School performance in Australia:

results from analyses of school effectiveness

Report for the
Victorian Department of Premier and Cabinet

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CONTENTS

TABLES AND FIGURES

Tables

Figures

EXECUTIVE SUMMARY

Policymakers and school system authorities are keenly interested in the issue of school performance and school effectiveness. Much of this interest stems from the view that some schools are doing a much better job than others in promoting high achievement levels and producing better student outcomes. However, it is not possible to reach this conclusion by looking at simple raw comparisons of student differences in outcomes. There are many factors that affect performance in school including student background characteristics that are related to the families and communities in which students live. These influences need to be considered in comparing schools in order to identify particular schools, school features and school policies that may be delivering better outcomes for young people.

This report presents results from analyses of school effectiveness in Australia. School effectiveness is measured by estimating performance gains or differences on a variety of student outcome measures after controlling for differences in student background characteristics. The study has been undertaken as part of the *Shared Future Project* for the Victorian Department of Premier and Cabinet (DPC). The report begins with an analysis of some of the factors, such as socioeconomic status (SES) and school sector, that influence school performance, by examining their impact on student outcomes. It then examines school performance through analyses of achievement and other student outcome measures after controlling for the effects of student background characteristics and community context. In these analyses school is the unit of analysis. Modelling is used to control for the effects of differences in student intake and other factors such as school size and school location. In the final section, students and schools are analysed jointly using multi-level analysis to identify the policies and school features that characterise successful and effective schools.

Data used for the report are from a variety of sources including state and national data sets.

Main findings

Performance in schools is strongly linked to student background

There are large differences in performance between students based on their social backgrounds. Students from lower SES backgrounds (those whose parents work in less well paid jobs and have low levels of education) perform less well at school than students from higher SES backgrounds (those where parents more often have professional jobs and high levels of income). For example, in 2000 the average tertiary entrance score for Year 12 students in the bottom quintile of SES was, on a 100-point scale, 22 points below the mean score achieved by students in the highest quintile of SES (52.9 compared with 74.9).

Australian students are highly segregated along social and academic lines

Residential segregation and the sector organisation of schools into government and non-government work to segregate students in Australia along social and academic lines. For example, independent schools accounted for about 19 percent of all Victorian Year 12 students in 2000. However, they enrolled over 40 per cent of all students from the highest SES band — those in the highest quintile of SES — and over 35 per cent of all students from the highest general achievement band — those in the top 20 per cent of General Achievement Test (GAT) performance.

Regional differences are also large. Over 50 per cent of Year 12 independent school students in Victoria live in high SES urban areas compared to only 20 per cent of government school students. Patterns of regional dispersion show that there is also segregation within as well as between sectors.

Segregation of students tends to intensify between-school differences in student outcomes

A recent Organisation for Economic Co-operation and Development (OECD) study of Program for International Student Assessment (PISA) results reported that Australia's more highly segregated system of schooling tends to contribute to comparatively large differences between schools in student achievement (OECD, 2001). The results of the present study support this finding. In a series of analyses

using Year 12 results, a consistent finding is that while adjustments for differences in social and academic intake reduce between-school differences and lead to considerable crossover in performance levels, substantial differences remain. For example, in an analysis of tertiary entrance (ENTER) scores, after controlling for SES, prior academic achievement, rurality and school size, over 60 per cent of government schools still performed below the median for independent schools. About 72 per cent of independent schools were above the government school median. In other analyses, the mean social intake of schools had a significant independent effect on a variety of student achievement and outcome measures even after controlling for differences in students' background characteristics. Performance tends to be better in schools where students are, on average, from more advantaged backgrounds. This is true both within and between sectors. Segregation in the school system tends to reinforce rather than weaken existing patterns of social inequity.

Schools differ in effectiveness

From the school-level analyses it is clear that some schools out-perform others while some under-perform across a range of performance measures. After appropriate modelling to control for intake differences, comparisons of variation in student outcomes show that at any given level of prior achievement or SES, there is substantial variation in school performance. For example, on the measure of Year 12 study scores some schools are greatly out-performing expectations, achieving an average gain per student of 6 points (on a 50 point scale) or even as much as 9 points above what would be expected given their social intake. Similarly, other schools are greatly under-performing, some producing losses of 5 or 6 points on average below what could be expected given their intake. This suggests that the school a student attends can have a significant effect on his or her Year 12 results and therefore post-school options.

