# The Impact of Higher Secondary Assessment Systems on the Tertiary-Level Academic Performance: An Empirical Study

MONIR MIR, HAI WEI FAN, ANNE DALY, GREG BOLAND

*University of Canberra*

Submitted to the *Journal of Institutional Research* on 14 November 2013, accepted for publication 14 March 2014.

## Abstract

In Australia there is no centrally administered nationwide assessment system for students who complete their final year (Year 12) of high school. Each state and territory uses its own Year 12 assessment system. Apart from Queensland and the Australian Capital Territory, all states and territories use externally set competitive examinations. The Queensland and Australian Capital Territory systems focus on continuous assessment that commences when students begin Year 11. Hence, policymakers at the state, territory and federal levels in Australia are debating over which of the Year 12 systems is superior, that is, an externally set competitive examination or a school/college-based continuous assessment system? If one of the assessment systems is superior to the other, then it is expected that the superiority should be reflected by the students' subsequent academic performances at their tertiary-level studies. In this article we specifically addressed this issue and compared the academic performances of these two groups of students at an Australian university in their first year of a business degree. We found no difference in their academic performances in the subjects studied. The empirical evidence provided in the article does not, therefore, support the claim that one system is superior to the other. Essentially, both systems have their inherent merits and demerits. The merits of one system are offset by the merits of the other system and vice versa.

**Key words:** academic performance, assessment, examination, state, territory, tertiary**.**

This article reignites the assessment type debate, which has received little scholarly attention in recent years although it has become a political football. It compares the performance of a first-year cohort of tertiary business studies students who have graduated from high school studies under two different assessment regimes. In order to place this in context, the article summarises relevant prior literature into assessment types followed by a section containing a description of the various Year 12 assessment systems used across Australia today. Being empirically based, a hypothesis for the study is developed and presented in the second section, which also incorporates the research method and data

*Correspondence to*: Greg Boland Faculty of Business, Government & Law, University of Canberra. E-mail: gregory.boland@canberra.edu.au

collection procedures adopted for the study. The test results of the study are then presented using tables and discussion. The article concludes with implications of the study together with contemporary thinking on this debate and suggestions for further research.

The motivation for the project came from an ongoing educational assessment system debate in Australia in recent years regarding which secondary school final assessment method prepares Year 12 leavers better for their tertiary studies. The debate is often centred on whether an externally held examination system at Year 12 is superior to a wholly ongoing continuous assessment system as employed by some states and territories in Australia. For example, Justine Ferrari, an education columnist for *The Australian*, commented:

> The continuous assessment of Year 12 students used in Queensland and the ACT (Australian Capital Territory) schools is unfair, inconsistent and fails to foster intellectual development. Federal Education Minister Julie Bishop has attacked Queensland and the ACT for failing to hold public exams in Year 12 subjects, branding the systems of schools assessing their own students over a year or more as inferior. In a letter to the Queensland and ACT education ministers, Ms Bishop said the Howard Government would require them to introduce public exams at the end of Year 12 as a condition of the next school funding agreement, to start from 2009. Queensland Education Minister Rod Welford and his ACT counterpart, Andrew Barr, yesterday angrily rejected the threat, saying reverting to an end-of-year external exam would be "a return to the dark ages". "Sudden-death exams is an unreliable assessment tool to measure irrelevant consequences," he said. "In many ways it's surprising that other states, for example NSW (New South Wales) with its final Year 12 cram testing, have been frozen in a 1960s model". (Ferrari, 2007a)

In another column, Justine Ferrari provided the opinions of the then Australian Federal Opposition Party (the Australian Federal Labor Party), which is as follows:

> Labor has questioned the benefit of external exams for Year 12 students, saying the merits, "if any", needed to be discussed. Responding to pressure on Queensland and the ACT from the Federal Government to introduce external exams in their systems of assessing year 12 students, Opposition spokesman on education Stephen Smith said the ALP had an open mind on the issue. (Ferrari, 2007b)

From the above excerpt it can be said that the issue of the merits and demerits of the Year 12 external exam system is not a trivial issue and thus needs further research to explore whether the students processed through the Year 12 external exam systems outperform academically at university compared to their counterparts who are processed through the alternative non-external exam systems. The latter is more commonly referred to as using continuous assessment practices over the final year/s of secondary schooling in order to ascertain a tertiary entrance score. Underpinning this debate is the accountability issue on whether educators should focus on teaching to the final exam or use assessment methodology to support and improve learning outcomes. The introduction of a national secondary curriculum and standards-driven reform as discussed by Klenowski (2012) has also caused a deviation from the ongoing assessment debate on whether external or internal assessment is the most effective way forward for Year 12 leavers graduating to tertiary studies.

Although this current study is directed more towards the Australian context, similar debates have been occurring in many overseas jurisdictions and, like Australia, consensus has not been uniform, as shown in our prior research section below. Over the previous three years Australian studies have also focused more on the accountability issue, such as addressed by

