional age students.

The relationship between student academic performance and academic ability was similarly mixed. Some studies demonstrated that students with lower GPAs were associated

with more procrastination (Ferrari et al. (2000): Hill et al. (1978); and Rayburn and Rayburn (1999)). However, Pychyl et al. (2000) and Beck et al. (2000) found no significant difference in grades or test results between academic procrastinators and non-procrastinators.

Course, Assignment, Term and Academic Procrastination

There is much less literature on the external characteristics of course, assignment, and academic term on the amount of academic procrastination in college. Ferrari and Schel (2000) discovered that early in an academic term, students procrastinated more in "nonpleasurable academic tasks" and completed pleasurable tasks sooner. Later in the same term, students reported that they were equally likely to complete both pleasurable and nonpleasurable tasks. The implication is that as the academic term proceeded, the students buckled down more diligently on the less pleasurable academic tasks.

Due to the fear of failure, students reported that they are more likely to finish an assignment if the tasks "reflect their ability in a nonthreatening, engaging way". Easier and less punitive assignments invited less procrastination. Typically the timing of the assignment during the academic term did not have a significant impact on the students' likelihood to procrastinate. Ferrari and Schel (2000) found the occurrence of academic procrastination was often consistent throughout the academic term.

Tuckman (1990) found that the length of the assignment (as measured by the number of questions or problems within the assignment) was directly related to academic procrastination, especially for students of average and above academic ability. The longer the assignment and the more points at stake, the greater the degree of procrastination and the lower the completion rate for the assignment. Students procrastinated more on long assignments because of the amount of work involved rather than procrastinating less because of the points they could earn. Finally, Milgram et al. (1993) found that students tend to be equal opportunity procrastinators: that is, they tended to procrastinate equally in all of a given term's courses.

Much of the existing literature was focused on student characteristics and attitudes that affect academic procrastination. There has been less analysis of other external characteristics that may affect academic procrastination. It is also important to note that most of the studies rely on self-reported and sometimes self-defined academic procrastination by the students.

The research in this study offers both a quantifiable measure of academic procrastination unaffected by student self-definition or self-reporting and a more complete analysis of external impacts on academic procrastination. By the use of this impartial measure, the effect of certain demographic and academic characteristics on the degree of academic procrastination is investigated more thoroughly.

Data and Methodology

In my courses, I developed and employ a variety of web-based homework exercises that illustrate key economic concepts. For each exercise, I announce the assignment at the beginning of one class session with the due date at the beginning of the next class session. Since the assignments are found only on my website, the students are asked to print out the exercise, complete it, and hand it in by the due date. Students lacking access to a printer are allowed to submit handwritten answers. Many of the computer printouts carry a date stamp showing the date on which the student first printed out the assignment. Sixty-nine percent of all the submitted homework carried a date stamp.

This date stamp thus represented the first time that the student engaged with the material and began to complete the assignment. This engagement represented the initiation of homework. While some students might have initially viewed the homework on my course webpage to see what was required of them before they printed it out, the date stamp ultimately represented the first time the student seriously considered completing the assignment.

Thus, the definition of academic procrastination employed in this paper is the difference between when the assignment was due and the time that the assignment was first printed out by the student. The greater the time gap, the less is the degree of academic procrastination. Thus, a student who printed out the exercise two days before it was due was deemed to exhibit less academic procrastination than a student who printed out the exercise on the day it was due.

The initiation of a homework assignment is a useful proxy for procrastination. A student who is starting the assignment nearer the due date will also be completing the assignment close to the due date as well. In this study, over 60 percent of the assignments were initiated either the day before or the day of the due date.

This measure of procrastination is not the traditional measure of procrastination in the literature that compares the due date to the time of completion of the assignment. The measure employed here has the advantage over the traditional measure of not requiring self-reporting by the students as to when they completed the assignment. This self-reporting has been a consistent weakness in the measurement of procrastination.

I collected data in the principles course I taught (*Principles of Macroeconomics*) during a single spring semester. Forty-seven students of the forty-nine students enrolled in the section gave their permission and provided the basic demographic and academic information required for this study. The course met on Mondays, Wednesdays, and Fridays at 10 a.m. Table 1 summarizes the demographic and academic information provided by the students.

