

# Effect of Merger on Efficiencies: A Study of Taiwanese Higher Education

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**Abstract**—This study applies nonparametric data envelopment analysis (DEA) to investigate two cases of educational university mergers. The purpose of this study is by comparing the performance differences between pre-merger and post-merger universities to provide a reference for policy makers and management to solve the higher education crisis in Taiwan. This study finds that it seems, so far, no significantly merger synergies reflecting in efficiencies improvement are found from the two cases of post-merger in Taiwan. National Pingtung University (NPTU) is still technical efficiency university after merger. Their efficiency scores are always 1.0 from 2012 to 2017, except 2014. Though, National Tsing Hua University (NTHU) suffers from decay of efficiency scores after merger; their technical efficiency, pure technical efficiency and scale efficiency all dropped after merger.

**Keywords**—Merger, data envelopment analysis, technical efficiency, pure technical efficiency, scale efficiency.

## I. INTRODUCTION

THE higher education (HE) crisis is sharply attacking Taiwan in recent years. Excess supply in HE results from dramatically declining of birth rate and expanding quantity of universities and colleges forces increasing higher education institutions (HEIs) suffer from shortage of students and thus financial crisis. Taiwanese Ministry of Education therefore implements "Higher education innovation and transformation project" [22] to the shock from crisis. Encouraging HEIs merger is one option under the Act. Until 2017, there have been two cases of educational university mergers. Both of them are mergers of educational universities and comprehensive universities and are described as follows.

NPTU is located in Pingtung county, which is the southernmost of Taiwan. On August 1, 2014, NPTU was formed by the merger of National Pingtung University of Education (NPUE) and the National Pingtung Institute of Commerce (NPIC) [23]. After being merged, NPTU has become a comprehensive university of normal education, management, computer, science and technology, and HE in Pingtung County.

NTHU is a university with a long history. As early as in 1911, Tsing Hua Academy was founded at Tsing Hua Garden in Beijing. In 1928, it was renamed as NTHU. In 1956, NTHU was rebuilt in Hsinchu, Taiwan. Since its re-establishment, the university has developed from a research institution focusing on nuclear science and technology into a comprehensive research university integrating science, engineering,

humanities, society and management. NTHU officially merged with National Hsinchu University of Education (NHCUE) on November 1, 2016 [24]. NTHU has long been one of Taiwan's top universities and is recognized as the best incubator for future industry leaders and scholars.

There is another case of HEI merger over the sample period of 2012-2017, though it is excluded in this study. University of Taipei (UT) was also founded by the merger of Taipei Municipal University of Education (TMUE) and Taipei Physical Education College (TPEC) on August 1, 2013. However, to as could as possible avoid misestimating of efficiency frontier by outliers and therefore misestimating efficiency scores of sample universities, this study excludes this case from sample universities due to his characteristics of municipal, too specific academic field, and too small size relative to other sample universities.

Although the Taiwanese government encourages HEI merger, and there have been actual cases of merger together with increasing cases of merger, what we know from previous studies about the impact of higher education merger on performance is limited and ambiguous until now [1], [2].

There are a lot of limitations on studies to investigate the effect of merger on HEIs performance. First, results may vary from varieties of empirical methods. That includes different measures of performance, different methodologies, different measures of input and output [1], [2]. Second, factors influencing HEIs' performance are quite complex and polytropic, and may vary with macroeconomic conditions, such as educational system and policy, population and demographics, state of national economic development, and microeconomic conditions, such as size of HEI filed and combination of academic speciality of HEI, ownership and funding sources of HEI [1]-[3].

As a whole, merger may benefit performance of HEIs by more efficient management, economies of scale, economies of scope, and increasing funding sources. On the other hand, merger may hamper HEI performance by inefficient management resulting in excess, shortage or misallocation of inputs, and by decreasing return to scale, decreasing return to scope, and diminishing competitive pressures.

References [1] and [4] both argue that merger of HEIs may contribute to release bureaucracy and thus better management efficiency of HEIs in China and in Russia, respectively. Also, [5] and [3] show that mergers do accelerate educational quality and productivity, though [3] highlights that it is just for outperforming HEIs, rather for underperforming ones. On the contrary, [6] argues that HEI merger may cause HEIs to cut down variety of inputs to pursue higher efficiency and thus

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disturb teaching quality or reduce choices taken by students, such as academic portfolio of programs, geographical location, and so on.