Carnoy, Elmore and Siskin (2013), and so have side-stepped the important relationship between Year 12 assessment methods and academic performance of tertiary-level students in Australia. The latter received considerable attention in this country during the previous two decades as different states were searching for the most effective assessment methods and still remains a debatable issue today. For example, Olani (2008), Evans and Farley (1998) Dobson and Sharma (1993) argued that students' secondary school performance (e.g., Year 12 performance) were a prima facie predictor of university performance. Levy and Murray (2005) and Win and Miller (2005), in this context, argued that universities are now enrolling students with lower Universities Admissions Index (UAI, known as ATAR; Australian Tertiary Admissions Ranking since the end of 2009) values who simply are not capable of pursuing studies at the university level. Win and Miller (2005) and Marks, McMillan, and Hillman (2001) argued that students having government school backgrounds struggle more in the first year of their university studies compared to their non-government school counterparts. Alternatively, Dobson and Skuja (2005) argued that students having government school backgrounds do not struggle. Ambler and Neathery (1999) and Schmitt et al. (2007) argued that students coming from low socioeconomic backgrounds normally struggle more compared to their well-off counterparts. Conversely, Marks et al. (2001) observed in the Australian context that low socioeconomic backgrounds do not significantly affect secondary students' performance towards achieving high tertiary entrance ranking. Clark and Ramsay (1990) argued that students coming fresh from Year 12 struggle more compared to their mature-age counterparts. Mutchler, Turner and Williams (1987) and Tyson (1989) argued that boys struggle more than girls. Marks et al. (2001), however, observed that gender differences in tertiary performance are small. To date, no study has specifically explored the question of whether the examinations systems that exist at secondary school/college Year 12 level have any effect on the students' subsequent academic performance at the university level, especially at the first-year university level.

As mentioned earlier, Year 12 students in the ACT and Queensland do not face any externally set competitive exam, other than the moderating scaling tests (Australian Capital Territory Scaling Test [AST], and Queensland Core Skills Test [QCS Test]) to graduate and to determine their UAIs. Year 12 students from the other states face externally set competitive examinations in order to graduate and have their UAIs calculated. The question is, what difference does it make? According to Kevin Donnelly, another education columnist for *The Australian*:

> Through the years, Australian states and territories have gradually reduced the emphasis on externally set competitive examinations by increasing the amount of work requirements completed outside the classroom and increasing the use of school-based moderation to assess work. In Queensland and the ACT, external examinations have disappeared altogether. This should be cause of concern. Research on education systems on whose students consistently outperform their Australian counterparts in the Trends in International Mathematics and Science Study tests concludes externally set competitive examinations with a strong academic focus are more effective in raising standards. Several papers written by Ludger Woessmann in Germany and John H Bishop in the US conclude that externally set competitive examinations provide an incentive for students and schools to perform well and minimise the risk of cheating and plagiarism [these studies will be emphasised later in the Prior Research section of this article]. Standards are raised as students are required to show evidence that they have mastered essential knowledge, understanding and skills necessary for further study. (Donnelly, 2007, p. 33)

Hartley (2011) argues that the Australian state of New South Wales HSC currently has a heavy reliance on assessment by examination, which provides limited information about students' true abilities. An Organisation for Economic Co-operation and Development (OECD) (2009) policy paper pointed out that teacher-based assessment has higher validity than external assessment. However, the paper also pointed out that there might be a high risk of bias in teacher (college)-based assessment. This means that a high-performing student who had gone through college-based assessment may not be a high-performing student compared to one who went through the process of centralised exam systems. A policy report by the Queensland Studies Authority (2009) strongly criticised a centralised exam system, pointing out that it is possible to improve test scores through mechanisms such as 'teaching to the test', narrowing the curriculum and concentrating effort and resources on borderline students. The policy report further pointed out that teachers have been forced to "teach to the test", thereby narrowing the students' educational experiences and attainments. Conversely, Hyndman (2011) criticised the role of the Australian Capital Territory's (ACT) Scaling Test (AST) in measuring students' aptitude and argues that the AST scores have very low (or even negative) correlations with students' aptitude, which suggests that the AST was not a good measure of general aptitude. Therefore, it is likely that the Year 12 examination systems' students' backgrounds should have an impact on their academic performance when they move into their university studies, at least in their first year of studies.

Contemporary discussion in global educational circles continues as to which assessment method/s better prepares high school graduates for the rigour of their future tertiary studies. This current paper adds to such discussion, in an Australian context, by comparing the results of students in a first-year tertiary business studies course who have come from an external Year 12 exit examination type system to their peers who have studied under a continuous assessment system in their final years of high school studies.

This article is expected to contribute new knowledge to the literature of education policy-making. Although the study is conducted in the Australian policy-making context, its findings should have importance in any country where policymakers are debating about the merits and demerits of an externally set, centrally administered, competitive exam for their high school (or higher secondary college) graduates.

## Prior Research on the Impact of Examination on Students' Subsequent Academic Performance

Bishop (1997) and Bishop, Moriarty and Mane (2000) studied the impact of the curriculum-based Regents examinations (curriculum-based external exit exam system, CBEEES) for high school students in New York. The Regents examination system is similar to the competitive exam system that is used in Year 12 in the NSW secondary school system in Australia. Bishop et al. argued that the improvements in the signalling of achievement generated by a CBEEES tended to induce teachers, administrators and parents to give greater priority to academic achievements and encourage students to devote additional time and effort to their studies. They further argued that high school students continued with this habit in their college studies (that is, university studies in the Australian context) and were more likely to survive better in the tertiary sector. The findings of their studies also suggested that by undertaking an exit examination from college (high school) student achievement, attendance

and completion rate was positively enhanced. They pointed out that there were opponents who opposed externally set curriculum-based examinations on the grounds that they caused students to avoid learning activities that did not enhance exam scores. Bishop (1997) tested this hypothesis and found no supporting evidence that external competitive exam systems caused students to avoid learning activities. In a later study, Woessmann (2001) argued that centralised exams boosted student performance. Woessmann studied the educational performance of students from 39 countries and observed that, all things being equal, students in countries with centralised exams outperformed those in countries without centralised exams. Woessmann further argued that a centralised exam system could profoundly alter the incentive structure within the educational system. Several other studies (see for example, Britton & Tesser, 1991, Larose & Roy, 1995) claimed that learning disposition, such as examination preparation, predicted college success.