Table 1
Demographic and Academic Characteristics

Characteristic	Description	Mean	SD
GPA	GPA during semester	3.06	0.55
ACT	Score on ACT	22.05	3.96
AGE	Age in years	19.93	1.76
NBUSM	1 if non-Business major or undecided	0.64	0.49
NBSD	1 if seeking non-BS degree	0.53	0.50
CLASS	1 = first year, 2 = sophomore, etc.	2.06	0.87
MALE	1 if male	0.77	0.43
HHWW	Hours worked at job Monday - Friday	10.41	10.91
HWWE	Hours worked at job during weekends	5.06	6.07
LOAD	Credit hours taken during semester	14.70	2.69
HSE	1 if had economics course in high school	0.45	0.50
CE	1 if had economics course in college	0.28	0.05
OC	1 if owned own computer	0.89	0.31
OP	1 if owned own printer	0.77	0.43
HOUSING	1 if living in residence hall	0.38	0.49

All forty-seven students provided information for the following variables: AGE, BUSM. NBSD, CLASS, MALE, HSE, CE, OC, OP, and HOUSING. Forty-four students provided GPA

and LOAD data; forty-six students provided HHWW and HHWE data; and thirty-seven students provided ACT data.

For each online exercise assigned, the degree of academic procrastination was classified into three categories: homework initiated on the day the assignment was due (Day Of), homework initiated the day before the assignment was due (Day Before), and homework initiated two or more days before the assignment was due (Two or More). For each assignment, the specific student score on the assignment and the academic and demographic information was noted as well as the degree of the academic procrastination.

Results

Two data sets were analyzed: one for the survey data and one for the regression results. The survey results were for the forty-seven students who provided the basic academic and demographic information. The regression results were for the thirty-five students who provided the more complete academic and demographic information. Table 2 illustrates the number of observations provided for each data set.

Table 2
Total Observations and Regression Observations

Assignments Possible for all Students (49 students)	441
Assignments Submitted from all Students (49 students)	411
Assignments Submitted from all Students who provided some demographic information (47 students)	395
Assignments Submitted with Date Stamp for all Students who provided some demographic information (47 students)	272
Assignments submitted with Date Stamp for all Students who provided complete demographic information (35 students)	205

Survey Results

There are a number of important demographic and academic characteristics of the students who participated in this study:

- The students in this class were about equally split between those seeking the Bachelor or Arts (BA) degree and those seeking the Bachelor of Science (BS) degree. Students seeking the BS degree were most likely business or economics majors for whom this class was a requirement. BA students were generally taking the class as part of a general education requirement.
- Seventy-seven percent of the respondents were men.
- Although a majority of students worked during the week (62 percent) and/or during the weekend (57 percent), more than half the students worked less than 10 hours during the week and/or less than six hours on the weekend.
- All but two of the students took between twelve and eighteen credit hours during the semester under examination. My university has a banded tuition program where the cost of tuition is the same for any amount of credit hours between twelve and eighteen credit hours. Most students opted for this course load.
- Forty-five percent of the students took an economics class in high school and twenty-eight percent had already taken an economics course in college prior to this class.

- Eighty-nine percent of the students had their own computer and 77 percent had their own printer.
- Thirty-eight percent of the students lived on campus.

Table 3 documents some of the interesting patterns in homework initiation drawn from the 272 assignments with date stamps that were submitted by the forty-seven students who provided the basic demographic and academic information.

Table 3
Patterns of Homework Initiation

Number of Students	47
Number of Assignments with date stamp	272
Correlation of degree of academic procrastination and score on activity	0.22751
Always Started Due Day (completing at least half the assignments)	0
Always Started Day Before Due Date (completing at least half the assignments)	6
Always Started Two or More Days Before Due Date (completing at least half the assignments)	7
Less academic procrastination over semester	3
More academic procrastination over semester	18
Same degree of academic procrastination over semester	12
Always Started Due Day for high scorers	0
Always Started Day Before Due Date for high scorers	0
Always Started Two or More Days Before Due Date for high scorers	2
Less academic procrastination over semester for high scorers	0
More academic procrastination over semester for high scorers	3

The percentage correct on each assignment was correlated with the degree of academic procrastination. The assignments were not extremely difficult or time consuming so, as seen in Table 3, the correlation between the percent correct on each assignment and the degree of academic procrastination was low.

Looking at the thirty-three students who had completed at least half of all the homework assignments with date stamps, several interesting patterns emerged. None of the thirty-three students always initiated the assignment on the day it was due. Six students always started on the day before the due date and seven students always started two or more days before the due date. Thus only thirteen students had a consistent pattern of initiating homework. For the other twenty students, the pattern of initiating homework varied during the course of the academic term.

Three of the students demonstrated less academic procrastination as the academic term progressed (as measured by the average procrastination for the first half of the assignments compared to the average for the last half of the assignments for students completing at least half the assignments). Eighteen of the students exhibited more academic procrastination over the academic term while twelve students showed the same degree of academic procrastination during the first and second halves of the academic term. In general, students tended to procrastinate more as the term went on.

