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Does Tuition Fee Impact Student Effort in Higher Education? The Effect of Scholarship Provision

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Abstrak

Penelitian ini mengkaji pengaruh biaya kuliah terhadap upaya akademik mahasiswa Politeknik Caltex Riau (PCR) periode 2017-2022. Data sekunder dari sistem akademik PCR dianalisis menggunakan metode difference in difference (DID) dengan Stata 17. Hasil menunjukkan perbedaan signifikan dalam nilai mahasiswa setelah menerima beasiswa. Mahasiswa penerima beasiswa meningkatkan upaya akademik mereka, menjaga nilai, dan meraih prestasi lebih baik. Temuan ini relevan bagi kampus dan penyedia beasiswa dalam menentukan penerima dan waktu distribusi beasiswa.

Abstract

This study examines the impact of tuition fees on students' academic efforts at Politeknik Caltex Riau (PCR) from 2017 to 2022. Secondary data from PCR's academic system was analyzed using the difference-in-difference (DID) method with Stata 17. The results reveal significant differences in student grades after receiving scholarships. Scholarship recipients tend to improve their academic efforts, maintain grades, and achieve better academic performance. These findings are relevant for institutions and scholarship providers in determining recipients and distribution timing.

Introduction

What are the factors influencing the success of students' studies and academic achievements? This question constitutes a primary focus for Higher Education Institutions (HEIs). This is because the success rate of students' studies serves as a metric for the overall success of the HEIs (Alyahyan & Düştegör, 2020; Gaftandzhieva et al., 2022). Accreditation of study programs at the HEIs, for instance, heavily depends on the percentage of students graduating on time. Furthermore, the success rate of studies will impact the image of the study program for prospective students considering enrolment in the HEIs.

HEIs employ various strategies to enhance academic achievements and student success. In addition to curriculum development, the tuition fees imposed on students are considered a motivating factor towards achieving the institutional goals of improving academic outcomes. Differential treatment in the form of tuition fee increases or reductions can influence students' efforts in completing their academic processes. For example, tuition fees are reduced in the absence of financial assistance (scholarships) to students (Spradley, 2018). Students with scholarships, who are not required to pay the full tuition amount, may be fully or partially supported by their scholarships.

Scholarships are one of the sources of financing for students' tuition. Even in developed countries like Germany, students who rely on scholarships as a source of funding for their tuition make up approximately 14% (Bietenbeck et al., 2020). Typically, scholarship recipients come from poor backgrounds, although some scholarships are merit-based regardless of economic status. In general, scholarship recipients tend to exert more effort to attain good academic grades and complete their studies on time. This is because scholarships often stipulate a minimum semester Cumulative Grade Point Average (CGPA) that recipients must maintain. Failure to meet this requirement can result in the withdrawal of the scholarship. Consequently, students are incentivized to strive for academic excellence, especially given that failure to graduate on time may lead to the discontinuation of their scholarships, prompting them to make extra efforts to ensure timely completion without incurring additional costs.

Several recent studies have examined the potential impact of tuition fees on academic performance and student success. However, the findings have not consistently shown a significant influence of tuition fees on students' academic achievements. For instance, a study conducted by (Fricke, 2018) at St. Gallen State University in Switzerland investigated the effect of tuition fee increases on students' financial situations and academic achievements. The results indicated that tuition fees had an insignificant effect on timely graduation, earned credits, and overall grades. Furthermore, (Bunce et al., 2017) demonstrated that when students perceive themselves as customers due to paying tuition fees, it correlates with lower academic achievements. Similar findings were reported by (Prka, 2001), where tuition fees showed no significant impact on academic performance. Nevertheless, there are studies suggesting that tuition fees do influence student success, such as research by (Beneito et al., 2018; Bietenbeck et al., 2020; Romlah et al., 2023) found that the absence of education fees had an almost 50% effect on improving learning quality.

In contrast, many other studies have focused on examining the impact of tuition fees or changes in tuition fee strategies on student enrollment (Bell, 2021; Suttle, 1983; Vortisch, 2023). The existing gap in previous research serves as the motivation for the current study. Moreover, this research will concentrate on the case of Politeknik Caltex Riau (PCR), a private polytechnic in Indonesia ranked among the top five in terms of student population. PCR adopts a singular tuition fee payment system with limited variations.

