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Measuring the Lost Income of the University

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Abstract

An expected or budgeted decrease in revenue is referred to as lost income. For universities to remain financially sustainable and to guarantee the ongoing provision of high-quality education and research, it is imperative that they have a thorough understanding of the causes and effects of lost income. The main reason for lost income, particularly for universities, is the decline in student enrollment and the state of the economy. In this study, we propose a methodology to measure the lost income. The methodology examines the financial report of the National University of Mongolia (NUM) from 2016 to 2022. In the case of NUM, the percentage of the lost income is 8 percent.

Keywords

Lost Income, ROE, Change of Income

1. Introduction

The new era of technological and innovation development has created high expectations for production and consumption. A system based on the collection, processing, and use of large amounts of information has led to education reform, and the needs and requirements of higher education have expanded rapidly. As a result, a lot of capital has been invested in expanding the university's infrastructure and opening new campuses. Due to the sources of funding for the construction of the campus, there is a high risk of a large debt burden and a lack of funds to support the normal operation of the university (Mikes & Kaplan, 2015). Some universities have begun new construction with government support, but funding has stopped due to the COVID-19 pandemic (Wang et al., 2020). The COVID-19 pandemic has had a significant impact on university finances, with reduced enrollments, canceled events, and increased expenses for health and safety measures contributing to lost income (Aristovnik et al., 2020; Negash et al., 2021).

The consequences of lost income for universities can be severe. Reduced funding and budget constraints may result in fewer resources for research and instruction, as well as job losses and program closures. Additionally, lost income can impact the quality of education and research, as universities may be forced to prioritize financial concerns over academic objectives. The financial stress caused by lost income can also lead to decreased morale and motivation among faculty and staff, which can further exacerbate the negative effects of lost income (Bhattacharyya, 2019; Bolton & Hubble, 2021).

To mitigate the impact of lost income, universities can use a variety of strategies. One strategy is to look for alternative revenue streams, such as industry partnerships and the recruitment of international students. Another strategy is to cut expenses, such as by implementing efficiency measures and reducing non-essential expenses. Universities can also concentrate on enhancing their fundraising efforts to increase charitable contributions and endowments. Effective financial planning and management can also assist universities in preparing for unexpected events and reducing the impact of lost income (Friga, 2020; Lapovsky, 2013).

This paper consists of five sections. The second section examines literature. The methodology of income interruption is introduced in Section 3. Quantitative experiments are covered in Section 4. In the last section, conclusions are provided.

2. Literature

A decrease in finding sources or unanticipated events can cause a loss of income in a variety of industries, including universities. One of the main causes is declining public funding, as many governments around the world have reduced their support for higher education in recent years (Estermann et al., 2020).

Furthermore, universities and some facilities are facing financial challenges related to the COVID-19 pandemic, and some institutions may no longer be viable. According to a recent report, thirteen universities would end up with 'negative reserves' because of the Covid-19 crisis, posing a significant financial risk to the UK higher education sector (Bolton & Hubble, 2021). During the pandemic, universities enrollment fellby 10% - 43% according to the type of students (Baer & Martel, 2020).

Therefore, higher education revenue is reduced by the three broad types of revenue: net tuition revenue, state and local funding, and revenue from auxiliary sources (Robert et al., 2021). In this discussion paper, they emphasized that these losses from state and local funding are projected to elevate over the next five years, and public universities face additional challenges.

Current financial risks at universities are classified into four categories: financing risk, investment risk, capital recovery risk, and income distribution risk (Ran, 2019). The university's financial risk has several characteristics. First, there are not many competitive restrictions on universities, and universities can be prevented from deteriorating by increasing enrollment. In this way, the univer-

sity provided financial risks with strong concealment. Second, debts are not often reflected in the general ledger because most universities have an approved budget. The payment capacity can be hidden and difficult to evaluate. Third, the purpose of a university operation is not to make a profit. Therefore, a university's ability to pay its debts is not evaluated by making a profit (Chen & He, 2018; Zhu & Chen, 2010).

According to Sergei et al. (2015), the most important aim of financial sustainability is that higher education institutions' goals are met and universities are able to generate enough income to invest their learning activities.

Lost income is a significant challenge for universities, and the causes and consequences of lost income are complex and multifaceted. However, by understanding the factors that contribute to lost income and implementing effective strategies to mitigate its impact, universities can maintain their financial sustainability and continue to provide high-quality education and research (Kharusi, 2017; OECD, 2009). This paper examines quantitative experiments and introduces a lost income methodology. We offer the National University of Mongolia (NUM) the first recommendation to eliminate the lost income.

3. Methodology

The change in university revenue $\Delta TR_{t,m}$ is represented by the following:

$$\Delta TR_{t,m} = TR_{t,m} - TR_{t-1,m}, t \qquad (1)$$
$$= \overline{1, n} m = \overline{1, 12},$$

where t is the year, and m is the month of the year. If $\Delta TR_{t,m} > 0$, then we call a positive revenue noted as $\Delta TR_{t,m}^+$, in the opposite case will be a negative revenue noted as $\Delta TR_{t,m}^-$.