There are a number of other studies, although not directly claiming a direct association between an external examination system at high school and students' academic performance at university, do recognise this may have some indirect impact on tertiary performance levels. Beck, Rorrer-Woody and Pierce (1991) assessed the role of learning orientation and grade orientation in academic performance and observed that grade orientation was negatively correlated with academic performance. Anecdotal evidence suggests that centralised examination system type assessments may make students more grades oriented than learning oriented and therefore students' examination systems background in Year 12 may impact their subsequent tertiary studies performance. Vermunt (2005) investigated the relationship between students' learning and personal, contextual, and performance variables and observed that student's prior education backgrounds were associated with their learning pattern. Struthers Perry and Menec (2000) found that college students' academic stress and course grades were influenced by problem-focused coping and motivation, but not emotion-focused coping. Anecdotal evidence suggests that students' Year 12 examination system backgrounds affect their stress–coping abilities differently. Duff (2004) investigated students' learning approaches involving first-year undergraduate accounting students and observed that 'ineffective learners' failed to progress beyond their first year at university. Duff also found that there was a strong relationship between students' prior academic achievements and students' first-year academic performance. Yip and Chung (2005) investigated whether the students' study strategies that brought academic achievement at matriculation level would also work efficiently at university level, finding that the effectiveness of strategies used at one level did not work at the next. Levy and Murray (2005) argued that when students are provided with an appropriately supportive transitional program and environment, retention rates and subsequent academic performance could be improved. Therefore, it is worthwhile to test whether an external examination system provides transitional confidence to Year 12 graduates at the university level or not. Addus (2007) argued that the lack of adequate background and/or preparation (for example, experience of external competitive examination) caused many students to withdraw from college or to graduate with low grades. Pascoe, McClelland and McGaw (1997) argued that the method of entry into university, and the ease with which entry could be made into university, also affected the predictive capacity of the secondary school grades. Tickell and Smyrnios (2005) found that the type of secondary school attended during Year 12 was a significant predictor of tertiary accounting students' performance. Win and Miller (2005) also found that schools had an impact on the academic performance of students at university

beyond the students' own background characteristics. All these studies hint towards a conclusion that students' pre-university educational background and experience may have implications on their further studies at the university level. The following section outlines the Year 12 examinations and assessment systems in Australia. In this section the same question can be raised again—do students processed through the Year 12 external exam systems outperform their counterparts who are processed through non-external exam systems?

### *Assessing Year 12 Students in Australia and the Development of the Hypotheses*

This section describes the assessment methods for student achievements in Australian senior secondary schools and colleges. There are four main methods that are used in assessing Year 12 students' academic achievements in Australia. These are:

- external (state-wide) examinations
- moderated school-based assessment
- school-based assessment (not moderated)
- external scaling test(s).

In cases where external examination systems are followed, all students studying a subject sit for the same examination, normally at the end of the study period. In cases of moderated school-based assessment, this is done by teachers in schools using a variety of assessment methods and the marks from this process then moderated by various factors including the school groups' performance. In some cases, school-based assessments are not moderated, but while some forms of moderation within the school exist there is no system-wide moderation. The external scaling test is an assessment of general scholastic ability rather than subject-specific tests and is used to rank students on a state-wide basis. In Australia none of the states/territories use a single method of assessment only; they use various combinations of them. Table 1 provides a matrix of the Year 12 assessment systems in Australian states and territories. As shown, Year 12 students from Queensland and the Australian Capital Territory do not experience externally set competitive examinations to finish their Year 12 before moving to higher studies at the university level. (One exception is a private school located in the ACT that follows the NSW Year 12 completion assessment system. This exception has been acknowledged in our database and statistical analysis.) It is expected, therefore, that the study habit strategies of Year 12 completers from the ACT and Queensland would differ from the study habit strategies of Year 12 completers from other Australian states. It is important to note that all these students would face examinations that are similar to externally set examinations when they begin university studies.

**Table 1**

*Year 12 Assessment in Australian States and Territories*

| States and Assessment Systems | ACT | NSW | NT | QLD | SA | TAS | VIC | WA |
|---|---|---|---|---|---|---|---|---|
| External (state-wide) examination | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ |
| Moderated school-based assessment | ✓ | ✓ | ✓ | ✓ | ✓ | | | ✓ |
| School-based assessment (not moderated) | | ✓ | | ✓ | | ✓ | ✓ | ✓ |
| External scaling test(s) | ✓ AST | | | ✓ QCS | | | | |

*Source*: New South Wales Board of Studies (2007).

*Note*. ACT = Australian Capital Territory; NSW = New South Wales; NT = Northern Territory; QLD = Queensland; SA = South Australia; TAS = Tasmania; VIC = Victoria; WA = Western Australia)

Therefore, it is worth exploring whether the students from Queensland and the ACT academically outperform their counterparts from other Australian states and territories at their university-level studies, or vice versa. Based on this discussion a hypothesis has been developed that will be tested in this study:

- H0: Students' higher secondary examination systems background has no impact on their academic performance at the first-year university level.

In addition to the students' experience in externally set examination systems, many other variables also affect their academic performance in their university-level studies. It was mentioned earlier that factors like UAI score, students' enrolment status (part-time or full-time), gender and so forth may also affect a student's academic performances. If H0 is rejected then we will also test the effect of these variables to seek an explanation of whether the academic performance difference is due to students' experience in externally set examinations or due to other factors such as UAI score, enrolment status and gender.