Additionally, this study will specifically investigate the impact of post-enrollment scholarships on students' academic efforts. This aims to discern

whether scholarships, acting as tuition fee reducers, have a discernible effect on students' academic commitment. The results of this research are expected to contribute valuable insights to policymakers, particularly those involved in scholarship provision, whether from the government or private sectors.

Literature Review

Resource Consumption Accounting (RCA) is an advanced and contemporary approach to cost assessment and allocation, which has been utilized in European and American countries (Alkhafaji et al., n.d.). Various studies have been conducted on RCA, including research by Wang et al., (2009) titled "Study on the Application of RCA in College Education Cost Accounting," which discusses the application of RCA in higher education institutions and the challenges associated with its implementation. However, this study indicates that RCA remains applicable within higher education settings.

Furthermore, Wang et al., (2009) explains that RCA can provide valuable information to various levels of management within academic institutions, and it offers additional insights into non-value-adding costs, allowing institutions to reduce such costs and avoid wastefulness. RCA is one of the management accounting methods that can complement Activity-Based Costing (ABC), which is generally difficult to implement widely in companies (Tse & Gong, 2009).

1. RCA aligns with decision-making principles aimed at optimizing company operations. The following are some key characteristics of RCA (White, 2009).

2. RCA clearly illustrates the relationship between resources and their associated costs.
3. RCA handles fluctuations in the output of a company's products or services without distorting cost allocation.
4. RCA provides direct insights into resource capacity management, beyond mere estimates and calculations.
5. The RCA model can be easily adapted depending on the complexity of the processes involved.
6. Cost behavior can be clearly modeled within RCA, including fixed and variable/proportional costs, as well as changes in cost nature, such as from variable to fixed costs. This serves as a bridge between operational processes and decision-making, offering a clear understanding of which parts are responsible for costs and resource utilization.
7. RCA readily provides multilevel and multidimensional information within an organization, such as about products/services, customers, etc.

The application of RCA has been employed to deliver more accurate product cost assessments across various companies. Previous research conducted on a five-star hotel in Turkey illustrates this. The financial services sector, such as banking, can benefit from RCA implementation. Banks can identify idle capacity that can be maximized to achieve cost savings and reduce the prices of products/services offered to customers (Yaqoub & Fadhil, 2020). This research demonstrates that RCA can assist hotel managers in understanding costs per customer group and aid in investment decision-making (Paksoy, 2021). RCA can also support manufacturing companies in determining resources, resource groupings, and activities, as well as in accurately separating fixed and variable costs from overhead costs (Okutmus, 2015).

RCA application also aids in identifying and eliminating unused capacity costs, as evidenced by a case study in an Iraqi textile company (Kbelah et al., 2019). Moreover, RCA's application not only assists companies in analyzing costs to identify unused capacity, but this analysis can also facilitate customer profitability analysis by determining the profit or loss associated with each customer (Alkhafaji et al., n.d.). However, no studies have yet been found on the application of RCA in higher education institutions. Nevertheless, (Wang et al., 2009; Yijuan et al., 2017) has formulated several steps for implementing

RCA in higher education institutions as follows:

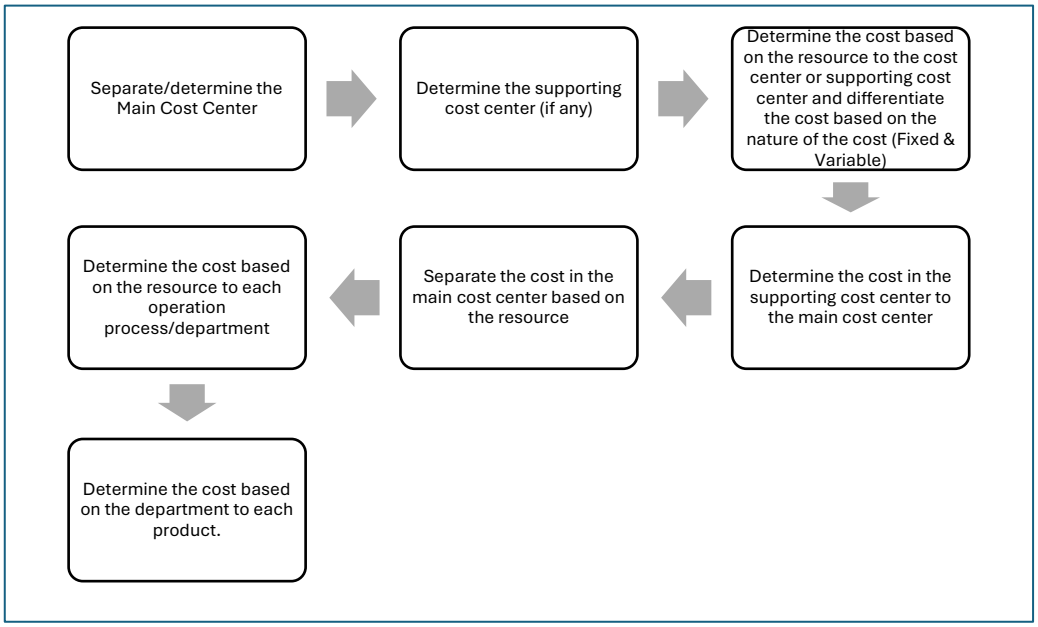


Figure 1. RCA Implementation Steps in Higher Education

Method

This study adopts a qualitative research approach, focusing on a singular case study conducted at Politeknik Caltex Riau (PCR). The investigation is centered around the academic records of students enrolled between the years 2017 and 2022.

The data collection process encompasses comprehensive information, including the students' high school origins, entry pathways to PCR, tuition payment models (specifically tuition fees which know as *Sumbangan Pengembangan Pendidikan – SPP in Indonesia*), as well as demographic data such as age and gender. Within the context of this research, the term "tuition fees" encompasses a spectrum of payments made by students to the institution, comprising SPP, Institutional Development Contribution (SPI), Matriculation fees, CO (Contribution Obligation), supplementary practicum fees, and graduation fees.

Data is sourced from the academic system, supplemented by pertinent information obtained from the Finance and Student Affairs Departments. The data collection methodology involves liaising with relevant department heads, specifically those in Academic Affairs, Student Affairs, and Finance. Unstructured interviews and documentation techniques are employed to systematically acquire all requisite data.

Table 1. Research data and sources of data

Departement	Data type
BAAK	Students profile Student grade per Semester
Keuangan	Tuition fee payment per student
Kemahasiswaan	Scholarship data per student

The data analysis seeks to examine whether students with varying tuition fee arrangements, specifically those receiving scholarships, exhibit different levels of effort in terms of academic performance and overall success in their studies. This study focuses on students who are recipients of government-sponsored achievement scholarships awarded after the third semester. Other forms of scholarships are excluded from the sample analysis, as these are typically granted at the commencement of a student's enrollment in the Higher Education Institution, making it challenging to observe changes in students' academic performance before and after receiving the scholarship.

To assess the impact of different tuition fee arrangements on academic outcomes, the analysis employs the Difference-in-Differences (DiD) method. This method is utilized to discern significant differences between students in the treatment group (those receiving scholarships) and the control group (those not receiving scholarships) due to variations in tuition fee payments. CGPA is utilized as a metric to measure the academic effort exerted by students. Significant differences will indicate the influence of disparate tuition fee arrangements on students' academic outcomes, including CGPA, course completion rates, and the duration of their studies (academic success). Stata software is utilized for conducting the DiD analysis due to its specialized commands tailored for such assessments.

Result and Discussion

The data analysis process is divided into two primary stages. Firstly, a descriptive analysis is conducted to portray the research data concerning students' academic success as indicated by the Academic Performance Index (IPK). Secondly, a descriptive analysis of student graduation data over time is carried out based on the respective student cohorts. Student data descriptions are categorized according to data groups to illustrate the assumptions underlying the Difference in Differences (DiD) approach concerning data trends within student cohorts.

In the DiD analysis, students are classified into two main groups: the treatment group, comprising students who receive treatment in the form of scholarships, and students undertaking a Contribution Obligation (CO). The control group consists of students who do not receive any treatment, either in the form of scholarships or CO. The data for these student groups will be examined based on IPK and graduation outcomes, which serve as the output or dependent variables (Y) in the analysis. This systematic categorization allows for a comprehensive understanding of the impact of treatment on students' academic performance and graduation rates over time, contributing to the robustness of the Difference in Differences analysis.