Multi-level modelling reveals that between-school differences can account for as much as 25 per cent of the variation in student outcomes. For example, in junior secondary school maths achievement measured using data from the Third International Mathematics and Science Survey (TIMSS), school differences

accounted for 24 percent of the variation in performance. In other words, a student's results can be affected markedly by the school he or she attends.

Effective schools are found in both the government and non-government sectors

There is variation in quality of schools in each of the school sectors. Higher than expected Year 12 performance, for example, is not restricted to schools with particular social intakes or achievement profiles. Schools performing well above average levels of performance compared to similar schools (in terms of intake) are found across the achievement and SES composition scales as well as across school sectors. As an example, on Year 12 study scores, 40 per cent of government schools perform above the median for independent schools, and 28 per cent of independent schools perform below the government school median. After adjusting for the effects of student intake, there are many government (and non-government) schools performing well above expected levels. There are a few cases at extremes (four to five standard deviations above the mean, representing 10 to 14 percent gains above what would be expected based on intake). At the same time, there are government Catholic and independent schools performing below what would be predicted given their intakes. And some government and independent schools well below.

Some schools consistently perform well

Results achieved by schools in individual subject areas show that while many schools have 'strengths' and 'weaknesses', that is their effectiveness is not 'across the board', some tend to be consistent in their effectiveness. Some schools do well across different subject areas suggesting that their effectiveness is broadly based. Similarly, over-time comparisons of performance on certain measures suggest that while some schools vary in their performance over time, others remain effective over successive years producing consistent achievement gains for their students.

Effectiveness extends beyond cognitive outcomes

School performance is often measured using cognitive achievement measures such as final year achievement. Yet school effectiveness can be assessed through other measures of student outcomes. Rates of transition from school to further study and work are examples. Transition rates indicate how well schools function to

encourage and support students to continue to engage in education and training after leaving school as well as to find employment. Analyses of transition outcomes show substantial variation between schools after adjusting for differences in social and academic composition. Larger numbers of non-government schools than government schools are effective in promoting entry to university and to non-apprenticeship forms of VET. However, while government schools do not do so well as a group in promoting entry to university, many are successful in gaining higher than expected rates of entry into apprenticeships and full-time work.

Some school factors help raise performance

Multi-level modelling of student performance was undertaken to identify not only the level of variation linked to schools as distinct from individuals, but also some of the factors that may be contributing to helping some schools out-perform other schools. In the analyses it is apparent that there is no single factor that explains why some schools gain better results than others. It is likely to reflect a combination of factors that includes pupil management policies, resources, approaches to school organisation, and teaching practices. Some factors were consistent.

The results suggest that intake is an important element. High concentrations of middle class students (mean SES) and high achieving students (mean achievement) provide certain schools with a platform on which they can build successful outcomes. Like physical resources, pupils provide a resource that helps some schools organise their teaching and other programs in ways which raise levels of achievement.

As well as composition of student intake, the results suggest that quality of teachers reflected in teaching styles and levels of satisfaction with teaching are influential. In junior secondary mathematics achievement, for example, certain features of teaching were significantly related to student achievement. All else equal, higher concentrations of teachers satisfied with their job (itself linked to the school environment) help produce better results. Teaching styles are also important. In schools where teachers rely more often on traditional methods rather than more innovative teaching practices the results are lower, all else equal.

Also important in helping schools promote high level performance is the academic climate schools create reflected in the behaviour of students, broad aspiration levels, student views on teachers and school and engagement in school life. High-performing schools adopt policies facilitating student engagement, through the provision of programs, extra-curricular programs and student support.

1. Introduction

There is considerable interest amongst policymakers and school system authorities in the quality of school performance. Much of this interest stems from the view that some schools are doing a much better job than others at increasing student achievement and producing superior student outcomes. It suggests that a student's chances of good academic progress, strong certificate results and successful post-school transition will vary depending on the school that he or she attends. For a school system this raises important issues. If a system wants to improve overall performance and achieve consistency in the quality of education and training then it will need to identify the schools that are doing a good job in order to identify successful school policies and practices that help achieve good student outcomes. It can then look to target improvements and help support those schools that are underperforming.