### *Data Collection and Research Method*

The data used for this study is based on the academic performance of a sample of first-year students doing core business subjects from a university in the Australian Capital Territory. For the purpose of this study the academic performance is defined as marks obtained by each student in their first-year-level university business subjects. The reason for selecting an ACT university is that it not only receives students who are from the ACT college system (i.e. ACT Year 12 completers) but also students from the neighbouring state of NSW. In this university, all courses and subjects have students from both the ACT and the NSW.

At the first stage of data collection, the marks of each student for the following four first-year core business subjects in semester 1 (S1), 2007 were collected from the respective lecturers in these subjects, code abbreviation is noted in parentheses:

- Accounting (ACCT)

- Economics (ECON)
- Management (MGMT)
- Marketing (MARK).

At the second stage, the marks of each student of the abovementioned four first-year business subjects in semester 1 (S1), 2009 were collected and analysed to backup the findings from the dataset of S1, 2007. The S1, 2009 students were a different cohort of students to those of S1, 2007.

We chose these first-year level subjects because they should be strong variables to study the impact of the Year 12 students' examination experience. By the time the students move to their second year of university studies, they have become accustomed to university exam systems and therefore their Year 12 exam experience may not have an impact on their subsequent academic performance at the university level. In our analysis, we used the marks of the four subjects for those students whose exam system background could be identified. Table 2 provides a matrix of the number of students that were included in our database. In all, the analyses were based on 1,192 students.

**Table 2**

*Numbers of Students Used in the Analysis*

| | **S1, 2007 ACT (No centralised exam system)** | **S1, 2007 NSW (Centralised exam system)** | **S1, 2009 ACT (No centralised exam system)** | **S1, 2009 NSW (Centralised exam system)** | **Total** |
|---|---|---|---|---|---|
| Accounting | 111 | 48 | 114 | 60 | 333 |
| Economics | 116 | 39 | 125 | 56 | 336 |
| Management | 91 | 32 | 99 | 36 | 258 |
| Marketing | 93 | 38 | 89 | 45 | 264 |
| Total | 411 | 157 | 427 | 197 | 1192 |

In order to facilitate statistical analyses the student results information that were collected were structured using the following steps. At the first step, the marks obtained in subjects were categorised into three groups, pre-final exam assessment marks, final exam marks and total marks. Each subject considered for this study had two major components of assessments. Tables 3 and 4 summarise the assessment criteria of these subjects in S1, 2007 and in S1, 2009.

**Table 3**

*Assessment Item Weightings in each Subject (S1, 2007)*

| | Pre-final Component Assessment Weight | Total Pre-final Assessment Weight | Final Exam Assessment Weight | Total |
|---|---|---|---|---|
| Accounting | Group Presentation 25%<br>Review Test 25% | 50% | 50% | 100% |
| Economics | Tutorial Work 20%<br>Review Test 30% | 50% | 50% | 100% |
| Management | Tutorial Work 10%<br>Group Presentation 30%<br>Essay 30% | 70% | 30% | 100% |
| Marketing | Tutorial Work 10%<br>Other Writings 40% | 50% | 50% | 100% |

As can be seen in Table 3, the assessments of all subjects involved both final exam and pre-final exam assessment components. However, the weighting of these two components of assessments varied from subject to subject. As all subjects did not have the same examination and non-examination-type assessment criteria we have also tested the academic performances of these two groups of students in their final exam and pre-final exam component assessments to explore whether or not any statistically significant difference existed.

As can be seen in Table 4, the assessments of all subjects under study continued to involve final exam and pre-final exam assessment components in S1, 2009 that were not significantly different from the assessment criteria that were used in S1, 2007.

**Table 4**

*Assessment Item Weightings in Each Subject (S1, 2009)*

| | Pre-final Component Assessment Weight | Total Pre-final Assessment Weight | Final Exam Assessment Weight | Total |
|---|---|---|---|---|
| Accounting | Group Presentation 25%<br>Review Test 25% | 50% | 50% | 100% |
| Economics | Tutorial hand–in 10%<br>Tutorial presentation 10%<br>Review Test 30% | 50% | 50% | 100% |
| Management | Quiz each week 10%<br>Group Presentation 30%<br>Essay 30% | 70% | 30% | 100% |
| Marketing | Tutorial hand in 15%<br>Group presentation 10%<br>Other Writings 35% | 60% | 40% | 100% |

At the second step, students in each subject were categorised into two groups based on the Year 12 exam background. The groups were as follows:

- Group 1: Year 12 graduates from the ACT and Queensland
- Group 2: Year 12 graduates from other Australian states.

Statistical tests were administered to find out whether there was a significant difference or equality between pre-final exam assessment marks, final exam marks and total marks of these two groups of students in S1, 2007 and in S1, 2009 in each subject separately. We conducted three statistical analyses.

Firstly, we used the Student's *t* test, as it is commonly used and very powerful for comparing means for two independent samples of marks. The conditions for using the test were met; the sample sizes of the groups of students for the four subjects were all large enough and all the marks of the groups of students were examined and found to follow a normal distribution. Because of the hypothesis of testing equality/difference between the two means for the two groups we chose to use a two-tailed test. We chose mainly a significance level of.05 as it is widely used, and also of.01 when suitable. The *t* test helped us to check the equality of the means of the academic performances of the two groups of students, that is, students coming from an externally set Year 12 competitive exam background and students coming from a Year 12 school/college-based assessment background. We tested the equality of means of the marks of these two groups of students in three substeps:

- Substep 1: Equality/Difference of the means of the pre-final exam assessment marks in each subject.
- Substep 2: Equality/Difference of the means of the final exam component marks in each subject.
- Substep 3: Equality/Difference of means of the total marks in each subject.
- Substep 4: Repeating three steps above for the whole sample (four subjects together) in the two years.