The analysis entails testing processed data using Stata software to ascertain the significance of the DiD. Before conducting the DiD test, an assumption test is performed to examine the trend between the Cumulative Grade Point Averages (CGPA) of students receiving scholarships and those not receiving scholarships. The trend analysis spans from the first semester to the third semester or before the disbursement of scholarships. To eliminate bias, data for inactive students or those with a CGPA of 0 or missing values in any semester are excluded from the processed data.

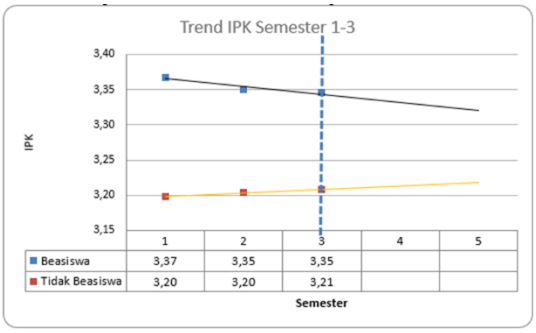


Figure 2. Student Cummulative Index trend before scholarship
Source: Data processing by researcher (2023)

The data is then segregated into two groups: students receiving scholarships and those not receiving scholarships. Although PCR offers various scholarships, only those granted after a student actively begins their studies (in this case, the Provincial Government of Riau Achievement Scholarship, awarded after the third semester) are considered for this analysis. Scholarships awarded at the commencement of a student's enrollment are excluded from the scholarship data, as their effects on CGPA over time cannot be tested. This approach aims to discern differences in CGPA before and after the receipt of scholarships.

From the trend graph in Figure 2, it is evident that the Cumulative Grade Point Averages (CGPA) of students receiving scholarships exhibit a slightly flat trend with a tendency to decline. Conversely, for

students not receiving scholarships, there is a flat trend with an upward tendency. However, in general, it can be said that both groups demonstrate a nearly identical linear trend. The testing in this study aims to reveal significant differences within the scholarship group after the disbursement of scholarships. The Difference in Differences (DiD) testing is conducted using Stata 17 software. First, we examine the data description in Figure 3, where a total of 4 variables are included:

Variable name	Storage type	Display format	Value label	Variable label
id	int	%8.0g		ID
t	byte	%8.0g		0=Sebelum Beasiswa; 1=Setelah Beasiswa
treatment	byte	%8.0g		0=Bukan Beasiswa; 1=Beasiswa
ipk	float	%8.0g		Output=IPK

0=Bukan Beasiswa; 1=Beasiswa	Freq.	Percent	Cum.
0	2,162	80.16	80.16
1	535	19.84	100.00
Total	2,697	100.00	

Figure 3. Descriptive analysis
Source: Data processing by STATA 17 (2023)

The processed dataset comprises 2,697 entries, with 2,162 students forming the control group—those without scholarships. Meanwhile, the treatment group, consisting of students who received scholarships, comprises 535 individuals. Despite the unequal distribution between the control and treatment groups, this discrepancy is deemed inconsequential as the data utilized pertains to Cumulative Grade Point Averages (CGPA). The DiD testing is conducted to examine whether there are significant differences in CGPA between the group receiving scholarships and the group not receiving scholarships, while considering the temporal factor before and after the scholarships are awarded. The DiD test results are presented in Figure 4.

The DiD test outcomes reveal significant differences, as indicated by a p-value of < 0.05. The DiD value between the non-scholarship (control) and scholarship (treated) groups is -0.287. Although the value is statistically significant, the negative figure suggests a smaller increase in CGPA for scholarship recipients after receiving the scholarship compared to the control group. However, in the DiD test, the negative result does not alter the conclusion. This implies that the provision of scholarships still has a significant effect in enhancing students' learning efforts.

Upon closer inspection of these results, it is indicative that scholarships enhance students' learning efforts, albeit with a lower increment compared to the group without scholarships. This may be attributed to the initial status of these students who entered higher education without financial constraints. Consequently, after receiving scholarships, the scholarship income is perceived merely as supplemental income rather than a primary motivator for maximizing the learning process. It is possible that tuition fees may not significantly influence students' satisfaction levels with the academic processes of their campus (Da et al., 2022). Additionally, factors related to scholarship management, such as the accuracy of the selection process, socialization, and monitoring processes, need to be considered as effective elements in scholarship provision, as suggested by (Intan Aulia et al., 2022).