School performance indicators are an important part of this process. They are increasingly being used by school systems to assess the effectiveness of schools. Performance or effectiveness measures often focus on growth in student achievement over time (such as growth in student achievement test scores between Years 3 and 5), final year certificate results (such as Year 12 Victorian Certificate of Education study scores and tertiary entrance rankings), and post-school outcomes (such as entry rates to university and transition to full-time employment).

The main purpose of school effectiveness analysis is to develop models of student outcomes that provide the best possible estimates of the productivity of schools. To do this, effectiveness analysis needs to take account of the variations in the backgrounds of students entering the schools. This is because school performance is affected by more than what happens in school. Differences in the educational, cultural and material resources in families, and variations in poverty across communities, are powerful influences on student performance. These influences, as well as other factors, need to be examined as possible causes of differences in student outcomes when undertaking analyses of school performance. For example,

a school serving mainly disadvantaged students may outperform schools serving similar populations, and therefore be considered rightly to be an effective school, but not attain the same levels of achievement as a school serving mainly advantaged students. Carefully examining and measuring the relationships between schools and the different populations in the community is fundamental to policy development as it helps separate school from other influences in order to more accurately identify effective schools and the policies that can be used in planning educational reforms.

The purpose of the current report is to present some preliminary results from analyses of school performance in Australia. The report is being undertaken as part of the *Shared Future Project* for the Victorian Department of Premier and Cabinet (DPC). The report will initially describe some of the factors, such as socioeconomic status and school sector, that influence school performance by examining their impact on student outcomes. It will then examine school performance by comparing average student achievement for each school, using school as the unit of analysis. Modelling is used to control for the effects of differences in student intake and other factors such as school size and school location. In the final section, students and schools are studied jointly using multi-level analysis to measure the separate influence of different school factors (between-school effects) from the effects of individual student factors (between-individual effects).

Some of the measures and techniques used in the report are topics of debate in research on school effectiveness. It is important, therefore, to examine some of these issues before presenting the results of the analyses undertaken for the current study. This we will do now by turning to issues raised in the research on school effectiveness in the United Kingdom and then in the United States.

An international perspective on evaluations of school performance

Developments in the United Kingdom

There has been considerable debate in the United Kingdom (UK) on school performance and school effectiveness. The debate has centred on the methods and data used to compare schools. One side of the debate has favoured and promoted comparisons using school as the unit of analysis. Early comparisons based on this approach, undertaken by Local Education Authorities and the Office for Standards in Education (OfSTED), used simple percentages of students achieving a level of graded award or comparisons of rates against a national average. Such comparisons made no adjustments for differences in student intake to schools, differences in prior achievement, or differences in pupil progress. Consequently, the rankings tended to favour schools with large numbers of students from middle class backgrounds or with large numbers of students with high levels of prior attainment, such as grammar schools (Jesson, 2001; Reed & Hallgarten, 2003).

In the early 1990's, criticisms of the simple ranking of schools highlighted the inequity of accountability procedures which did not adjust for differences in the composition of student intake. Some argued that schools with large numbers of disadvantaged students may not have the same high levels of performance as those schools with students from more advantaged backgrounds but produce larger overall gains in learning and achievement. This led in 1995 to the government supporting the use of a contextual factor to control for differences in social intake – the percentage of pupils in receipt of free school meals. Schools were grouped into seven groups using this measure and 'benchmarks' were applied to the ranking of schools within each group. Any school's results could then be placed within the appropriate benchmark table and judgements made about how well its performance compared with 'similar' schools. Using this approach it became clear that schools with higher percentages of students receiving free school meals, in general, performed at lower levels than schools with lower levels of 'disadvantage'.

Refinements to the approach using school as the unit of analysis occurred over time. In 1999, 'free school meal' benchmarks were dropped and prior attainment benchmarks became the point of reference for all schools. A major feature of this

method of evaluating school performance was that schools' scholastic achievement characteristics were identified by aggregate measures of intake, context and outcome. Judgements were then made about the relative performance of any school by using order statistics to evaluate its aggregate performance measure. It followed that, for practical purposes, using aggregate measures for school evaluation could provide a simple first step in helping schools see where their performance placed them.

Another development within this framework of using school as the main unit of analysis was achieved in the work of the Specialist Schools Trust, an independent charitable organisation set up to promote the ideals of high performance through innovation and excellence primarily through developing outstanding performance in a distinct area of the curriculum (Jesson, 2001). The approach to school evaluation developed by the Trust was an extension of the benchmarking procedures which had been accepted and used by the Office for School Standards (OfSTED). Linear regression analysis was applied to groupings of schools identified, ranked and grouped according to aggregate prior attainment levels.

