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## THE CAUSE OF PRIVATE UNIVERSITIES' FINANCIAL VULNERABILITY AND PERFORMANCE EVIDENCE FROM TAIWAN

*This study refers to Trussel (2002) who investigated the financial vulnerability of private universities and colleges in Taiwan. As Carbone and Winston (2004) show the saving of an individual school describes its performance measure and the slack, breathing space, or vulnerability which is related to its spending or competition. The results show that financial vulnerability is significantly associated with debt ratio, revenue concentration and yearly savings, but insignificantly – with size. We obtained yearly declining of performance and the financial vulnerability indicators are useful in predicting.*

*Keywords: financial vulnerability, performance, saving, higher education organization.*

*JEL Classification: G31, G32, I2.*

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## ПРИЧИНИ ФІНАНСОВОЇ ВРАЗЛИВОСТІ ПРИВАТНИХ УНІВЕРСИТЕТІВ (ЗА ДАНИМИ ТАЙВАНІЮ)

*У статті описано причини фінансової вразливості приватних університетів і коледжів Тайваню. Накопичення в окремих навчальних закладах залежать від ефективності їх роботи і вразливостей, які пов'язані з видатками або витратами на підтримку конкурентоспроможності. Результати показали, що фінансова вразливість значною мірою пов'язана з рівнем заборгованості, концентрацією доходів та щорічних накопичень, але від розміру навчального закладу залежить незначно. З кожним роком ефективність діяльності університетів знижується, тому фінансові показники вразливості можуть бути використані при прогнозуванні та розробці стратегій розвитку навчальних закладів.*

*Ключові слова: фінансова вразливість, ефективність, накопичення, вищі навчальні заклади.*

*Табл. 4. Літ .17.*

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## ПРИЧИНЫ ФИНАНСОВОЙ УЯЗВИМОСТИ ЧАСТНЫХ УНИВЕРСИТЕТОВ (ПО ДАННЫМ ТАЙВАНЯ)

*В статье описаны причины финансовой уязвимости частных университетов и колледжей Тайваня. Накопления в отдельных учебных заведениях зависят от эффективности их работы и уязвимостей, которые связаны с расходами или тратами на поддержание конкурентоспособности. Результаты показали, что финансовая уязвимость в значительной степени связана с уровнем задолженности, концентрацией доходов и ежегодных накоплений, но от размера учебного заведения зависит незначительно. С каждым годом эффективность деятельности университетов снижается, так что финансовые показатели уязвимости могут быть использованы при прогнозировании и разработке стратегий развития учебных заведений.*

*Ключевые слова: финансовая уязвимость, эффективность, накопления, высшие учебные заведения.*

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## 1. Introduction.

From 1965 to 2002, there were 1,070 colleges and universities that became bankrupt among more than 3000 schools in America (Ho, 2003). The competition of higher education at the global market, especially in advanced countries, has been growing fiercer because of more schools establishment and lower birth rate. On the contrary, the wealthiest colleges and universities showed truly stunning yearly increases in their savings in 1999–2000: Harvard, US\$ 5 bln, Yale, US\$ 3 bln, Princeton, US\$ 2 bln (Carbone and Winston, 2004). This drives us to look into the situation of local higher education environment and financial performance among different schools and their potential financial problems. This study sets out to examine the following situations in Taiwan private colleges and universities: First, what constitutes components and changes in wealth, saving, and spending that occurred among private colleges and universities between 2006 and 2011? Second, are the changes of saving rates differ among these schools, and thus result in the growth or decrease of their wealth of financial performance? Third and most important purpose, to empirically confirm how serious for those schools is financial vulnerability, when they are facing a very high density of schools compared with other countries, under domestic dramatically decreasing population birth rate (Excellence Monthly, 2010 June).

Prior studies of financial issues and vulnerability on non-profit organization had been growing in recent years, since the increasing distress of limited social resources allocation, and high expectation for service and accountability to the agency of non-profit (Hodge and Piccolo, 2005). The study on higher education financial changes also drew the attention of researchers in many countries (Carbone and Winston 2004; Kaufman and Woglom, 2005; The Times Higher Education Supplement, 2010).

Over the period from 1986 to 2010, the number of colleges and universities grew by 56%, and increased from 105 to 174 in Taiwan. On the contrary, the population birth rate decreased by 47%, or from 309,230 down to 166,886 new baby numbers per year in the corresponding period of time (Taiwan MOE), which has caused the financial distress of several universities. This financial vulnerability evaluation should be helpful for learning the real financial condition of private colleges and universities, and for predicting their future from the view of on-going concern.