Secondly, we determined the proportion of pass rates in each subject for these two groups of students. For the determination of proportion of pass or fail rates we determined the fact that a student obtained a pass in a subject if he or she completed all assessments in that subject and obtained fifty or more marks out of a total mark of one hundred. We conducted a z test, commonly used for testing equality/difference of two proportions for two populations. Finally, we conducted a regression analysis to determine the effect of other variables such as UAI score, students' enrolment status and gender etc. on the academic performance of the students in our database.

## Results and Discussion

The test results from our study are presented in Tables 5 to 15 below. Tables 5–10 present the results of difference in means test. Tables 11 and 12 present the results of the z test and Tables 13–15 present regression results.

Tables 5 and 6 provide the difference/equality of the academic performances of these two groups of students (students coming from the ACT Year 12 background and students coming from the NSW Year 12 backgrounds) in their pre-final assessment components in each of the first-year level business subjects in S1, 2007 and in S2, 2009.

**Table 5**

*Test Results: Equality/Difference of Pre-final Assessment Component Marks, S1, 2007*

| Hypothesis | *t* value | *p* value | Mean Difference | Std. Error Difference | Bounds for 95% confidence interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| H1, ACCT | 0.717 | .475 | 0.497 | 0.694 | −0.873 | 1.868 |
| H1, ECON | 1.950 | .053 | 1.997 | 1.024 | −0.026 | 4.020 |
| H1, MGMT | −0.186 | .853 | -0.347 | 1.862 | −4.034 | 3.341 |
| H1, MARK | −0.452 | .652 | −0.413 | 0.915 | −2.224 | 1.397 |
| H1, Four units | 0.811 | .417 | 0.616 | 0.759 | -0.875 | 2.107 |

**Table 6**

*Test Results: Equality/Difference of Pre-final Assessment Component Marks, S1, 2009*

| Hypothesis | *t* value | *p* value | Mean Difference | Std. Error Difference | Bounds for 95% confidence interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| H1, ACCT | 1.357 | .176 | 0.588 | 0.433 | -0.267 | 1.444 |
| H1, ECON | 0.826 | .410 | 0.624 | 0.756 | -0.867 | 2.115 |
| H1, MGMT | 2.368 | .019 | 2.747 | 1.160 | 0.452 | 5.043 |
| H1, MARK | 0.940 | .349 | 1.353 | 1.440 | -1.496 | 4.202 |
| H1, Four units | 1.554 | .121 | 1.752 | 1.127 | -0.462 | 3.965 |

The results show that there was no significant difference in the average performance of students from continuous and external high school backgrounds, except in only one case. Students from a continuous background had a higher average score in the pre-final assessment in Introduction to Management in 2009, although this result was just significant at the 5% level.

Tables 7 and 8 provide the results testing for significant differences in the average performance of the students in the final exam components in each subject. In this comparison of means, the only statistically significant difference was in favour of the students from external backgrounds in the Introduction to Marketing exam in 2007.

**Table 7**

*Test Results: Equality/Difference of Final Examination Component Marks, S1, 2007*

| Hypothesis | *t* value | *p* value | Mean Difference | Std. Error Difference | Bounds for 95% confidence interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| H2, ACCT | 0.901 | .369 | 1.268 | 1.408 | −1.512 | 4.048 |
| H2, ECON | 1.150 | .252 | 1.462 | 1.272 | −1.050 | 3.974 |
| H2, MGMT | −1.605 | .111 | −2.127 | 1.326 | −4.752 | 0.497 |
| H2, MARK | −2.402 | .018 | −2.924 | 1.217 | −5.332 | −0.516 |
| H1, Four units | -0.705 | .481 | -0.536 | 0.760 | -2.030 | 0.957 |

**Table 8**

*Test Results: Equality/Difference of Final Examination Component Marks, S1, 2009*

| Hypothesis | *t* value | *p* value | Mean Difference | Std. Error Difference | Bounds for 95% confidence interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| H2, ACCT | -0.283 | .777 | -0.467 | 1.647 | -3.718 | 2.784 |
| H2, ECON | -0.007 | .994 | -0.014 | 1.927 | -3.817 | 3.789 |
| H2, MGMT | -0.788 | .432 | -0.997 | 1.265 | -3.500 | 1.505 |
| H2, MARK | -1.208 | .229 | -1.046 | 0.866 | -2.760 | 0.667 |
| H1, Four units | -0.812 | .417 | -0.946 | 1.165 | -3.234 | 1.342 |

Tables 9 and 10 present the results for a comparison of mean scores overall in the four subjects in 2007 and 2009. The differences were insignificant for all the subjects except for Introduction to Economics in 2007 where students with a continuous background had higher average grades, although the difference was barely significant at the 5% level.