Reference [7] finds an increasing return to scale and scope in the UK HEIs. Though, [3] finds a very temporary positive effect of merger on efficiency, while together with a negative effect of size on efficiency; they therefore infer that merger of HEIs is better to efficiency typically by economic scope rather than by economic scale. That is consistent with [8].

Sav [9], [10] reveals government funding enhances efficiency of public universities, but injures cost efficiency of private ones in the USA. Nevertheless, [11] and [3] show that the higher government funding significantly impedes HEIs efficiency in the UK. That is consistent with findings of [1], [4], and [3] in that different educational system and policy may lead to varying effect of funding sources on performance of HEIs.

De Fraja and Valbonesi [6] argue HEIs merger results in higher market power and less competitive pressures and hence hamper efficiency. However, [5] claims he does not find evidence that merger HEIs enhance their prices of tuition and fees to injure student benefit.

This study argues and highlights that policy of HEIs merger should be viewed discreetly. It is required to realize the impacts of HEIs merger on performance in detail before implementation of merger policy. Furthermore, to avoid possible model misspecification bias and together to explore the causes of poor performance, as highlighted by [12], [2], this study chooses a nonparametric estimation method of DEA to examine the impact of HEIs merger on technical efficiency, pure technical efficiency and scale efficiency in Taiwan from 2012 to 2017.

In sum, this study purposes and contributes to empirically examine the effect of HEIs merger on efficiency by comparing the performance differences between pre-merger and post-merger universities to provide a reference for policy makers and management to solve the HE crisis in Taiwan.

The remainder of the paper is structured as follows. Section II reviews previous literature. Section III details the methodology and data. Section IV presents empirical results, and Section V provides conclusion and suggestion.

## II. LITERATURE REVIEW

There are increasing cases of HEIs merger around the world, such as the UK, China, and Russia in recent years. In Taiwan, HEIs merger is encouraged by government policy and is increasing, too. However, what we know from previous studies about the impact of HEIs merger on performance, especially post-merger effect on performance, is limited and ambiguous until now. Indeed, that is because there are a lot of limitations on studies to investigate the effect of merger on HEIs performance. First, varieties of empirical methods may lead to quite different results. That includes different measures of performance, such as production efficiency, cost efficiency, educational quality, economies of scale, economies of scope and so on [1], [2]; different methodologies, comprising parametric estimation and nonparametric estimation; different measures of input and output [2], [3]. Second, factors influencing HEIs performance are quite complex and

diversified, and may vary with macroeconomic conditions, such as educational system and policy, population and demographics, state of national economic development, and microeconomic conditions, such as size of HEI filed and combination of academic specialty of HEI, ownership and funding sources of HEI [1]-[3].

In sum, HEI merger may better their performance by more efficient management (that will be shown in a higher productivity after mergers), or by economies of scale (that will be shown in positive effect of size on performance), or by economies of scope (that will be shown in positive effect of mixed degree of specialty on performance), or by increasing funding sources. On the other hand, merger may hamper HEI performance by inefficient management resulting in excess, shortage or misallocation of inputs, or by decreasing return to scale, decreasing return to scope, or diminishing competitive pressures.

References [1] and [4] both argue that merger of HEIs may contribute to release bureaucracy and thus better management efficiency of HEIs in China and in Russia, respectively. In terms of educational quality, [6] argues that merger of HEIs may cause cut of variety of inputs and thus deterioration in teaching quality or less choices taken by students, such as academic portfolio of programmes, geographical location, and so on. On the contrary, [5] points out that in the USA, the growing retention rate and the proportion of students graduating on time with a four-year degree show that mergers improve the quality and productivity of education. Besides, it is involuntary mergers in the USA that that can actually improve retention rates and on-time graduation. However, that result collides with the findings from [13]; they find that voluntary mergers moderate dropout risk while involuntary mergers accelerate the risk in the UK.

Johnes and Johnes [7] find an increasing return to scale and scope in the UK HEIs. Though, [3] finds an only one year positive effect of merger on efficiency, while together with an inverse effect of size on efficiency. They therefore admonish merger policy of HEIs should be treated prudently. Besides, they also infer that merger of HEIs is better to efficiency typically by economic scope rather than by economic scale in the UK. Finally, they highlight the merger policy should be suitable for outperforming HEIs rather for underperforming ones. Their inferences are consistent with [8]. Fu et al. [14] also confirm that all kinds of universities in Taiwan suffer from decreasing return to scale over 2000-2003. In particular, [2] employs a meta-regression analysis to reveal that studies using older, cross-sectional data sets, smaller sample sizes or developing country samples tend to more likely to find the evidences of scope economies.

