Does Downloading PowerPoint Slides Before the Lecture Lead to Better Student Achievement?: Reply

Jennjou Chen and Tsui-Fang Lin

Abstract

This reply responds to a comment by Cannon (2011) that opens the debate on consistency of the effect of downloading PowerPoint slides before lectures on students' exam performance. Cannon (2011) points out potential endogeneity problems in Chen and Lin (2008) and attempts to explore the unconditional mean effect of downloading PowerPoint slides for the full sample. In this reply, we firstly argue that the estimates in our original article are consistent since the effect of interest is the "conditional" treatment effect but not the unconditional mean effect. We provide explanations for our rationale of estimating the "conditional" treatment effect. Secondly, we propose a modified downloading variable to replicate Cannon's analysis. Our results suggest that downloading PowerPoint slides before the exam does not produce a significant effect on absent students' exam performance which is different from the results in Cannon (2011). Our analysis does support Cannon's argument that students fixed effects are different across different attendance status.

JEL classification: A22, I21

1. Introduction

Edmund Cannon (2011) points out an endogeneity problem in Chen and Lin (2008), and opens the debate on consistency of the effect of downloading PowerPoint slides before lectures on students' exam performance. Cannon (2011) argues that an unobserved question-*j* specific determinant for student *i* may be correlated with download decision and attendance decision. Cannon (2011) proposes a test for endogeneity and takes into account clustered standard errors; the estimation results indicate that the OLS estimates are inconsistent.

2. Unconditional vs. Conditional Effects

We agree with Cannon (2011) that the endogeneity problem stemming from both attendance and download choices could lead to biased estimates. As pointed out, in the case of unobserved heterogeneity, identifying the average treatment effect is very difficult. However, what Chen and Lin (2008) aimed to identify was a conditional mean effect, i.e. not an unconditional mean effect. In Chen and Lin's paper, only attendees' data were used to analyse the lecture slides download effect (2008, pp. 10, 13 and 15). By making it conditional on attending lectures, to obtain consistent lecture slides estimates, our concern is whether a student's download decision is exogenous. Estimates of conditional treatment effects in Chen and Lin (2008) are consistent as long as endogeneity of students'

downloading PowerPoint slide choices is properly taken care of. A fixed effects model is used to solve part of the endogeneity problem of students' downloading decision (2008, p. 16).

Why did Chen and Lin (2008) not focus on estimation of the unconditional mean effect (i.e. average downloading lecture slides effect for all students regardless of their attendance records)? First, one of our major interests was to investigate whether or not downloading PowerPoint slides before lectures helps students learn and perform better in examinations. The channel through which downloading PowerPoint slides enhances students' learning is that printed lecture slides complement note taking and help students to preview lecture materials. These two effects mainly apply to students who choose to attend lectures. Second, our data is not generated by a random experiment, nor do we have proper instruments for attendance choice variable to estimate the unconditional mean effect properly. As recognised by Cannon (2011), the potential endogeneity problem of attendance choices makes it difficult to estimate the unconditional mean effect consistently. As a result, we focus our estimation on the conditional mean effect.

Cannon (2011) sheds light on the investigation of the unconditional mean effect of downloading PowerPoint slides on students' exam performance and attempts to estimate the effects of downloading PowerPoint slides for the full sample. We recognise that estimating the unconditional mean effect of instructor provided PowerPoint slides is also interesting and important since all students could potentially benefit from downloading the slides. The potential downloading benefits might be different for different groups of students. For instance, the benefit may depend on whether or not students attend lectures. The lecture slides could be downloaded by students before or after class meetings. For those who download slides and then attend a lecture, the benefit from printed slides is previewing class material, better note taking during the lecture, and using these slides as good references for exam preparation. Those who did not attend the lecture can use the downloaded slides only as a reference for exam preparation.

