Full-Time Work and College Enrollment: The Roles of Scheduling Constraints and Online Education

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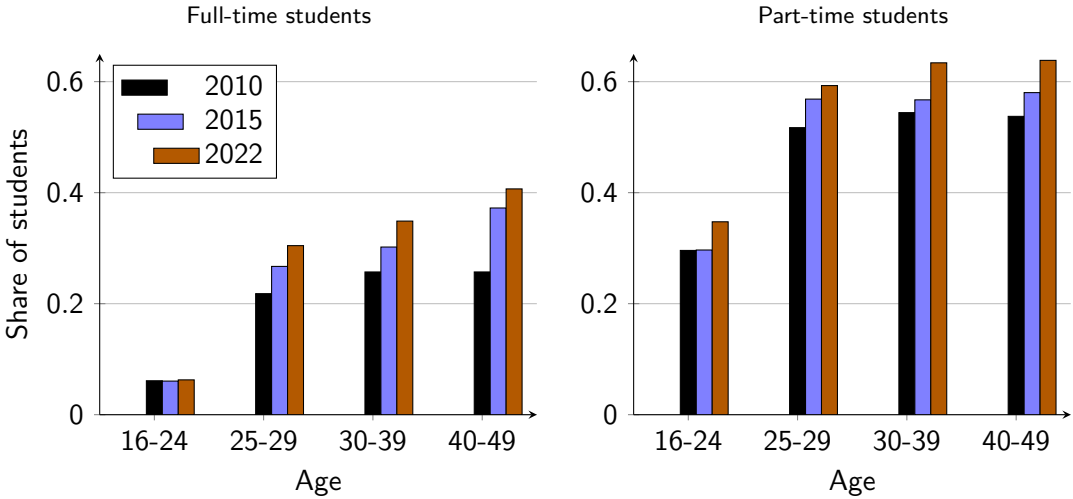
Full-Time Work and Postsecondary Enrollment

- 15% of full-time college students and 54% of part-time college students are 25 or older
  - About 20% of part-time students are age 25–29 and another ∼20% are 30–39
- Over half of undergraduate students over the age of 25 work full-time and this share has been increasing

Share of College Students Working Full-Time



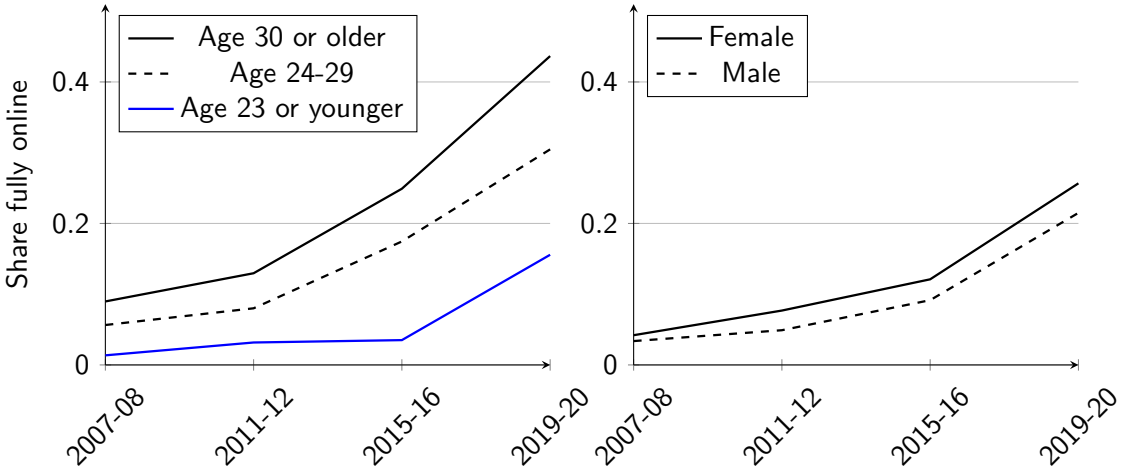
Research Questions

- Is the expansion of online program offerings lowering the opportunity cost of attending college while working full-time?
- Are there differences by gender, given women's generally higher demand for scheduling flexibility?

Related Literature

- Online programs expand access to higher education, especially for non-traditional students
  - Goodman, Melkers & Pallais (2019) [Online MS in Computer Science at GA Tech]
  - Barahona, Dobbin & Otero (2025) [Online sector expansion in Brazil]
- Online education offers flexibility and lowers the opportunity cost of working
  - Aucejo, Perry & Zafar (2024) [Uber drivers enrolled at ASU]

Undergraduate Online Program Enrollment by Age and Gender



Theoretical Framework

- Two-period model; workers choose hours h and schooling intensity s in period 1 ($h + s \leq 1$) and supply 1 unit of labor in period 2
- Period 1 wage equals w if employed full-time and $w(1-\delta)$ if employed part-time ($h < \overline{h}$)
- Period 2 wage is $w(1+s)$
- Workers incur disutility of work effort $\alpha_h^i h^2$ and disutility of schooling effort $\alpha_s^i s^2$
- With full-time work, there are also negative complementarities in the disutility of time spent working and on schooling activities: $\alpha_{hs}^i hs$