Cohn et al. [15] and Zhang and Worthington [2] argue that ownership of HEIs may affect economies of scale and scope by funding restriction on programs and enrollment. Moreover, [1], [4], and [3] find and highlight that different educational system and policy may lead to varying effect of funding sources on performance of HEIs. Consistent with their findings, [9], [10] reveal that government funding enhances efficiency of public universities, but injures cost efficiency of private ones in the

USA. Nevertheless, [11] and [3] show that the higher proportion of income from the government significantly impedes HEIs efficiency in the UK.

De Fraja and Valbonesi [6] argue that HEIs merger results in higher market power and less competitive pressures and hence hampers efficiency. However, [5] claims he does not find evidence that merger of HEIs enhances their prices of tuition and fees to injure student benefit.

In view of methodology, [16] argues that the neglect of managerial inefficiency will lead to biased and inconsistent estimates and subsequent inferences. Andrews et al. [17], Schiltz and De Witte [12], Zhang and Worthington [2] highlight that sufficient agility in specifying functional form is necessary to ensure the robustness of the estimated results. Besides, [12] has revealed that the quadratic cost functions used in some studies have a significant inverse effect on the scale economies. They thus suggest the choice of functional form is not neutral when estimating scale economies.

Given the above, this study argues and highlights that policy of HEI merger should be viewed discreetly. It is required to realize the impacts of HEI merger on performance in detail before implementation of merger policy. Moreover, to endow full flexibility of function and simultaneously take managerial inefficiency into account, this study adopts a nonparametric estimation method of DEA to examine the impact of HEI merger on technical efficiency, pure technical efficiency and scale efficiency in Taiwan from 2012 to 2017.

### III. METHODOLOGY AND DATA

Although there are a large variety of ways to evaluate performance of HE, as [17], [12], and [2] show, lack of flexibility in assuming functional form would induce model misspecification bias and accordingly abate robustness of estimation. To avoid estimation errors as could as possible and consequently make the empirical results useful to policy makers and administrators of higher education, this study adopts DEA to evaluate university efficiencies, and explores the major cause of inefficiencies.

DEA originates from Farrell efficiency measurement [18], which is a nonparametric analysis with no default function. Linear programming is used to search for production frontier with production efficiency from samples, and then compared with other production points to obtain relative efficiency of each producer. Charnes et al. [19] develop DEA as input-oriented and assume constant returns to scale (CRS), which is namely CCR model. On this basis, [20] proposes a model of variable returns to scale (VRS), which relaxes the original assumption of CRS in CCR model and calls it BCC model. Due to allowing varying returns to scale, BCC model is allowed to further analyze whether the main cause of technical inefficiency is pure technical inefficiency or scale inefficiency. If the former, it indicates the waste of resources caused by inefficient management and lack of innovation ability of the producer; while the latter shows that the producer fails to reach the optimal scale, resulting in the inability to minimize the cost. The CCR and BCC models are described as follows.

#### A. CCR Model

Charnes et al. [19] extend Farrell efficiency measurement [18] to multiple production practices with mathematical programming method and in addition, assuming that all decision-making unit are CRS, namely, assuming they have reached optimal scale and ignoring the effect of diseconomies of scale on efficiency. The CCR model is stated as follows,

$$\text{Min } \theta_j \quad (1)$$

$$\text{s.t. } Y^{ALL}\lambda > Y_j \quad (2)$$

$$X^{ALL}\lambda \leq \theta_j X_j \quad (3)$$

$$\lambda \geq 0 \quad (4)$$

where,  $\theta_j$ : the percentage of cuts the  $j^{\text{th}}$  university needs to make in order to be efficient,  $\lambda$ :  $N \times 1$  vector of each university weight forming efficient frontier,  $Y^{ALL}$ :  $B \times N$  matrix of  $B$  types of outputs for all universities,  $X^{ALL}$ :  $A \times N$  matrix of  $A$  types of inputs for all universities,  $Y_j$ :  $B \times 1$  matrix of  $B$  types of outputs for the  $j^{\text{th}}$  university,  $X_j$ :  $A \times 1$  matrix of  $A$  types of inputs for the  $j^{\text{th}}$  university,  $\theta_j$  is the efficiency score for the  $j^{\text{th}}$  university and a value of 1 indicates that the university is technically efficient.