There were five students who scored consistently well on the exercises during the academic term (at least 80 percent of the assignments scored at 100 percent correct). Of this group, none of the students started the homework on the day of the assignment. On the other hand, two of the other high scorers on the homework started each assignment two or more days before it was due. For the same five high scorers, none of the students exhibited less academic procrastination as the academic term went along while three students exhibited more procrastination over the term.

Regression Results

The regression results were based on the homework initiated by the thirty-five students who provided the more complete set of academic and demographic data solicited in the survey. For each student who provided a more complete set of data, each individual homework assignment submitted with a date stamp provided one observation. Thus, if one student with the complete set of data submitted seven homework assignments with a date stamp, this yielded seven observations. The degree of academic procrastination ("0" = Day of; "1" = Day Before; and "2" = Two or more) was regressed against the complete list of demographic and academic characteristics of the individual student.

As seen in Table 2, 205 specific observations (individual assignments with a date stamp submitted by the thirty-five students who provided complete information) in the *Principles of Macroeconomics* course were included in the regression analysis.

For each assignment, the degree of academic procrastination was regressed against various academic, demographic, and personal characteristics. In the regression analysis, CLASS was decomposed into SENIOR (1 = senior standing, 0 = otherwise), JUNIOR (1 = junior standing, 0 = otherwise), and SOPH (1 = sophomore standing, 0 = otherwise) with first year students' coefficient implicitly equaling zero. Thus the other class standings were compared to the degree of procrastination exhibited by first year student. Since the degree of timeliness ranges from a "0" for work begun the day the assignment was due to a "2" for work begun two or more days before the due date, negative coefficients indicate variables that reduced timeliness (added to academic procrastination).

Table 4 contains the regression results for this *Principles of Macroeconomics* course. Looking at the determinants that were statistically significantly different from zero (defined as a 0.05 Type I error level or lower), the regression results indicated that:

- Those with a higher GPA or a higher ACT score procrastinated less.
- Older students procrastinated less.
- Students with sophomore and junior standing procrastinated more than those with first year standing.
- Students who took a college-level economics course prior to enrolling in *Principles of Macroeconomics* procrastinated less.

It is also important to note in Table 4 which independent variables did not have a statistically significant impact on the degree of academic procrastination. The following variables that were statistically insignificant in their impact on procrastination: academic major, degree sought, senior standing, gender, hours worked during the week, hours worked on weekends, academic load, completion of a high school economics class, having one's own computer and printer, and students' housing situation.

Table 4
Regression Results

Variable	M	SE
GPA	.264**	.158
ACT	.040***	.017
AGE	.246***	.084
NBUSM	.070	.137
NBSD	-.091	.142
SOPH	-.257**	.130
JUNIOR	-.607***	.255
SENIOR	-1.046*	.666
MALE	-.184 *	.135
HWWD	.002	.006
HWWE	.011	.009
LOAD	.026	.023
HSE	.105	.119
CE	.462***	.151
OC	-.035	.293
OP	-.028	.242
HOUSING	.062	.114
CONSTANT	-5.46***	1.709
R square	.276	

* = significantly different from zero at the 0.10 Type I error level; ** = significantly different from zero at the 0.05 Type I error level; and *** = significantly different from zero at the 0.01 Type I error level.

These regression results shed more light on what is traditionally found in the literature. Previous studies provided ambiguous results regarding academic skills and achievement with some studies finding better students procrastinate more while other studies found poorer student engaging in more procrastination. In this study, better students (whether measured by GPA in college or ACT score prior to college) procrastinated less.

The class standing of the students provided an interesting result. Students with sophomore or junior class standing exhibited significantly more academic procrastination than first year students. Seniors also exhibited more procrastination than first year students, although the coefficient was significant only at the 0.10 level. One might speculate that characteristics of the sophomore, junior, and senior years lent themselves to procrastination. Perhaps more experienced and practiced students had learned the process of just-in-time completion of their academic work and were engaged in applying that process. Those students also might schedule extra-curricular and co-curricular activities more heavily, facilitating academic procrastination. First-year students, relatively new to the pace of academic demands, may be more likely to start school work sooner and to minimize participation in extra-curricular and co-curricular activities.

Not all competing demands on students' time provided significant impacts on procrastination. While one might expect the competing responsibilities of employment and schooling to significantly impact the timeliness with which students initiated their homework,

the number of hours worked by students as well as their academic loads had no significant influence on the degree of procrastination

The standard literature on the impact of the age of the student on procrastination also provides conflicting conclusions. In this study, older students procrastinated less. Perhaps these students had more family and job responsibilities leading to more organized, timely, and motivated academic work.