**Table 9**

*Test Results: Equality/Difference of Total Marks in Subjects, Semester 1, 2007*

| Hypothesis | *t* value | *p* value | Mean Difference | Std. Error Difference | Bounds for 95%confidence interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| H3, ACCT | 0.953 | .342 | 1.753 | 1.839 | −1.879 | 5.385 |
| H3, ECON | 1.958 | .052 | 3.896 | 1.990 | −0.036 | 7.827 |
| H3, MGMT | −0.868 | .387 | −2.474 | 2.852 | −8.120 | 3.172 |
| H3, MARK | −1.781 | .077 | −3.332 | 1.871 | −7.033 | 0.369 |
| H1, Four units | 0.182 | .855 | 0.201 | 1.104 | -1.966 | 2.367 |

**Table 10**

*Test Results: Equality/Difference of Total Marks in Subjects, Semester 1, 2009*

| Hypothesis | *t* value | *p* value | Mean Difference | Std. Error Difference | Bounds for 95%confidence interval | |
|---|---|---|---|---|---|---|
| | | | | | Lower | Upper |
| H3, ACCT | 0.062 | .950 | 0.111 | 1.777 | -3.397 | 3.619 |
| H3, ECON | 0.258 | .797 | 0.610 | 2.363 | -4.052 | 5.272 |
| H3, MGMT | 0.840 | .403 | 1.750 | 2.084 | -2.373 | 5.873 |
| H3, MARK | 0.160 | .873 | 0.307 | 1.920 | -3.492 | 4.105 |
| H1, Four units | 0.759 | .448 | 0.803 | 1.058 | -1.274 | 2.881 |

In summary, the results of a comparison of average scores for students from a continuous or external background presented in Tables 5–10 do not suggest that there are major differences in performance in either the assessment conducted during the semester, such as presentations and assignments, or in the final exam. Where there were differences, they favoured students from a continuous high school assessment background in all but one instance—performance in the final exam in Introduction to Marketing. These simple

comparisons of mean scores do not support the arguments outlined at the beginning of the article that continuous assessment does not prepare students to learn at university. It could be argued the fact that today's Australian university assessment regimes are similar in structure to the continuous assessment methods as used in the ACT and Queensland schools and so students who have studied under these secondary school systems are in fact better prepared for their future university studies in this country.

Tables 11 and 12 provide the statistical test results of the pass rates of these two groups of students in S1, 2007 and S1, 2009 in each subject.

**Table 11**

*Test Result: Equality/Difference of the Proportion of Pass Rates in Each Subject, S1, 2007*

| | ***z* test value** | ***p* value** | **Bounds for 95% confidence interval** | |
|---|---|---|---|---|
| | | | **Lower** | **Upper** |
| ACCT | -0.346 | .729 | -0.132 | 0.091 |
| ECON | 0.993 | .321 | -0.060 | 0.161 |
| MGMT | 0.000 | 1.000 | 0.000 | 0.000 |
| MARK | -1.614 | .107 | -0.228 | 0.004 |

**Table 12**

*Test Result: Equality/Difference of the Proportion of Pass Rates in Each Subject, S1, 2009*

| | | | **Bounds for 95% confidence interval** | |
|---|---|---|---|---|
| | ***z* test value** | ***p* value** | **Lower** | **Upper** |
| ACCT | 0.025 | 0.980 | -0.043 | 0.059 |
| ECON | 0.194 | 0.846 | 0.016 | 0.122 |
| MGMT | 0.256 | 0.798 | 0.028 | 0.136 |
| MARK | -0.093 | 0.926 | -0.074 | 0.022 |

As can be seen from the analyses provided in Tables 11 and 12, the *p* values of the differences in the proportion of pass rates in each subject are larger than.05 in both 2007 and 2009. Therefore, it can be said that the pass rates of these two groups of students in each subject are virtually the same. This means that the null hypothesis cannot be rejected by us at the level of 5%. Therefore, it can be claimed that students' Year 12 examination systems background has no impact on the academic performance of university students at the first-year level business subjects at this university.

Tables 13–15 present the regression results on the determinants of grades in pre-exam assessment, exam assessment and the total for the whole sample in the two years for which data was collected, 2007 and 2009. The variable of interest for this study is 'ACT' which takes the value of 1 for students who undertook their Year 12 in the ACT. The other explanatory variables acting as control variables include age, gender (takes a value of 1 for females), full-time or part-time load (1 for full-timers), maths background (1 for those who did maths at

school), UAI and dummies for the three subjects other than Accounting for Managers, that is Economics, Management and Marketing.

**Table 13**

*Determinants of Grade in Pre-exam Assessment*

| | **2007** | **2009** |
|---|---|---|
| Constant | 30.69 (2.35)*** | 14.21 (3.13)*** |
| Gender | 1.59 (0.50)*** | 1.87 (0.44)*** |
| Age | 0.15 (0.07)** | -0.02 (0.13) |
| Load | 0.30 (0.80) | 1.42 (0.55)* |
| ACT | 0.61 (0.57) | 1.13 (0.46)* |
| UAI | 0.02 (0.01)** | 0.02 (0.02) |
| Maths | -0.32 (0.77) | 1.44 (0.75) |
| Economics | -3.15 (0.67)*** | -5.56 (0.57)*** |
| Management | 10.71 (0.71)*** | 20.61 (0.62)*** |
| Marketing | -3.07 (0.70)*** | 20.42 (0.62)*** |
| $R^2$ | 0.47 | 0.84 |

*Note:* * * *, * *, * indicate significance at the 0.1, 1, and 5% level, respectively.

Table 13 reports the results for the determinants of pre-exam marks. Holding everything else constant, there was no statistically significant difference found in 2007, but students from ACT system did record higher grades than students from other systems in 2009. The subject dummies were significant in each year with students in Economics, Management and Marketing. In 2007, those students with a higher UAI and older students had higher grades. Females and full-time students had higher grades in both years.

