

Measuring inequalities in higher education (Very Preliminary and Incomplete)

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Abstract

We explore the costs that work imposes upon full-time students who work one or more jobs concomitantly with their academic schedule. We offer a comprehensive measure this concurrent work imposes upon student's performance in terms of overall outcome, GPA and the frequency in their change in major, e.g. switching to less arduous majors in response to external stresses imposed by their employment. This study includes constraints such as "on-campus" vs "out of campus" employment, travel time to and from work, etc. Additional stresses are also considered, such as the presence of direct supervision at work, which can contribute to the student's overall anxiety. The number of hours students choose to work are also modeled on these constraints.

1 Introduction

The relationship between college education and work has been extensively studied in the literature. Interest in the impact of employment during college is growing because of the rising costs of attending college and a significant increase in student employment (Ehrenberg & Sherman, 1987; Horn & Malizio, 1998; NCES, 1994). As suggested by Riggert, Boyle, Petrosko, Ash, and Rude-Parkins (2006), colleges and universities can no longer assume that the majority of students will be able to give their full-time attention to academic studies. On the one hand, working during college could be viewed as a way to achieve independence from their family, to develop communications, early knowledge about the 'labour market world' and to be socialized to job-related values (Davies, 1999; Stephenson, 1982). However, on the other hand, working during university studies may negatively affect academic results, increasing the risk of dropping out, having a delayed graduation or achieving lower grades.

Empirical research has reached mixed and contradictory results so far, and most reviews of the literature have not been able to identify a clear pattern regarding the impact of student employment on academic outcomes (Lyons, Krachenberg, & Henke, 1986; Riggert et al., 2006). Some studies conclude that working during college is not detrimental to various educational outcomes, while others suggest the opposite. For example, several studies find no significant effect of student employment on grades among American students (Canabal, 1998; Gleason, 1993), while other studies find a negative effect in the United States (Astin, 1993; Furr & Elling, 2000; Wenz & Yu, 2010), the United Kingdom (Callender, 2008; Humphrey, 2006) and Northern Ireland (McVicar & McKee, 2002).

If most studies focus on how the amount of time spent at work, much less focus is given to the many constraints attached to working and their consequences on educational outcomes. In this paper, we explore the effects that work imposes upon students who work one or more jobs concomitantly with their academic schedule. We offer a comprehensive measure this concurrent work imposes upon student's performance in terms of overall outcome, GPA and the frequency in their change in major, e.g. switching to less arduous majors in response to external stresses imposed by their employment. This study includes constraints such as "on-campus" vs "out of campus" employment, travel time to and from work, etc. Additional stresses are also considered, such as the presence of direct supervision at work, which can contribute to the student's overall anxiety. The number of hours students choose to work are also modeled on these constraints.

Describing the profile of students who typically struggle from the dual constraints imposed by their academic and external workloads will allow policy-makers to better identify and support this important segment of the student body. The subsequent awareness of the performance issues associated with the rising number of students who are increasingly working more hours and/or jobs to compensate for increasing academic costs will aid in the proper allocation/reallocation of funding and non-monetary assistance for this vulnerable student cohort.

2 Data:

The data for this study comes from two sources. We administered a survey to 790 undergraduate sophomores, juniors, and seniors at UMBC, asking about their intrinsic motivation and their on- and off-campus work experiences for the Fall 2016 and Spring 2016 semesters. That data was then matched to an institutional dataset from IRADS at UMBC containing academic and financial aid data. Key variables include the time each individual travels to and from work, the amount of time the individual can study during work, the individuals' level of intrinsic motivation, level of extracurricular involvement on- and off-campus, GPA, choice of major, and student loan amount.

3 The Model

3.1 Students' GPA

We assume student i 's GPA at the end of semester t , $G_{i,t}$ is a function of his GPA at the end of semester $t - 1$, average weekly amount of time worked $W_{i,t}$ in semester t and semester $t - 1$, the average weekly amount of traveling time to and from work $T_{i,t}^W$ during semester t and semester $t - 1$, the average weekly amount of time spent studying during work hours in semester t (when possible), $S_{i,t}^W$, the quality of the student's high school attended Q^{HS} as well as a measure of difficulty/quality of the major Q_i^M (we assume that both the quality of high school attended and the quality of the major are constant over time) and his academic ability or motivation A_i and individual observable characteristics Z_i such as age, marital status, or cultural background.

$$\begin{aligned} G_{i,t} &= f(G_{i,t-1}, W_{i,t}, T_{i,t}^W, T_{i,t-1}^W, S_{i,t}^W, Q_i^{HS}, Q_i^M, Z_i, A_i) & (1) \\ &= \beta_0 + \beta_1 G_{i,t-1} + \beta_{21} W_{i,t} + \beta_{22} W_{i,t-1} + \beta_{31} T_{i,t}^W \\ &\quad + \beta_{32} T_{i,t-1}^W + \beta_4 S_{i,t}^W + \beta_5 Q_i^{HS} + \beta_6 Q_i^M + \beta_7 Z_i + A_i + \epsilon_{i,t} & (2) \end{aligned}$$