Worker Maximization Problem

- With part-time work in period 1:

$$\max_{h,s} w(1-\delta)h - \alpha_h^i h^2 - \alpha_s^i s^2 + w(1+s)$$

subject to $0 \leq h \leq \overline{h}$; $s \geq 0$; $h + s \leq 1$

- With full-time work in period 1:

$$\max_{h,s} wh - \alpha_h^i h^2 - \alpha_s^i s^2 - \alpha_{hs}^i hs + w(1+s)$$

subject to $h \geq \overline{h}$; $s \geq 0$; $h + s \leq 1$

- Choose full-time work if it yields higher utility

Assumptions

- 2 types of workers, L and H, with $\alpha_{hs}^{H} > \alpha_{hs}^{L}$
  - Women have higher demand for job flexibility (e.g. Goldin, 2014)
- Online education lowers α_{hs}^{i}, more so for type H workers
- Occupation is exogenous
  - w and δ are given

Model Predictions

- With online education, interior solutions for schooling become more likely for full-time workers, and the increase is more pronounced for workers of type H
- Workers who are also enrolled in school are more likely to choose full-time over part-time employment when online education is available. The increase in full-time employment is larger for workers of type H.

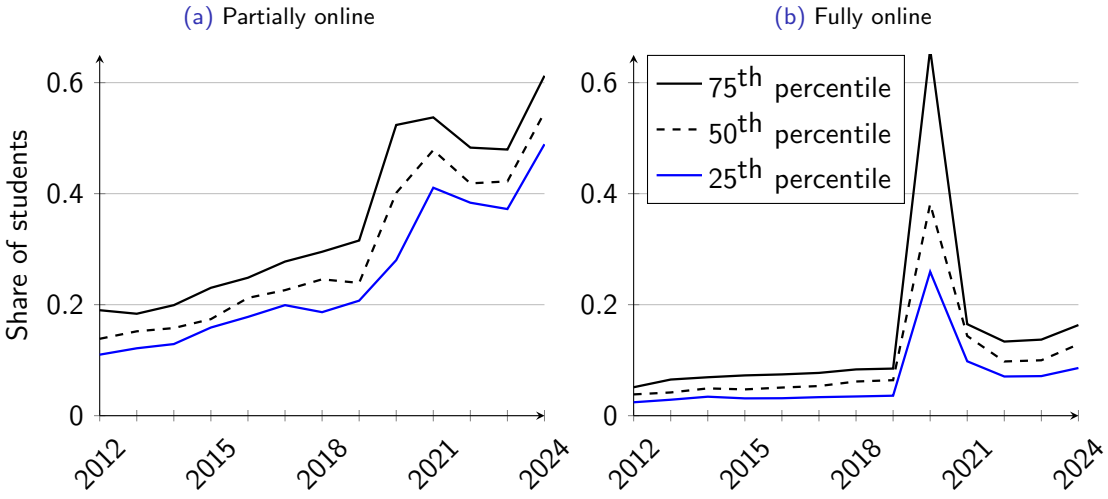
Data: Employment and College Enrollment

- American Community Survey, 2012–2024
  - Sample of employed high school completers
  - Full-time employment defined as 35 hours or more
- Four age groups:
  - 18–23
  - 24–29
  - 30–39
  - 40–49

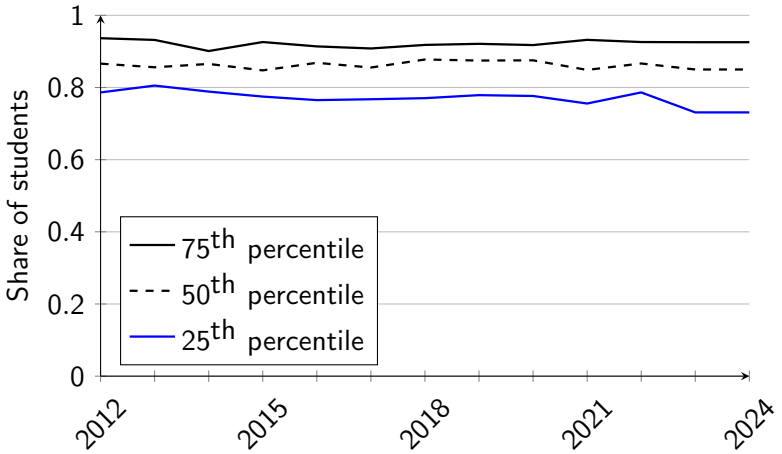
Data: Online Education Availability

- Integrated Postsecondary Education Data System (IPEDS), 2012–2024
  - All postsecondary institutions in the U.S.
  - Fall enrollment data files
  - Total number enrolled, number enrolled in at least one distance education class but not all distance, number enrolled exclusively in distance education classes
  - By level of student and by in-state status
- Focus on bachelor's degree-seeking students at 4-year public institutions
- Aggregate by state and year