**Table 14**

*Determinants of Grade in Exam Assessment*

| | 2007 | 2009 |
|---|---|---|
| Constant | 20.61 (2.77)*** | 28.01 (5.28)*** |
| Gender | 2.07 (0.59)*** | 1.94 (0.74)*** |
| Age | 0.15 (0.09)* | -0.14 (0.22) |
| Load | -0.52 (0.94) | 3.28 (0.93)*** |
| ACT | -0.40 (0.67) | -0.71 (0.78) |
| UAI | 0.04 (0.01)*** | 0.09 (0.03)*** |
| Maths | 1.26 (0.90) | 3.49 (1.26)*** |
| Economics | -1.10 (0.79) | 8.20 (0.96)*** |
| Management | -10.51 (0.84)*** | -15.10 (1.04)*** |
| Marketing | -5.07 (0.82)*** | -14.95 (1.04)*** |
| R2 | 0.28 | 0.57 |

*Note:* * * *, * *, * indicate significance at the 0.1, 1, and 5% level, respectively.

Table 14 reports the results for the determinants of exam grades. In this case, the difference in assessment systems between the ACT and elsewhere might be expected to produce lower results for ACT students who had less practice with large formal exams. But this was not the case. Holding everything else constant, there was no statistically significant difference found across the two years. Students with higher UAIs recorded higher exam grades in both years. Students in Management and Marketing had higher grades on average than students in Accounting.

**Table 15**

*Determinants of Total Grade*

| | 2007 | 2009 |
|---|---|---|
| Constant | 52.15(4.40)*** | 42.22(6.83)*** |
| Gender | 3.67(0.94)*** | 3.81(0.95)*** |
| Age | 0.30(0.14)** | -0.16(0.28) |
| Load | -0.15(1.50) | 4.70(1.21)*** |
| ACT | 0.32(1.06) | 0.42(1.00) |
| UAI | 0.06(0.02)*** | 0.11(0.04)*** |
| Maths | 0.94(1.44) | 4.93(1.63)*** |
| Economics | -3.91(1.25)*** | 2.66(1.24)** |
| Management | 0.22(1.33) | 5.53(1.35)*** |
| Marketing | -8.12(1.31)*** | 5.49(1.35)*** |
| R2 | 0.13 | 0.12 |

*Note:* * * *, * *, * indicate significance at the 0.1, 1, and 5% level, respectively.

The results reported in Table 15 combine both pre-exam and exam grades. There was no statistically significant difference between students from the ACT and other systems. The difference in pre-exam performance found in 2009 was not sufficient to create a statistically significant difference in the overall mark. In both years female students had higher grades than male students. Grades also differed in significant ways between subjects but there was not a consistent pattern over the two years for which we have data.

## Conclusion and Direction for Future Research

This study empirically tested the association between the externally set competitive examination experience of Year 12 completers and their academic performance at the university level. This is a debatable issue in Australia as the educational institutions who have, and are, currently investigating adopting these different assessment systems are claiming superiorities over each other's assessment systems. As has been quoted earlier, the previous (2007) Federal Minister for Education in Australia threatened to cut back federal funding for those states and territories that did not follow the assessment system of externally set competitive exams for Year 12 students, claiming that the method of assessment was superior to the school/college-based assessment system. If either of the assessment systems is superior to the other, then it is expected that the superiority should reflect students' subsequent academic performances at their tertiary-level studies. That is, if the externally set competitive exam system is superior to the school/college-based assessment system, then tertiary students, having the experience of an externally set Year 12 examination system, should outperform their counterparts who have no such experience, and vice versa. Empirical evidence that has been provided in this study suggests that students' background in the Year 12 examination systems has no impact on the academic performance of first-year university business students. Therefore, the argument that an externally set competitive examination system of assessment is superior to the school/college-based assessment system is not valid, at least for students doing first-year business subjects in a university environment. Overall, both forms of Year 12 assessment systems have their inherent merits and demerits and the demerits of one system are offset by the merits of the other system and vice versa.

There are implications to this current research. In particular, the study only considered a sample of first-year students at one university who were doing business related subjects. In order to substantiate further the policy-making arguments in favour of the centralised examination system or against the school/college-based assessment system for Year 12 completion, the scope of the study could be broadened in a follow-up study by using a database of all first-year business students from all universities in the Australian Capital Territory having centralised and non-centralised exam systems backgrounds. Such a follow-up could also assist the current submission before the Queensland Senate Education and Innovation Committee (2013) on Teaching and Learning into the assessment methods used in senior secondary maths, chemistry and physics subjects. On behalf of the Australian Council for Educational Research (ACER), this submission—being undertaken by Professor Geoff Masters, ACER Chief Executive, and ACER Principal Research Fellow Dr Gabrielle Matters—focuses on the use of assessment to establish and understand where students are up to in their learning by studying various assessment methods and could certainly complement a future study in the ACT on the results of different methods used to assess university entrants using a wider cohort.

Expanding future studies to include other topical areas of discussion such as post-secondary outcomes; school responses to assessment methods as well as secondary and tertiary graduate attributes would also prove beneficial in contemporary society as we grasp with the most effective form of student assessment to enhance student learning. Similarly, research into on-line self-paced learning and related assessment which is becoming very popular in the tertiary sector would also add value to this current assessment debate for policy makers.

## References

Addus, A. (2007). Academic performance and advisement of university students: A case study. *College Student Journal, 41*(2), 316–326.

Ambler, J., & Neathery, J. (1999). Education policy and equality: Some evidence from Europe. *Social Science Quarterly, 80*(3), 437–456.

Beck, H., Rorrer-Woody, S., & Pierce, L. (1991). The relations of learning and grade orientations to academic performance. *Teaching of Psychology, 18*(1), 35–37.

Bishop, J. (1997). The effects of national standards and curriculum-based exams on achievement. *The American Economic Review, 87*(2), 260–264.

Bishop, J., Moriarty, J., & Mane, F. (2000). Diplomas for learning, not seat time: The impacts of New York Regents examinations. *Economics of Education Review, 19*, 333–349.