Estimation results from Cannon (Column B in Table 1) suggest that absent students benefit more than attendees from downloading PowerPoint slides. This strange OLS result may imply the existence of endogeneity of attendance choice. We agree with Cannon regarding the potential problem of engodenous attendance choice. However, it is worth noting that the variable of downloading PowerPoint slides may not be properly defined for the purpose of estimating lecture slides effects for students who choose not to attend lectures, and for the full sample. In Chen and Lin (2008) and Cannon (2011), the downloading variable is coded as 1 if a student downloaded lecture slides before the lecture was taught. And, it is coded as 0 if a student did not download slides before the lecture was taught. In order to properly measure the downloading effect on students' exam performance for absent students, and the full sample, we propose to redefine the downloading slides variable.

We use the same data source, and construct a new variable which measures whether or not a student downloaded lecture slides before the examination (not before the lecture) to estimate the lecture slides effect for absent students, and for the entire sample. The sample mean of this variable is 0.867. We estimate the same models as in Cannon (2011), using the modified downloading variable. In addition, two types of cluster designs are considered: by lecture and by chapter. Twelve lectures and nine chapters were covered during the sample semester. Estimation results with different clustering methods are similar. Here, we report results with clustered standard errors by chapter. Under the new definition of the download variable, none of the coefficients is statistically significantly different from 0. In this case, the downloading variable does not produce a significant effect on students' exam performance.

Also, we perform the same test as Cannon (2011) and obtain $F(8, 8) = 13.64$ with clustering and $F(81, 4757) = 10.13$ without clustering. The F test results suggest that the interaction of the lecture attendance variable and student fixed effects should be incorporated when estimating the downloading

effect for the entire sample. It also implies that student fixed effects are different across different attendance status. Therefore, to estimate the lecture slides effect for the full sample, we need to take into account the endogeneity bias from the attending decision.

3. Conclusion

It is important to assess the effectiveness of new information technology on college students' learning outcomes. Chen and Lin (2008) attempt to explore the lecture slides effect for attendees and find a nontrivial effect of downloading PowerPoint slides before the lecture on students' examination performance. Cannon (2011) has demonstrated that it is difficult to isolate the unconditional treatment effect given the complicated endogeneity nature associated with attendance and downloading decisions. We have explained the rationale of estimating the conditional treatment effect in Chen and Lin (2008) and argued that our fixed effects estimates have dealt with part of the endogeneity bias resulting from the downloading decision.

In addition, to properly estimate the lecture slides effect for absent students and the full sample, we employ a modified downloading variable to replicate Cannon's analysis. Our results suggest that downloading PowerPoint slides before the exam does not produce a significant impact on absent students' exam performance. Furthermore, our results support the argument that student fixed effects are different across different attendance status as demonstrated in Cannon (2011). As a result, to estimate the lecture slides effect for the full sample, one needs to take the potential endogeneity bias into account in order to estimate the unconditional treatment effect consistently.

Table 1: OLS estimates with new definition of download variable

	A	B	C
p_{ij}	0.0029 (0.0232) [0.0361]	-0.0126 (0.0405) [0.0351]	0.0340 (0.0336) [0.0339]
l_{ij}			0.0479 (0.0370) [0.0461]
$p_{ij}l_{ij}$			-0.0243 (0.0390) [0.0511]
Sample used	$l_{ij} = 1$	$l_{ij} = 0$	Whole sample
Sample size	3,675	1,331	5,006

Notes: OLS regression results include student and question fixed effects. White's heteroskedasticity-robust standard errors in parentheses; standard errors also robust to clustering in square brackets.

References

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Author Biography

Jennjou Chen received his Ph.D. in Economics from Cornell University, and he is currently an associate professor at National Chengchi University in Taiwan.

Tsui-Fang Lin received her Ph.D. in Consumer Economics from Cornell University, and she is currently an associate professor at National Taipei University in Taiwan.

Contact details

Jennjou Chen
Department of Economics
National Chengchi University
Wen Shan District
Taipei City, 11605
Taiwan

Tsui-Fang Lin
Department of Public Finance
National Taipei University
San Shia District
New Taipei City, 23741
Taiwan