DIFFERENCE-IN-DIFFERENCES ESTIMATION RESULTS
Number of observations in the DIFF-IN-DIFF: 2697

	Before	After	
Control:	1266	896	2162
Treated:	102	433	535
	1368	1329	

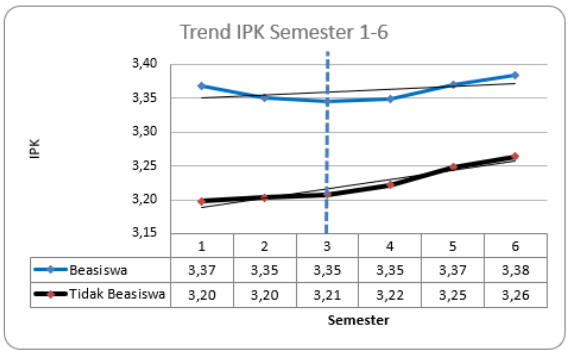
Outcome var.	ipk	S. Err.	|t|	P>|t|
Before				
Control	3.180			
Treated	3.519			
Diff (T-C)	0.339	0.054	6.24	0.000***
After				
Control	3.402			
Treated	3.453			
Diff (T-C)	0.051	0.031	1.66	0.096*
Diff-in-Diff	-0.287	0.062	4.60	0.000***

R-square: 0.05
* Means and Standard Errors are estimated by linear regression
**Inference: *** p<0.01; ** p<0.05; * p<0.1

Figure 4. DiD test result
Source: Data processing by researchers (2023)

Furthermore, scholarship recipients are students who consistently maintain grades above the minimum scholarship eligibility criteria (with a notably high average CGPA). Consequently, they do not express significant concern if there is a decrease in their grades if it does not fall below the minimal requirement of a CGPA of 3. Therefore, any increase that occurs

may not be perceived as particularly significant. In contrast, students in the control group exhibit a more varied range of CGPA values before the scholarship is awarded, with an average below 3.1. Consequently, when an increase occurs, it is perceived as more substantial compared to the treatment group.



	1	2	3	4	5	6
Beasiswa	3,37	3,35	3,35	3,35	3,37	3,38
Tidak Beasiswa	3,20	3,20	3,21	3,22	3,25	3,26

Figure 5. Student Cummulative Index before and after scholarship
Source: Data processing by researchers (2023)

This study also indicates that providing scholarships midway through the academic journey has a relatively insignificant effect on improving overall student academic achievement. While these findings cannot be generalized due to the study being conducted at a single institution, it suggests that scholarship providers could potentially maximize their impact by awarding scholarships at the outset of students' enrollment in higher education. Additionally, the results of this study suggest that scholarships should ideally be directed toward individuals in genuine need of financial assistance. It is evident that students from low-income families do not consistently receive better financial aid (Czarnecki et al., 2021). While this specific testing was not conducted in the current study, for future research, the financial capacity of the scholarship recipients' parents could be considered as two separate variables. For instance, distinguishing between students with financial means and those without, with the acknowledgment that there is a need for a theoretical definition in determining financial capacity. In the context of this study, it is important to note that the treatment group comprises students who receive merit-based scholarships that do not require a demonstration of financial need from their parents.

Conclusion

This study aims to investigate whether the variation in tuition fees paid by students influences their effort in completing their academic processes. The examination is conducted by analyzing the Cumulative Grade Point Averages (CGPA) of students over six semesters. Students are divided into two groups: those receiving scholarships (treatment) and those not receiving scholarships (control). Changes in CGPA are also observed by considering the time effect, specifically the CGPA three semesters before the scholarship and three semesters after the scholarship. The CGPA of both groups is compared before and after the scholarship. The Difference in Differences (DiD) test indicates the significance of the change in CGPA for the treatment group. This implies that the provision of scholarships has a positive effect on enhancing students' effort in their academic processes. Although this research also reveals other interesting findings, such as the increase observed in the control group, which may be attributed to unseen factors not explored in this study. Future research could potentially explore the impact of parents' income levels on scholarship recipients.

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