Britton, B., & Tesser, A. (1991). Effects of time Management practices on college grades. *Journal of Educational Psychology, 83*, 405–410.

Carnoy, M., Elmore, R., & Siskin, L. (2013). *New accountability: High schools and high school-stakes testing*. Google eBook: Routledge.

Clark, E., & Ramsay, W. (1990). Problems of retention in tertiary education. *Education Research and Perspectives, 17*, 47–57.

Dobson, I., & Skuja, E. (2005). Secondary schooling, tertiary entry ranks and university performance. *People and Place, 13*(1), 53–62.

Dobson, I. & Sharma, R. (1993). Student progress: A study of the experience in Victorian tertiary institutions. *Journal of Tertiary Education Administration, 15*(2), 203–211.

Donnelly, K. (2007, June 27). Ill-prepared for the rigours of uni. *The Australian*, Higher Education. Retrieved from http://www.theaustralian.com.au/higher-education/appointments/ill-prepared-for-the-rigours-of-uni/story-e6frgckf-1111113830716

Duff, A. (2004). Understanding academic performance and progression of first-year Accounting and business Economics undergraduates: The role of approaches to learning and prior academic achievement. *Accounting Education, 13*(4), 409–430.

Evans, M., & Farley, A. (1998). *Institutional characteristics and the relationship between students' first-year university and final-year secondary school academic performance.* (Working Paper 18/98). Melbourne; Australia: Department of Econometrics and Statistics, Monash University.

Ferrari, J. (2007a, August 1). No-exam Year 'inferior'. *The Australian.* Higher Education. Retrieved from http://www.theaustralian.com.au/archive/news/no-exam-year-12-inferior/story-e6frg6no-1111114082618

Ferrari, J. (2007b, August 6). Labor wary on state exams. *The Australian*. Higher Education.

Hartley, S. (2011). *A proposal to improve HSC assessment by introducing externally marked projects or portfolios for all subjects*. (Submitted on behalf of NSW Board of Studies Curriculum and Assessment). Retrieved from http://shartley.edublogs.org/files/2011/05/20110528-Policy-Proposal-1giuhjf.pdf

Hyndman, R. (2011). *Review of the impact of correlations in the ACT scaling process*. Canberra, Australia: ACT Board of Senior Secondary Studies.

Klenowski, V. (2012). *Learning communities learning series*. Working paper (unpublished), Queensland University of Technology. Retrieved from http://eprints.qut.edu.au/52649

Larose, S., & Roy, R. (1995). Test of reactions and adaptation in college (TRAC): A new measure of learning propensity for college students. *Journal of Educational Psychology, 87*, 293–306.

Levy, S., & Murray, J. (2005). Tertiary entrance scores need not determine academic success: An analysis of student performance in an equity and access program. *Journal of Higher Education Policy and Management, 27*(1), 129–140.

Marks, G., McMillan, J., & Hillman, K. (2001). *Tertiary entrance performance: The role of student background and school factors* (LSAY Research Report No. 22). Australian Council for Educational Research. Adelaide, Australia.

Mutchler, J., Turner, J., & Williams, D. (1987). The performance of female versus male accounting students. *Issues in Accounting Education, 2*(1), 103–111.

New South Wales Board of Studies. (2007). *Leaving school in Australia: Year 12 state by state*. Retrieved from http://www.boardofstudies.nsw.edu.au/acaca/s3_assessing.html

Olani, A. (2008). *Predicting first year university students' academic success* (Master's thesis). Institute for Educational Research, University of Groningen, The Netherlands.

Organisation for Economic Co-operation and Development. (2009). *Evaluation and assessment frameworks for improving school outcomes.* Retrieved from http://www.oecd.org/edu/evaluationpolicy

Pascoe, R., McClelland, A., & McGaw, B. (1997). *Perspectives on selection methods for entry into higher education in Australia.* Canberra: Australian Government Publishing Service.

Queensland Studies Authority. (2009). Student assessment regimes. *QTU Professional Magazine, 24*, 20–26.

Queensland Senate Education and Innovation Committee. (2013). *Inquiry into assessment of senior maths, chemistry and physics in Queensland Schools*. Retrieved from http://www.parliament.qld.gov.au/documents/committees/EIC/2013/QldAssessment/trns-ph10Jul2013-PROOF.pdf

Schmitt, N., Oswald, F., Kim, B., Imus, A, Merritt, S., Friede, A., & Shivpuri, S. (2007). The use of background and ability profiles to predict college student outcome. *Journal of Applied Psychology, 92*(1), 165–179.

Struthers, C., Perry, R., & Menec, V. (2000). An examination of the relationship among academic stress, coping, motivation, and performance in college. *Research in Higher Education, 41*(5), 581–592.

Tickell, G., & Smyrnios, K. (2005). Predictors of tertiary Accounting students' academic performance: A comparison of Year 12-to-university students with TAFE-to-university students. *Journal of Higher Education Policy and Management, 27*(2), 239–259.

Tyson, T. (1989). Grade performance in introductory accounting courses: Why female students outperform males. *Issues in Accounting Education, 4*(1), 153–160.

Vermunt, J. (2005). Relations between student learning patterns and personal and contextual factors and academic performance. *Higher Education, 49*, 205–234.

Win, R., & Miller, P. (2005). The effects of individual and school factors on university students' academic performance. *The Australian Economic Review, 38*(1), 1–18.

Woessmann, L. (2001). Why students in some countries do better. *Education Matters,* Summer, 67–74.

Yip, M., & Chung, O. (2005). Relationship of study strategies and academic performance in different learning phases of higher education in Hong Kong. *Educational Research and Evaluation, 11*(1), 61–70.