The amount of change in positive revenue for the year is expressed as:

$$\Delta TR_t^+ = \sum_{m=1}^{12} \Delta TR_{t,m}^+, \qquad (2)$$

and the amount of the change in negative revenue is defined by:

$$\Delta TR_t^- = \sum_{m=1}^{12} \Delta TR_{t,m}^-. \qquad (3)$$

From (2) and (3), the changes in total positive and negative annual income can be written as follows:

$$\Delta TR^+ = \sum_{t=1}^{n} \Delta TR_t^+, \qquad (4)$$

$$\Delta TR^- = \sum_{t=1}^{n} \Delta TR_t^-. \qquad (5)$$

Interpretation as in (4) and (5) means:

- no risk of income interruption if $\Delta TR^+ > -\Delta TR^-$
- no lost income at $\Delta TR^+ = -\Delta TR^-$
- income interruption if $\Delta TR^+ < -\Delta TR^-$.

The purpose of measuring university income interruption is to eliminate the lost income. However, the amount of the change in positive and negative income is not equal, so a certain percentage adjustment is required (Mihai, 2017). Instead of considering future positive income changes, we consider current negative income changes. Therefore, the following present value formula is given:

$$\Delta TR^- = -\frac{\Delta TR^+}{(1+\rho)^n},$$

where ρ is the percentage of the lost income. Furthermore, it becomes:

$$\rho = \left(-\frac{\sum_{t=1}^{n} \Delta TR_t^+}{\sum_{t=1}^{n} \Delta TR_t^-} \right)^{\frac{1}{n}} - 1 \tag{6}$$

For (6), it is necessary to increase the amount of the change in positive income for a given year and reduce the amount of the change in negative income to eliminate the lost income. Then, the percentage of the lost income is defined by:

$$\rho = \left(-\frac{\sum_{t=1}^{n} \Delta TR_t^+ (1+WACC)^{n-t}}{\sum_{t=1}^{n} \frac{\Delta TR_t^-}{(1+r)^{n-1}}} \right)^{\frac{1}{n}} - 1, \tag{7}$$

where $WACC$ is the weighted average cost of capital and r is discountrate.

4. Quantitative Experiments

The NUM income report from the university's official website for the years 2016-2022 has been used to calculate the lost income. There is no specific liability or bank loan. The liability to asset ratio is equal to 0, so WACC is equal to the ROE indicator according to the formula for WACC. Although CAPM can be used to calculate the discount rate, we consider using ROE since NUM is not a stock company. Table 1 presents the average return on equity (ROE), and the discount rate is also ROE.

The amount of change in positive and negative income for the year is shown in Table 2.

To calculate the percentage of lost income, we use Table 1 and Table 2. The results show as follows (Table 3):

$$\rho = \left(-\frac{138,816.0}{-80,991.1} \right)^{\frac{1}{7}} - 1 = 0.08$$

To sum up, future income growth is expected to recover by establishing an 8% risk fund each year, even if income declines.

5. Conclusion

This study concludes that universities should establish a risk fund to reduce lost

Table 1. Return on equity.

Year	Return on equity (ROE)
2016	10.57%
2017	14.42%
2018	13.33%
2019	6.89%
2020	7.92%
2021	8.04%
2022	9.23%
Average	**10.06%**

Source: Financial report, NUM.

Table 2. Change in positive and negative income (million, MNT).

Year	ΔTR_t^+	ΔTR_t^-
2016	7758.5	−12754.2
2017	14293.5	−8765.3
2018	16169.2	−13008.2
2019	30087.0	−13504.9
2020	7448.4	−33424.0
2021	10543.9	−16473.1
2022	17447.2	−11418.0

Source: Income report, NUM.

Table 3. Calculation of change in positive and negative income.

Year	$n-t$	$(1+WACC)^{n-t}$	$\Delta TR_t^+ (1+WACC)^{n-t}$	$t-1$	$1/(1+r)^{t-1}$	$\Delta TR_t^- /(1+r)^{t-1}$
2016	6	1.777	13789.7	0	1.000	−12754.2
2017	5	1.615	23082.7	1	0.909	−7964.1
2018	4	1.467	23725.0	2	0.826	−10738.9
2019	3	1.333	40111.4	3	0.750	−10129.8
2020	2	1.211	9022.4	4	0.682	−22779.3
2021	1	1.101	11637.6	5	0.619	−10200.6
2022	0	1.000	17447.2	6	0.563	−6424.1
Total amounts			**138816.0**			**−80991.1**

Source: Author's own calculation.

income. Our methodology is based on the ratio of the change in positive and negative income and uses ROE instead of the WACC and discount rate. Finally, it is appropriate to establish a risk fund of 8 percent of the planned income for each year to recover the lost income for NUM.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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