Despite improvements to the method of school comparison, some statisticians argued that comparisons using school as the unit of analysis without regard to the extent of variation linked to individual students were inappropriate and did not accurately measure school effectiveness. This opposing view on the measurement of school effectiveness argued for the development of pupil level 'models' of school performance. On this approach 'official' school-level comparisons were viewed as distorting the underlying reality of pupil progress and of schools' accountability for this by not taking into account variations in student achievement. It led to the development of multi-level modelling procedures, such as those devised by Goldstein (1987, 1993) of the London Institute of Education, which employ student-level and school-level factors to predict differences in student performance and estimate the percentage of variance in student outcomes separately attributable to schools. Measures of performance are derived from statistical models that include non-school factors that contribute to growth in student achievement, in particular, prior student achievement and student, family, and neighborhood characteristics. The aim is to statistically isolate the contribution of schools and programs to growth

in student achievement at a given grade level from all other sources of student achievement growth. The end result is a value-added indicator that captures differences in educational productivity among schools, programs, and policies.

School effectiveness research in the United States

School effectiveness has also been an important issue of debate in the United States. Beginning with the first large-scale study of school effectiveness in 1966 known as the Coleman Report (Coleman, et al., 1966), literally hundreds of empirical studies have been conducted that have addressed two fundamental questions:

1. Do schools have measurable impacts on student achievement?
2. If so, what are the sources of those impacts?

Studies designed to answer these questions have employed different sources of data, different variables, and different analytic techniques. Both the results of those studies and the methods used to conduct them have been subject to considerable debate.

In general, there has been widespread agreement on the first question. Most researchers have concluded that schools indeed influence student achievement. Murnane's (1981, p. 20) early review captured this consensus well: "… there are significant differences in the amount of learning taking place in different schools and in different classrooms within the same school, even among inner city schools, and even after taking into account the skills and backgrounds that children bring to school." Another reviewer concluded more succinctly: "Teachers and schools differ dramatically in their effectiveness" (Hanushek, 1986, p. 1159).

Despite this general level of agreement on the overall impact of schools, how much impact they have is less clear. Coleman generated considerable debate with the publication of his report in 1966 by concluding that schools had relatively little impact on student achievement compared to the background of the students who attend them.

The second question has also generated widespread debate. Coleman also began this debate with his conclusion that "the social composition of the student body is more highly related to achievement, independent of the student's own social background, than is any school factor" (Coleman, 1990, p. 119). This finding and the publication of the Coleman report marked the beginning of the methodological debate on how to estimate school effectiveness, a debate that has continued to this day. The Coleman study was criticized on a number of methodological grounds, including the lack of controls for prior background and the regression techniques used to assess school effects (Mosteller & Moynihan, 1972).

Since the publication of the original Coleman report, there have been a number of other controversies on sources of school effectiveness and the methodological approaches to assess them. One debate has focused on whether school resources make a difference. In a major review of 187 studies that examined the effects of instructional expenditures on student achievement, Hanushek (1989, p. 47) concludes: "There is no strong or systematic relationship between school expenditures and student performance." As noted earlier, Hanushek does acknowledge widespread differences in student achievement among schools, but does not attribute these differences to the factors commonly associated with school expenditures – teacher experience, teacher education, and class size. A recent re-analysis of the same studies used by Hanushek, however, reaches a different conclusion: "Reanalysis with more powerful analytic methods suggests strong support for at least some positive effects of resource inputs and little support for the existence of negative effects" (Hedges et al. 1994, p.13).

Another debate has focused on the effectiveness of public versus private schools. Several empirical studies found that average achievement levels are higher in private schools, in general, and Catholic schools, in particular, than in public schools, even after accounting for differences in student characteristics and resources (Bryk et al. 1993; Chubb & Moe 1990; Coleman et al. 1982; Coleman & Hoffer 1987). Yet while some (Chubb & Moe 1990) argue that all private schools are better than public, and thus argue for private school choice as a means to improve education, other researchers have argued that Catholic schools, but not

other private schools, are both more effective and more equitable than public schools (Bryk et al. 1993). Still other researchers find little or no Catholic school advantage (Alexander & Pallas 1985; Gamoran 1996; Willms 1985). Moreover, it has been suggested that controlling for differences in demographic characteristics may still not adequately control for fundamental and important differences among students in the two sectors (Witte 1992, p. 389).