#### B. BCC Model

Banker et al. [20] further take potential scale diseconomies into account, which is namely BCC model. The linear programming problem of BCC model is defined as follows,

$$\text{Min } \theta_j \quad (5)$$

$$\text{s.t. } Y^{ALL}\lambda > Y_j \quad (6)$$

$$X^{ALL}\lambda \leq \theta_j X_j \quad (7)$$

$$N'\lambda = 1 \quad (8)$$

$$\lambda \geq 0 \quad (9)$$

where,  $\theta_j$ : the percentage of cuts the  $j^{\text{th}}$  university needs to make in order to be efficient,  $\lambda$ :  $N \times 1$  vector of each university weight forming efficient frontier,  $Y^{ALL}$ :  $B \times N$  matrix of  $B$  types of outputs for all universities,  $X^{ALL}$ :  $A \times N$  matrix of  $A$  types of inputs for all universities,  $Y_j$ :  $B \times 1$  matrix of  $B$  types of outputs for the  $j^{\text{th}}$  university,  $X_j$ :  $A \times 1$  matrix of  $A$  types of inputs for the  $j^{\text{th}}$  university,  $N$ :  $N \times 1$  vector of ones.

The efficiency estimated by CCR model is technical efficiency (TE), and the efficiency estimated by BCC model is pure technical efficiency (PTE). Banker et al. [20] point out that the TE is the product of the PTE and the scale efficiency (SE), that is,

$$\text{TE} = \text{PTE} \times \text{SE} \quad (10)$$

Therefore, the SE could be obtained by dividing the TE by the PTE,

$$SE = \frac{TE}{PTE} \quad (11)$$

If a university has achieved technical efficiency, it should be observed that its technical efficiency score, pure technical efficiency score and scale efficiency score are all 1, that is,  $TE = 1$ ,  $PTE = 1$ , and  $SE = 1$ ; On the contrary, if the university fails to achieve technical efficiency, i.e.  $TE < 1$ , the model is allowed to further investigate whether technical inefficiency is mainly caused by pure technical inefficiency or scale inefficiency. If a university is with  $PTE < 1$ , it indicates that the university is pure technical inefficient, it thus should focus on improving the efficiency of resource utilization by advancing the management efficiency, innovation ability of teaching and research to effectively enhance the pure technical efficiency. In other words, stubbornly encouraging mergers of universities which are lack of the management efficiency, innovation ability of teaching and research, may not only fail to improve the efficiency of resource utilization, but also even sacrifice the quality of higher education. On the other hand, a university with an  $SE < 1$  reflects that the university cannot minimize his costs because he deviates from optimal scale. This can be improved by changing composition of key outputs to enhance various incomes, such as the transformation of universities and departments to increase revenue from teaching and research, or promotion of academia-industry cooperation, reform of financial investment to enhance financial income, much more flexible use of site and facility to raise rental and use incomes, and so on. Mergers may also promptly enlarge scale and make higher SE possible, however, continued expansion of scale is not conducive to the improvement of SE or even TE, if the merged universities are already in the stage of decreasing returns to scale and thus face with excess supply.

To sum up, university merger is not a panacea. What is the most crucial is to clarify the causes of the inefficiency of in universities, so as to ease the crisis of higher education and guarantee the quality of higher education, especially in terms of long-term development.

In terms of input and output measures, this study argues that inputs and outputs measure should be as close as possible to the practical state of resources sources and use in the current Taiwanese universities. Accordingly, this study measures inputs and outputs primarily basing on the "National University Endowment Fund Establishment Act" [25] in Taiwan, and simultaneously on the practical income and expenditure status shown in the financial statements of universities, so that the university's input and output measures in line with the practical operation situation are defined.

Since 1999, to respond accordingly to HE development trends, enhance the educational quality, strengthen educational performance, and facilitate financial flexibility of university, Taiwan's Ministry of Education passed and implemented "National University Endowment Fund Establishment Act". The Article 1 of the Act regulates national university and tertiary college shall establish a university endowment fund.