Distribution across States in Online College Attendance



Share of Fully Online Students from Same State as Institution



Measure of Exposure to Online Education

- Use variations across states in online program penetration
- Share of bachelor's degree-seeking students at public institutions who are in-state and attending fully online

  $$\text{Online Exposure} = (\text{Share Exclusively Online}) \times (\text{Share of Online Students in Same State})$$

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- Potentially endogenous if online program growth is driven by overall growth of program offerings in fields with high labor demand (e.g. business, computer science, health)
- Use time-invariant 2019 value

College Enrollment Rates

- In a given occupation, how does the share of full-time workers who are attending college change when online education is more widely available?
  - Do women's enrollment rates increase more?

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- Estimate specifications at 4-digit occupation-gender-state-year level:

$$\text{ShareEnrolled}_{ogst} = \alpha_0(\text{Female}_g) + \alpha_1(\text{Female}_g \times \text{OnlineExposure}_s) + \eta_t + \gamma_s + \nu_o + \varepsilon_{ogst}$$

  - Estimated separately by FT/PT worker status and by age group
  - Weighted by number of workers in each cell

- Model predicts that $\alpha_1 > 0$ for FT workers

Exposure to Online Education and Undergraduate Enrollment Rates

	18-23	24-29	30-39	40-49
		Full-time workers		
Female × Online exposure	0.14**	0.051***	0.020**	0.024***
	(0.052)	(0.015)	(0.0087)	(0.0065)
Mean of dep. var.	0.20	0.068	0.035	0.021
St. dev.	0.18	0.076	0.043	0.031
		Part-time workers		
Female × Online exposure	0.050	-0.15	-0.019	-0.0084
	(0.065)	(0.12)	(0.033)	(0.016)
Mean of dep. var.	0.63	0.20	0.069	0.033
St. dev.	0.22	0.20	0.11	0.076

Exposure to Online Education and Full-Time Employment

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- Specifications at the worker level with gender-specific coefficients:

$$\begin{aligned} \text{FT}_{iost} = {} & \alpha_0^g(\text{SchoolEnrollment}_{it}) + \alpha_1^g(\text{OnlineExposure}_s) \\ & + \alpha_2^g(\text{SchoolEnrollment}_{it} \times \text{OnlineExposure}_s) \\ & + X_{it}'\beta^g + \eta_t + \gamma_s + \nu_o + \varepsilon_{iost} \end{aligned}$$

- Model predicts that $0 < \alpha_2^{Male} < \alpha_2^{Female}$

Exposure to Online Education and Full-Time Employment

	18-23	24-29	30-39	40-49
Enrolled in college	-0.38***	-0.17***	-0.063***	-0.032***
	(0.0092)	(0.012)	(0.0081)	(0.0042)
Female×Enrolled	0.042***	0.013	-0.020***	-0.016**
	(0.011)	(0.0096)	(0.0073)	(0.0065)
Online exposure × Enrolled	0.28***	0.22***	0.10**	0.031
	(0.056)	(0.050)	(0.041)	(0.036)
Female × Online exposure × Enrolled	-0.079	0.16***	0.14**	0.13*
	(0.088)	(0.054)	(0.069)	(0.067)

Exposure to Online Education and Hourly Wages

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- Does online program availability affect the wages of workers attending college?

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$$\begin{aligned}\text{Ln(Wage)}_{iost} = {} & \alpha_0^g(\text{SchoolEnrollment}_{it}) + \alpha_1^g(\text{OnlineExposure}_s) \\ & + \alpha_2^g(\text{SchoolEnrollment}_{it} \times \text{OnlineExposure}_s) \\ & + \delta^g \text{Ln(Hours)}_{it} + X_{it}'\beta^g + \eta_t + \gamma_s + \nu_o + \varepsilon_{iost}\end{aligned}$$

- No theoretical prediction without endogenous occupational sorting

Exposure to Online Education and Hourly Wages

	18-23	24-29	30-39	40-49
School enrollment	-0.090***	-0.080***	-0.058***	-0.045***
	(0.0070)	(0.0060)	(0.0064)	(0.0081)
Female×Enrolled	0.022***	0.048***	0.044***	0.021**
	(0.0060)	(0.0068)	(0.0076)	(0.0096)
Online exposure × Enrolled	0.072	0.24***	0.19***	0.067
	(0.057)	(0.047)	(0.066)	(0.079)
Female × Online exposure × Enrolled	0.10	-0.030	-0.017	0.18*
	(0.082)	(0.067)	(0.083)	(0.11)

Discussion

- Recent expansions of online postsecondary program offerings may be lowering the opportunity cost of college attendance while working full-time
- Use state variations in online education penetration at public four-year institutions
  - Most online undergraduate students at public institutions attend in-state
- Online program availability allows more people to pursue undergraduate degrees while working full-time and in higher-paying jobs
- Female workers benefit more from online program availability
- Important for institutions to provide high-quality online programs