Much of the debate about school effectiveness has centered on methodological issues. These issues concern such topics as data, variables, and statistical models used to estimate school effectiveness. Since the research and debate on school effectiveness began almost fifty years ago, new, more comprehensive sources of data and new, more sophisticated statistical models been developed that have improved school effectiveness studies. In particular, the development of multilevel models and the computer software to estimate them have given researchers more and better approaches for investigating school effectiveness.

Approach in this report

The current report presents three main sets of analyses:

1. A descriptive analysis of variations in cognitive, attainment and transition outcomes, measured between individuals and at a school level. This section presents an analysis of the distribution of outcomes using a range of measures and dimensions. For upper secondary performance, the measures include Year 12 results, and Year 12 achievement as measured by tertiary entrance scores. School dimensions include measures of student characteristics such as the mean student socioeconomic status (SES) and mean achievement.

2. A school-level analysis in which performance is estimated using regression models, with general achievement and a range of catchment area and intake characteristics factored in. Models are constructed which take account of both mean levels of achievement in a school and a range of social intake and locational characteristics to estimate school performance, and use the size of the residuals as a measure of effective schools.

3. A multi-level modeling analysis in which hierarchical linear modelling (HLM) is used to look at the interrelationships between factors at the student and school levels. This procedure allows modelling of outcomes using both individual and school units, partitioning separately the variance and effects at each level while controlling for the variance across levels. This type of analysis provides a robust way of measuring school effectiveness.

The data for the three sets of analyses were derived from a wide range of sources. The three sets of analyses include data from the Longitudinal Surveys of Australian Youth (LSAY), the Third International Mathematics and Science Survey (TIMSS), primary school achievement data for the state of Victoria, and secondary school Year 12 data provided by the Victorian Curriculum and Accreditation Authority.

2. Descriptive analysis

How well students do in school is affected by a range of factors. There is a substantial body of research, both local and international, demonstrating that children from lower socioeconomic family backgrounds tend to achieve less well at school, and are less likely to stay on at school and enter further or higher education. How are these students distributed across schools? School performance is likely to reflect in part the effect of these distributions. This section will present information on some of the institutional factors, such as socioeconomic status and school sector, that influence school performance. It provides information on the social and achievement distributions of students across different types of schools as well as across different regions.

The analysis is presented separately for students and then for schools. The student analysis begins with a descriptive outline of the distributions of students across categories of schools and regions. It then provides an analysis of the relationship between student achievement and family background across different types of schools. The school level analysis focuses on performance across a range of different student outcome measures with schools grouped by school sector (government, Catholic and Independent). It provides a descriptive analysis of school performance.

Student analysis

Distributions of students

Tables 1 to 3 present information on the distributions of Year 12 students across Victorian schools. They provide information on the social distribution by school sector (government, Catholic, independent), the regional distribution (high SES urban, middle SES urban, low SES urban, rural Victoria) by school sector, and the general achievement distribution (General Achievement Test scores) by sector. The social distribution of students is based on the grouping of students into quintiles of socioeconomic status. The achievement distribution of students is based on the grouping of students into quintiles of achievement scores based on results derived

from the General Achievement Test (GAT) which is a test of general knowledge and skills in written communication, mathematics, science and technology and humanities, the arts and social sciences.

The tables show that schools in Victoria are socially segregated. Independent schools largely serve students from high SES backgrounds. Almost 50 per cent of students in independent schools are in the highest quintile of SES. This is compared to only 13.4 per cent of government school students and 18.8 per cent of Catholic students.

Looking across social groups, independent schools enroll 42.4 per cent of all high SES students, compared to only 37.7 for government schools. At the other end of the scale, government schools enroll 72.4 per cent of low SES students, compared to independent schools, which enroll only 5.3 per cent and Catholic schools that enroll 22 per cent.