## 2. Financial Performance and Vulnerability.

How to measure financial performance of non-profit organizations has not been reached among scholars. Using factor analysis techniques, there was an empirically developed four-category: fiscal performance, fundraising efficiency, public support, and investment performance and concentration (Ritchie and Kolodinsky, 2003). For the category of fiscal performance, including 6 sub-items of ratio, which are mainly based on the difference between total revenue and expenses, and its ratio to total assets. This measurement is also found in the other research evaluating financial performance of colleges and universities (Carbone and Winston, 2004).

Savings of an individual school describe its performance and the slack, breathing space, or vulnerability, related to its spending or competition (Carbone and Winston, 2004). Therefore, savings of a school in every single year is very crucial to its continuity to accumulate wealth, which could help enhance the quality of students and faculty, and may move up their position in the hierarchy.

There are several ways in which universities could increase their savings. First, they can receive donations and gifts. Second, they can receive investments from their endowment. Third, they can spend less (Kaufman and Woglom, 2005). In terms of measuring savings, wealth, and its financial performance, there were confirmed formulas in the previous studies: the relationship between saving and wealth is that income that is not used to cover production costs during the year is saved in the form of increased financial wealth. And the related financial performance was calculated by the ratio of saving as percentage of total resources in a fiscal year and as percentage of wealth as of a fiscal period end (Carbone and Winston, 2004).

For vulnerability, as suggested by Trussel (2002), various groups would be interested in understanding the relationship between financial indicators and financial vulnerability. Indeed, whether or not a nonprofit organization is financially vulnerable is an important issue for the organization. For example, donors hope that the organization to which they contribute their money is financially sound enough to finish the activities they wish to sponsor; or inversely, they might be interested in helping the organization to improve their vulnerability. In both situations, they would be concerned about whether the organization is financial vulnerable or not. As suggested by Bowman (2002), donors may get assistance from the government or other agencies when making donation decisions, but to a large extent they should be their own monitors. From this viewpoint, financial indicators shown in financial statements, if useful to effectively exhibit or predict financial vulnerability of the organization, would be very helpful for donors or other related parties, such as the government which sets policies.

**Table 1. Financial Vulnerability Indicators**

Indicator	Measure	Expected Sign
Debt ratio (EQUITY)	$\frac{\text{Total liabilities}}{\text{Total assets}}$	+
Revenue concentration CONCERN <sup>a</sup>	$\sum \left( \frac{\text{Revenue}}{\text{Total revenues}} \right)^2$	+
Surplus margin (MARGIN)	$\frac{\text{Total revenues} - \text{Total expenses}}{\text{Total revenues}}$	-
Size (SIZE)	Natural log of total assets	-

<sup>a</sup> Revenue is the revenue from source *j*.

Therefore, our study follows Trussel (2002) and develops a model of financial vulnerability, which includes 4 financial indicators. Table 1 summarizes these 4 indicators and the variables they imply. The expected sign is its relationship with the influence on financial vulnerability.

### 3. Data and Methodology.

We selected our sample of private universities and colleges in Taiwan with totally 63 universities. For fiscal performance, we applied the model of saving, wealth, and financial performance that the previous study used (Carbone and Winston, 2004) for those universities and colleges.

When collecting the data, we found that there were very few fundraising, public support or investment activities, and only fiscal performance had clear information

available for the study. Positive savings of an organization for each year means that the school spends less than it receives. The value of a positive fiscal balance means that school could provide more resources to students and teachers and thus bring higher quality education and less pressure of increasing tuition fee to attract more students. On the contrary, if the universities get negative savings, it means there are some potential problems for sustaining their future school operations. Table 2 shows the fundamental results of descriptive statistics.

**Table 2. The Performance of Private Higher Education Institution, 2011**  
(In NT \$ or ratio of relation)

	Number of Universities	Average Saving to Tuition fee (%)	Total Wealth to Tuition fee	Performance		
				% of Universities with Negative Savings (Number of Schools)	Savings to Total Resources	Saving as % of Wealth (Saving / Wealth)
All Private Universities	63	12.2%	4.65	25.8% (16)	384,687,937	0.024
Private University	19	20.4%	5.85	5.6% (1)	333,750,282	0.031
Private College	44	6.8%	4.12	94.4% (15)	50,937,655	0.011

Note: 1. We used the tuition fee as a proxy for the student number since we did not find the data on each school.