3.2 Students number of hours worked

We further assume that the amount of work chosen in semester t , $W_{i,t}$, depends on the student's GPA at the end of semester $t - 1$, $G_{i,t-1}$, the student's academic ability, the amount of time traveling to work and the amount of time spent studying on the job, as well as the student's parent's income I_i^p , and the student's ability to establish social connections. This is measured by the number of friends on Facebook F_i^F or number of followers on Twitters TW_i^F as well as a macroeconomic variable representing the predicted amount of state subsidies during that semester \widehat{SB}_t . $l_{i,t}$ is the amount of student loans that student i holds.

$$W_{i,t} = g(G_{i,t-1}, W_{i,t-1}, T_{i,t}^W, S_{i,t}^W, \widehat{A}_i, I_i^p, F_i^F, TW_i^F, \widehat{SB}_t, Q_i^m, l_{i,t}) \quad (3)$$

We measure the difficulty of a major Q_t^m by an index equal to the number of students switching from major m divided by the number of total students in major m that semester:

$$Q_t^m = \frac{N_S^m}{N^m}$$

Academic ability is measured by analytical SC_i^a and writing scores SC_i^w :

$$A_i = \alpha_1 SC_i^a + \alpha_2 SC_i^w + u_i$$

3.3 Choice of Major

Suppose that each major m can be put into S groups (colleges) of similar category. Let m , denote a major $m \in M$. Let G_S denote the number of majors within group S . In our data, we observe _____ majors. We divide majors broadly into four groups $s = 1, 2, 3, 4$: engineering/technical sciences, life sciences, arts and humanities, and social sciences. Then the conditional probability of choosing major m given that group s is chosen is

$$P_t(y = m | y \in S, \mathbf{x}) = \frac{\exp(\rho_s^{-1} V_{i,m|s,t})}{\sum_{h \in S} \exp(\rho_s^{-1} V_{i,h|s,t})} \quad \text{for } i \in S \quad (4)$$

where $V_{i,m}$ is the indirect utility function associated with choosing major m , ρ_s is the dissimilarity parameter and ρ_s^{-1} is a normalizing factor, allowing the utilities across each group to be comparable.

$$V_{i,m|s,t} = f(G_{i,m,t-1}, A_i, Q_t^m, Q_t^s, W_{i,t}, S_{i,t}^W, o_{i,t})$$

where $G_{i,t-1}$ is the students' GPA in the fall 2016, A_i is the academic ability of student i , Q_t^m measures the difficulty of major m in which the student is enrolled, Q_t^s measures the difficulty of group s to which major m belongs, $W_{i,t}$ is the amount of time student n spends working, $T_{i,t}$ is the total amount of daily time spent travelling (work and home travelling), $S_{i,t}$ is the amount of time that student i can study on the job, and $o_{i,t}$ is the student i 's occupation.

4 Results (see Appendix)

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5 Appendix:

TABLE 1. Average Tuition and Fees and Room and Board in 2016 Dollars, 1976-77 to 2016-17, Selected Years					
	Tuition and Fees in 2016 Dollars			Tuition and Fees and Room and Board in 2016	
Academic Year	Nonprofit Four-Year	Public Four-Year	Public Two-Year	Nonprofit Four-Year	Public Four-Year
1976-77	\$10,680	\$2,600	\$1,190	\$16,760	\$8,160
1981-82	\$10,810	\$2,390	\$1,140	\$16,630	\$7,540
1986-87	\$14,630	\$3,110	\$1,450	\$21,650	\$8,900
1991-92	\$17,340	\$3,720	\$2,070	\$25,070	\$9,630
1996-97	\$19,920	\$4,560	\$2,250	\$28,140	\$10,950
2001-02	\$23,560	\$5,110	\$2,180	\$32,340	\$12,250
2006-07	\$26,380	\$6,860	\$2,680	\$36,060	\$15,180
2011-12	\$29,700	\$8,820	\$3,170	\$40,450	\$18,270
2016-17	\$33,480	\$9,650	\$3,520	\$45,370	\$20,090

SOURCES: The College Board, Annual Survey of Colleges; NCES, IPEDS data.

Table 1: Very preliminary results

GPA	0.339*** (0.045)
Combined work hours at job 1 and job 2	-0.002 (0.003)
composite motivation score	0.080*** (0.021)
Percent of students switching major	-0.713*** (0.258)
Work travel time	-0.000 (0.001)
Number of Facebook friends	-0.000 (0.000)
Number of Twitter followers	-0.000* (0.000)
Age	-0.005 (0.039)
Age squared	-0.000 (0.001)
Black	-0.408*** (0.091)
Hispanic	0.010 (0.130)
Female	0.137** (0.058)
Constant	2.037*** (0.598)
R-squared	
N	710

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$