Table 1 Distribution of Year 12 students, by sector and quintile of SES: Victoria (%)

	Government	Catholic	Independent
		Within school type	
SES quintile			
Low	23.3	18.8	5.9
Lower middle	22.7	19.1	8.8
Middle	21.2	22.3	13.7
Upper middle	19.3	21.0	21.7
High	13.4	18.8	49.9
Total	100.0	100.0	100.0
		Within SES quintile	
SES quintile			
Low	72.4	22.0	5.6
Lower middle	69.8	22.0	8.1
Middle	62.8	24.9	12.3
Upper middle	57.2	23.4	19.4
High	37.7	19.9	42.4
% of Year 12 students	59.1	22.3	18.6

Source: Figures derived from 2000 VCE data provided by the Victorian Curriculum and Accreditation Authority. SES is based on address-matched census collection district scores from the occupation and education index of the Socioeconomic Indexes For Areas (SEIFA) provided by the Australian Bureau of Statistics. The scale has a mean of 1,000 and a standard deviation of 93.4. N=53,527.

Table 2 shows that this pattern also occurs regionally. Students attending independent schools are mainly located in high SES urban areas, while students attending government schools are more often in low SES urban areas and in rural Victoria.

Table 2 Distribution of Year 12 students, by sector and region: Victoria (%)

	Government	Catholic	Independent	% of Year 12 students
		Within school type		
Region				
High SES Urban	19.6	27.6	53.1	29.0
Middle SES Urban	21.6	18.5	19.3	20.1
Low SES Urban	24.7	26.7	12.6	22.6
Rural Victoria	34.1	27.2	15.0	28.3
Total	100.0	100.0	100.0	100.0
		Within region		
Region				
High SES Urban	42.1	22.2	35.8	
Middle SES Urban	62.5	20.0	17.5	
Low SES Urban	63.8	25.9	10.3	
Rural Victoria	69.6	20.8	9.6	

Source: Figures derived from 2000 VCE data.

Table 3 Distribution of Year 12 VCE students, by sector and quintile of GAT achievement: Victoria (%)

	Government	Catholic	Independent
		Within school type	
GAT quintile			
Low	27.4	16.3	9.4
Lower middle	20.8	19.7	12.6
Middle	20.4	23.5	17.9
Upper middle	16.8	21.4	22.8
High	14.5	19.1	37.3
Total	100.0	100.0	100.0
		Within GAT quintile	
GAT quintile			
Low	74.2	17.6	8.2
Lower middle	63.6	24.0	12.3
Middle	57.4	26.4	16.2
Upper middle	51.4	26.1	22.5
High	42.6	22.3	35.1

Source: Figures derived from 2000 VCE data.

The achievement distribution, measured by quintiles of General Achievement Test (GAT) scores, also shows marked variation by school sector, though not as strongly as SES (see Table 3). Over 60 per cent of students in independent schools are in the two top quintiles of GAT achievement, compared to only 31.3 per cent of government school students. The patterns show that the school system is divided along achievement lines as much as social background.

Variation occurs not only across school sectors and regions, but also within. For example, students attending government schools are segregated along socioeconomic lines, due in part to the effects of residential segregation and economic factors as well as school selection policies and features of the government school system. One interesting pattern of segregation involving government schools is that linking school size and social composition. Table 4 contains information on the social distribution (SES quintiles) of government primary and secondary schools, by school size. The social intake of schools is strongly related to enrolment size. It shows that schools with a high SES intake are more often large schools whereas schools that serve students from low SES backgrounds are more often small to medium sized. For example, 43 per cent of primary schools with a high SES student population have enrolments over 400. By contrast, only 17 per cent of schools serving low SES communities are of this size. At secondary school level, almost 70 per cent of schools with a low SES intake enrol 600 or fewer students. At the same time, over 60 per cent of schools with a high SES intake have enrolments exceeding 900 students.

The relationship between school size and social intake has important policy and resource implications. There are advantages to size. Large schools produce economies of scale. They can provide levels of service in a more cost-effective way. Smaller schools appear less efficient because they have higher per capita funding needs to provide the same level of services provided in larger schools. The tendency for schools serving low SES populations to be smaller in size exerts increased resource pressures on such schools in pursuing the same educational goals as larger schools. The recent OECD study on student reading performance using PISA data reported significant gains in performance for every increase of 100

students up to 1000 students (OECD, 2001). To achieve the same level of performance as larger schools, many low SES secondary schools mainly small in size need additional resources to deliver the same services and further resources to address the problems associated with schooling students from disadvantaged backgrounds.