2. In the 4 column in the brackets is the numbers of the universities with negative savings.

The prediction of financial vulnerability, Greenlee and Trussel (2000) also used 4 financial indicators to develop a model to predict financial vulnerability of non-profit organizations, in which they defined an organization as financially vulnerable if it reduced its expenditures on programs for 3 consecutive years. In contrast, Trussel (2002) defined an organization as financial vulnerable if it had more than a 20% decrease in its fund balance over 3 years. Using a similar definition, we classify a university or college as financial vulnerable if a school had decreased in its equity compared with the previous year or if it had negative saving. We expand the Trussel's (2002) model by using slightly different financial indicators, and using a database in Taiwan, which is hand-collected from the Internet of official announced data, to select the sample for an empirical test. In addition, we confine our sample of higher educational organizations, especially private universities and colleges since they are subject to financial problems and insolvency risks without the full support of the government as public universities receive every year.

Since public universities being financial donors from government, we select private universities to examine. First, the data used in this study are hand-collected from the Internet. Our sample includes 19 private universities and 44 private colleges, with the total number of 63. The reason why we excluded public universities is that they are fully supported by the government financially. The model employed will be fully discussed, including the specification of the model and the explanation of independent variables. The description statistics information is stated in Table 3.

As described earlier, we follow Trussel (2002), with slight alteration of surplus margin ratio to surplus savings/1,000 as an independent variable. Also, we compare

the prior research such as Greenlee and Trussel (2000), Trussel and Greenlee (2004) and Gilbert, Menon, and Schwartz (1992), and develop a model applicable to higher educational organizations in Taiwan.

**Table 3. Description Statistics of the Sample, NT\$1000**

	Rev-concern	T-expense	T-income	Equity	Asset	Saving	D/ B ratio
Private Colleges	0.62	726,440	946,600	2,775,742	3,136,778	6,746	0.15
Private Universities	0.49	1,478,017	1,782,729	5,907,119	7,035,845	313,974	0.17
Average	0.555	1,102,228	1,364,664	4,341,430	4,763,717	154,412	0.16

We develop a logit model, using financial vulnerability as the dependent variable that is a dummy variable with the value of 1 if an organization had declined equity or negative saving in the current year, and 0 if the equity did not decline. The previous research such as Gilbert, Menon, and Schwartz (1992) defined a financially vulnerable proprietary organization as one that had cumulative net losses over the three-year period. In addition, compared to the definition of Trussel (2002) or Trussel and Greenlee (2004), as described earlier, our definition of financial vulnerability is relatively slack that school had decreased in its equity compared with the previous year or negative saving. However, it is a must in our sample since we cannot find enough observations which correspond to the standards of the previous research.

The independent variables, the 4 accounting variables, are similar to those in the model of Trussel (2002). The independent variables used in his model are the surplus margin, the debt ratio and the revenue concentration index, and we use savings to replace the surplus margin. Similarly, we also use the size of the organization as an independent variable since size may affect financial status. Besides, we suppose that the independent variables represent the current accounting variables which may serve as indicators of financial vulnerability in the following year. We therefore run a regression of financial vulnerability on the 4 variables in the previous year, which are similar to Trussel (2002).

**3.1. The Independent Variables.** Debt Ratio (DEBT) is measured as the ratio of total liabilities to total assets. As suggested by Trussel (2002), organizations with larger amounts of debt may be less able to finance its programs than those with smaller amounts of debt. The higher the debt ratio is, the more vulnerable the organization is to financial problems.

Revenue Concentration Index (CONCEN): measured as the sum of the squares of each individual revenue ratio, which is individual revenue divided by total revenues. This is very similar to the Herfindahl-Hirschman index (Wooldridge, 2008), which measures the concentration of industrial market. If an organization only has few resources of revenue or rely too much on them, organizations may be more vulnerable to financial problems. The larger the revenue concentration index is, the more vulnerable the organization is to financial problems, and the maximum value is 1 while the minimum value is 0.

*Savings*: measured as the excess of revenue over expenses divided by 1000. As suggested by Trussel (2002), organizations with a relatively low surplus (the excess of

revenues over expenses) may be more vulnerable to financial problems. In other words, an organization with more savings is less likely to reduce its program services for preventing worse financial situations. Therefore, the larger the savings are, the less vulnerable the organization is to financial problems.

*Size*: measured as the natural log of total assets. As cited in Trussel (2002), Ohlson (2003) and Tinkleman (2004) indicated that many factors such as age, reputation and economies of scale are usually correlated with size. We can imagine that an organization with large assets may have more liquidity to support its activities and can reduce its costs by increasing the scale of purchasing or other related spending. In addition, as suggested by Carbone and Winston (2002), when times are tough, typically wealthy universities have more ability to “weather the storm”. Accordingly, an organization with large assets may be less vulnerable to financial problems.

For overall review, the 4 indicators are relatively intuitive for many people and thus very easy to be understood. We hypothesize that the expected sign of the coefficients are as shown in Table 1. If our results are the same as the expected sign, we will verify whether the logical reasoning of previous works is also applicable to the higher educational institutions.