Moreover, the legal sources of funding and use for a public university endowment fund are specified in Article 3 and 4. Article 3 specifies, besides government normal budget appropriations, there are some self-raised income of the following nature, 1) Income from tuition and fees, 2) Income from continuing education, 3) Income from academia-industry cooperation, 4) Income from government subsidies for scientific research or from government commissions, 5) Site facility management income, 6) Donation income, 7) Investment income, 8) other income. Article 4 further regulates that a university endowment fund is to be used for the following, 1) Teaching and research payments, 2) Personnel expense payments, 3) Student scholarship and grant payments, 4) Continuing education payments, 5) Academia-industry cooperation payments, 6) Asset and property addition, expansion, and improvement related payments, 7) Other university development related payments [25]. Under this Act, the funding sources and uses of public universities have been liberalized, so compared with private universities, there are no tighter restrictions on the inputs and outputs of public universities. However, all public universities' financial statements show that due to lack of inducement, such as fine performance reward and punishment scheme, almost all of them are very conservative in management of endowment fund. Accordingly, government budgets and tuition fees have long been the two main sources of income for Taiwan's universities and colleges.

Among all of self-raised funds, except "Income from tuition and fees" and "Income from academia-industry cooperation and government subsidies for scientific research or from government commissions", the legal outputs of various universities are all less than 5% (see Table I). To be in line with the practical operation situation, taking the Act and practical financial statements into account together is required, this study thus adopts (1) income from tuition and other fees, and (2) income from academia-industry cooperation and government subsidies for scientific research or from government commissions as two output measures, and (1) teaching and research payments, (2) academia-industry cooperation payments, (3) administration and general expenses, (4) net fixed assets, which is fixed assets minus accumulated depreciation, as fore input measures.

TABLE I  
THE AVERAGE PROPORTION OF MAJOR SELF-RAISED FUNDS IN THE TOTAL SELF-FUNDED FUNDS OF 53 SAMPLE UNIVERSITIES IN TAIWAN FROM 2012 TO 2017

Income from tuition and fees	Income from research relevant output <sup>a</sup>	Income from continuing education	Investment income
62%	30%	5%	3%

<sup>a</sup>This measure includes income from academia-industry cooperation and government subsidies for scientific research or from government commissions.

Following [15] and [21], this study considers the potential impact of inter-university heterogeneity on resource and input-output mix, so only 46 comprehensive universities are selected as the research object. In addition, since the merger cases of the two universities are all mergers of educational

universities and comprehensive universities, in order to verify the effect of post-merger on efficiency, 7 educational universities need to be included in the sample universities in this study. Therefore, this study selected 53 comprehensive universities from 2012 to 2016 and 52 comprehensive universities in 2017 as sample. Table II describes the main sample statistics.

TABLE II  
SAMPLE STATISTICS DESCRIPTION

Statistics	Income from tuition and fees	Income from research output	Teaching and research payments	Academia-industry cooperation payments	Administration and general expenses	Net fixed assets
Mean	791	576	1395	542	311	4740
Max	2465	6342	7680	6256	2557	29479
Min	8	1	25	4	43	552
Stand. Dev.	577	1017	1172	994	268	4187

#### IV. EMPIRICAL RESULTS

##### A. Impact of Merger on Efficiencies - NPTU Analyses

DEA efficiency scores of NPUE and NPTU from 2012 to 2017 are displayed as Table III. As shown in Table III, in the pre-merger period, NPUE performs well and is efficiency university (TE = 1) from 2012 to 2013. Nevertheless, NPUE becomes inefficient university due to less SE in 2014. After merging to be NPTU, the new HEI again performs efficiently to be efficiency university until 2017. The result seems to confirm that the merger of HEIs is conducive to the optimization of the scale of HEIs, thus contributing to their SE. That is consistent with [7]. Besides, the result also coincides with [4] in that both do not find that universities that absorb technical colleges suffer from depletion in their efficiency scores. However, since NPUE has been an efficiency university during the sample period of 2012-2017, except 2014, the exact effect of HEIs merger on efficiencies is still ambiguous and need to be verified further.

TABLE III  
DEA EFFICIENCY SCORE OF NPTU FROM 2012 TO 2017

HEI	TE/ PTE/ SE	2012	2013	2014	2015	2016	2017	Mean
NPUE	TE	1.000	1.000	0.960	-	-	-	0.987
	PTE	1.000	1.000	1.000	-	-	-	1.000
	SE	1.000	1.000	0.960	-	-	-	0.987
NPTU	TE	-	-	-	1.000	1.000	1.000	1.000
	PTE	-	-	-	1.000	1.000	1.000	1.000
	SE	-	-	-	1.000	1.000	1.000	1.000