For the students in this study, previous enrollment in a college level economics course reduced the tendency to procrastinate. Previous experience in economics might give students a deeper understanding of the pedagogy and rigor of economics, encouraging them to initiate their homework in a more timely fashion.

In some ways, the more interesting findings were the variables that did not significantly impact the degree of student procrastination. The major and degree sought by the students had no significant impact on procrastination. Having a non-business major did not significantly affect procrastination. Seeking a Bachelor of Arts (a non-business degree) had no significant effect on procrastination. Given that this general education class has a majority of first year students and sophomores, the commitment to a particular major or degree may not be as strong for these students as for juniors or seniors. This lack of commitment may encourage procrastination. One might also imagine that a stronger commitment to a more technical or rigorous major or degree would affect the student's procrastination, yet it did not.

While the literature provides mixed results for the impact of gender on procrastination with either no impact of gender or females procrastinating less, this study suggests (coefficient significant at the 0.10 level) that women procrastinate less than men.

Findings

Based on the results above, a preliminary picture of academic procrastination in this course at my institution emerged:

1. Most of the students did not have a consistent pattern of homework initiation. Rarely did a student start her or his homework at the same point in the homework cycle during the entire academic term. Sometimes a student initiated an online assignment very early in the homework cycle and other times at the last minute. This may represent a rational response by the student to other academic or extra-curricular responsibilities. It certainly makes sense to postpone starting on a five-point homework assignment in order to spend time studying for a 100-point midterm examination in another subject.
2. Academic procrastination generally got worse as the academic term progressed. For most students, the pattern of homework initiation got closer to the due date as the term wore on. This illustrated a kind of "New Year's Resolution" mentality in which the students started the academic term resolved to initiate their homework in a timely manner only to see this resolution fade over the term as assignments increased and dedication waned.
3. Weekends were "homework-free" zones. An analysis of the overall submission pattern indicated that homework assigned on a Friday and due the following Monday had the greatest degree of academic procrastination. The most typical pattern was for students to get the assignment on Friday and then initiate the assignment on Monday when the work was due. Since hours of employment on the weekends was insignificant, the amount that students worked on the weekend did not affect their

degree of academic procrastination. Whether they worked a little or a lot on the weekend, they did not initiate homework on Saturday or Sunday. This suggests that students believe that doing homework on weekends is not required to succeed academically.

4. As one might expect, students who were weaker academically (whether measured by GPA or ACT) tended to procrastinate more. The literature previously cited often found that such students used procrastination as an excuse for poor academic performance, as a built-in expiation for their academic problems, and a self-fulfilling prophecy.
5. Older students tended to procrastinate less. This result supports the frequent anecdotal observations by many faculty members that students of non-traditional college age are often highly motivated to succeed in their academic programs. Older students typically have more family obligations that may encourage more efficient time management techniques.
6. Sophomore and junior class standing had significant impacts on the likelihood of academic procrastination, while the impact of senior standing was slightly less significant. Perhaps these students were in the rarified region where they had found the study habits that work most efficiently for them (which included a substantial degree of academic procrastination). Similarly, these students may have found that their course work in their major took precedence over this introductory general education course and so tended to procrastinate more in this lower level course.
7. For instructors, there is little to be done in course design (other than not assigning homework over the weekend) that can reduce the tendency of students to procrastinate. Interestingly, there also seems to be little that students can do to reduce procrastination. The determinants under their control such as major, degree, hours worked, academic load, owning their own computer and/or printer, or housing situation did not significantly affect the timeliness of their homework initiation. Determinants that do significantly affect procrastination such as academic ability, sophomore, junior, or senior standing, and age are not easily manipulated by students. The one variable under students' control that may reduce procrastination is previous enrollment in a college level economics course.

Conclusion

This paper presents an analysis relating the degree of academic procrastination to a variety of student academic and demographic characteristics. The results are based on a more objective measure of academic procrastination than typical studies in the literature that rely on self-identified or self-reported academic procrastination. The results also shed light on some of the conflicting effects of student demographics reported in the literature.

This study finds that most student-specific academic and demographic characteristics do not significantly affect procrastination and those that do affect it are largely beyond the student's control. Consequently, one is left with the conclusion that a tendency toward procrastination is more a psychological phenomenon that students must understand and address on their own rather than a condition generated by characteristics that can be manipulated by instructors. Professors that wish to reduce procrastination should, it seems, focus their attention on the psychological causes mentioned in the literature (most importantly, fear of failure, perfectionism, and self-handicapping) and ameliorate student concerns in these areas to reduce procrastination.

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