As described in the previous section, we follow the model of Trussel (2002), other previous works and develop a logit model. As our expectation, the sign of the coefficients are the same as in Table 4, which is also consistent with the reasoning of previous research. We therefore conclude that the 4 accounting variables are also applicable for predicting financial vulnerability of higher education organizations in Taiwan.

**4. Results and Discussion.**

**4.1 Empirical design.** In order to gain insight into the relation between financial vulnerability and the financial distress indicators, we follow the model of Trussel (2002) and employ the regression model as follows:

Where “Vul” as the financial vulnerability of the sample universities. The regression results are shown below:

**Table 4. The financial vulnerability model analysis**

	Intercept	DEBT	CONCERN	Savings/ 1000	Size	Adj-R <sup>2</sup>
Vul	4.18 (0.66)	7.01 (4.32)***	5.15 (3.01)**	-5.14E-06 (-4.83)***	-0.11 (-0.21)	0.24

Note: \*, \*\*, \*\*\* means the significant 10%, 5%, 1% levels of P value.

As explained in the introduction, we are concerned with the situations with which higher educational organizations are facing. Because the number of students was obviously decreasing, universities had to make efforts to attract new students or even to keep the existing students. We found that the program expenses for recruiting students had increased in these years, and universities also cut some program expenses. Meanwhile, we can also examine how tough is the situation by checking the yearly savings of these universities. From our sample, we also found that the number of negative savings had also increased these years, which is an alarming signal for higher educational organizations in Taiwan.

School savings is an effective indicator of its economic performance – a kind of “bottom line”, as suggested by Carbone and Winston (2004). At least, the positive saving of a school could add to the wealth of an educational organization, and also could

prevent to be affected by surprisingly shocks if the organization does not have other financial resources. In Table 2, we present the related ratios of savings to tuition fee, total resources and wealth.

According to Table 2, the proportion of universities with negative savings is 25.8% for all private universities, in which private universities are only 5.6% while private colleges are as high as 94.4%. This shows that colleges face a tougher situation than universities, since colleges are more affected by the fact that the number of students are decreasing year by year.

As shown in Table 3, private universities have more equity, assets and savings than private colleges. As for the revenue concentration, private colleges show a higher value than private universities but both are not too high, at least compared with the value of revenue concentration in Trussel's (2002), which is 0.82 for charitable organizations in US. In addition, the debt ratio is relatively low and indicates that the debt ratio seems not to be a major issue for universities.

From the above analysis of financial vulnerability of three-year decreasing in fund balance and negative saving, each independent variable is statistically significant with expected sign. We found that financial vulnerability is significantly associated with debt ratio, revenue concentration, and yearly saving, but insignificant with school size. This result probably was caused by the fact over the long term Taiwan Ministry of education has always approved less headcount of student to universities than students population.

As mentioned above, the results based on pooled OLS-regressions confirm the findings discussed above. Despite of anecdotal evidence, we test the robustness of the results presented above by employing linear instrumental variable regressions. In these regressions, all the independent variables are instrumented by their lagged values. The regression estimates obtained by this method as well as the test statistics of the Hausman (Wooldridge, 2008) is the test of endogeneity (not shown). In all specifications, the exogeneity of family ownership variables cannot be rejected (the lowest Hausman p-value is 0.16).

### **5. Conclusion.**

Hoefer (2000) suggested that financial distress is a common situation for many nonprofit organizations, which may be due to running out of grants or donations. Donators may also change their giving guidelines, or contributions are diverted to other organizations. These could lead to some problems of organizations or even drive them to stop operations. Besides, we could add to the reasons that if an organization is a "productive" organization which invert inputs into valuable outputs, and rely heavily on the general revenue as the for-profit firms, the decline of savings or negative savings would be an important issue.

This study examined the current situation of private colleges and universities and found that due to the declining number of students, the operations of private universities are gradually affected by the tough situation. The number of private universities with negative savings reveals they are no more safe. We constructed a model following Trussel (2002) and found it also applicable to private educational organizations in Taiwan. Especially because these organizations are not fully financially supported by the government, and rely much on their own "earnings", they are potentially vulnerable to financial problems. This study found the 4 accounting indicators used in pre-

vious literature also helpful for predicting financial vulnerability of private universities and colleges in Taiwan. Further evidence shows that although the debt ratio seems not a serious issue for these universities. However, it does have a significantly positive impact on financial vulnerability, which should draw our attention. This may require a deeper investigation of the association of the change of debt ratio and vulnerability. Surely, other measures of the indicators also need to be monitored by the constituents of the organizations. Further implication of our findings is that they be applied to the improvement of the quality of grants policy of the related parties, including the government and pre-stage warning for practitioners.

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