##### B. Impact of Merger on Efficiencies - NTHU Analyses

DEA efficiency scores of NHCUE and NTHU from 2012 to 2017 are displayed as Table IV. As shown in Table IV, in the period before merging with NTHU, the efficiency score of NHCUE which is the university to be merged is decaying from 2012 to 2016, and especially worst in 2014. To further explore the cause of inefficiency, this study finds that it is decaying scale efficiency impedes his performance and consequently results in his technical inefficiency, especially in 2015 and

2016. Actually, NHCUE has improved his PTE from 2015 to 2016 and accordingly mitigates the deteriorating impact of scale inefficiency on TE. On the other hand, the trend and cause of efficiency score of NTHU which is the survived HEI are quite different from NHCUE. His trend is variable and bottoms in 2013. Moreover, it is pure technical inefficiency leads to his inefficiency mainly, rather than scale inefficiency. Though, in most years of the pre-merger period, NTHU performs better than NHCUE whatever PTE or SE. The result implies that NTHU has better management efficiency and closer to optimal scale than NHCUE before merger.

After merging, TE of NTHU decays from 0.932 to 0.872. That is caused by deterioration in both of PTE and SE, especially the PTE. His PTE and SE drop from 0.933 and 0.999 to 0.875 and 0.997, respectively. The result implies merging with NHCUE destroys not only management efficiency but also SE. Merger does not make use of inputs more optimal and also not contribute to scale optimization.

The result is consistent with [3] in inverse effect of size on efficiency, though is discordant with [1], [7], and [4] in their findings that HEIs merger raises their management efficiency and optimize their scale by increasing return to scale.

In sum, the results from two cases of HEI merger in this study are nonuniform and ambiguous. To provide a reference for policy makers and management to solve the HE crisis in Taiwan, it is required to further trace and verify the exact effect of HEIs merger on performance.

TABLE IV  
DEA EFFICIENCY SCORE OF NTHU FROM 2012 TO 2017

HEI	TE/ PTE/ SE	2012	2013	2014	2015	2016	2017	Mean
NHCUE	TE	0.854	0.785	0.697	0.759	0.725	-	0.764
	PTE	0.906	0.867	0.829	0.958	0.999	-	0.912
	SE	0.942	0.906	0.841	0.792	0.726	-	0.841
NTHU	TE	0.918	0.782	0.833	0.960	0.932	0.872	0.883
	PTE	0.940	0.790	0.833	0.963	0.933	0.875	0.889
	SE	0.976	0.990	1.000	0.997	0.999	0.997	0.993

#### V. CONCLUSION AND SUGGESTION

This study aims to adopt nonparametric DEA to investigate Taiwan's two cases of educational university mergers. By comparing the differences of efficiency scores between the pre-merger and post-merger universities, this study empirically investigates the impact of merger on efficiency, so as to provide a reference for policy makers and managers to solve the crisis of higher education in Taiwan. From the findings in this study, it seems, so far, no significantly merger synergies are found from post-merger cases.

In the case of NPTU, this study finds that the merger is conducive to the optimization of the scale of NPTU, thus contributing to his SE. However, since NPUE has been an efficiency university during the sample period of 2012-2017, except 2014, the exact effect of HEIs merger on efficiencies is still ambiguous and need to be verified further.

In the case of NTHU, this study finds that TE of NTHU decays from 0.932 to 0.872. That is caused by deterioration in

both of pure technical efficiency and scale efficiency, especially the pure technical efficiency. The pure technical efficiency and scale efficiency drop from 0.933 and 0.999 to 0.875 and 0.997, respectively. The results show that the merger with NHCUE not only impedes the management efficiency, but also destroys the scale efficiency. That is, merger does not make use of inputs more optimal, nor do it helps scale optimization.

This study accords with [3] and [8], argues merger policy may be not a panacea for Taiwanese HEIs, especially for underperforming ones. It is suitable for outperforming HEIs rather than for underperforming ones to merge. The limitation of this study is that the merger cases of HEIs in Taiwan until 2017 are still very few, and the time after merger is too short for long-term observation and empirical test. With the increasingly serious HE crisis in Taiwan, the number of HEI mergers has been increasing in recent two years, and the performance of HEIs after merger needs further tracking and verification to provide sufficient policy references and suggestions. Policy makers and HEIs managers should be cautious about merger policies before empirical studies have been conducted to determine the impact of merger on performance.

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2. Chen, Chiou-Rung and Chai-Liang Huang. What A Puzzle It Is! (2014). Does Financial Development Really Benefit Economic Growth? *Global Economy and Finance Journal* 7(1): 14-37.