Table 4 SES and school size: Victorian government schools (%)

	SES quintile					
	High SES	Upper middle	Middle	Lower middle	Low SES	All
Size (quintiles)			*Primary schools*			% (N=)
Less than 80	13.5	19.2	21.2	17.1	11.4	20 (246)
81-185	9.4	18.9	19.9	19.2	18.2	20 (246)
186-275	12.5	13.9	14.1	19.2	28.9	20 (246)
276-405	21.5	16.2	13.5	18.9	23.9	20 (246)
406+	43.1	31.8	31.4	25.5	17.5	20 (246)
Total	100.0	100.0	100.0	100.0	100.0	100 (1230)
Size (quintiles)			*Secondary schools*			
Less than 350	8.2	14.3	16.0	14.3	20.4	20 (51)
350-600	10.2	26.5	24.0	18.4	46.9	20 (51)
601-900	20.4	28.6	20.0	24.5	10.2	20 (52)
901-1200	30.6	20.4	18.0	30.6	14.3	20 (51)
1201+	30.6	10.2	22.0	12.2	8.2	20 (51)
Total	100.0	100.0	100.0	100.0	100.0	100 (256)

Source: Data provided by the Victorian Department of Education from the annual school census.

The cost of delivering services in smaller schools is greater on a per capita basis. The interaction with social disadvantage, and the higher costs associated with meeting the educational needs of low SES students, mean that smaller schools serving largely low SES populations may require disproportionately larger per capita funds. Only then will such schools be able to deliver the sorts of programs or services needed to improve outcomes, programs such as more intensive individual instruction and assistance, case management and mentoring, smaller class sizes and welfare management.

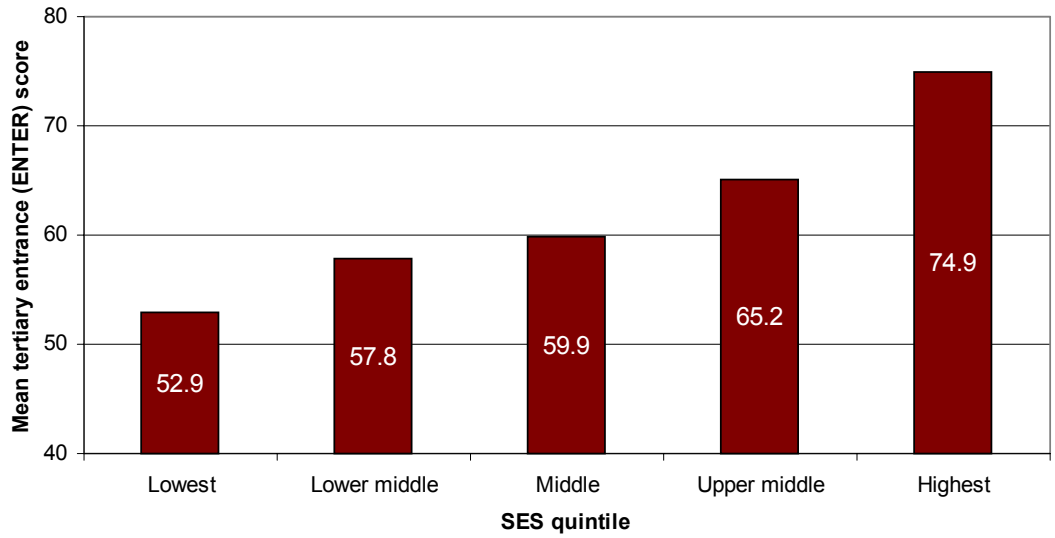
Achievement and SES

The performances of students at Year 12 level are closely related to the socioeconomic backgrounds of their families. Figure 2 depicts the relationship

between student Year 12 performance and student SES. Students have been grouped into quintiles according to their SES index scores. The figure reports the mean tertiary entrance (ENTER) score by quintile of SES. Tertiary entrance scores are percentile rankings based on the total of the "three best" Year 12 subject or study scores plus English (or equivalent).

The figure shows quite clearly that students from lower SES backgrounds (those whose parents more often are in lower paid jobs and less often possess tertiary qualifications), perform less well in Year 12 than students from higher SES families (those where parents more often have higher educational qualifications and more often work in professional occupations). The average ENTER score for Year 12 students in the bottom quintile of SES in 2000 was 52.9. This was 22 points below the mean score achieved by students in the highest quintile of SES.

Figure 1 Mean tertiary entrance (ENTER) scores, by quintiles of SES: Year 12 VCE students, 2000 (%)



Source: Figures derived from 2000 VCE data. SES is based on address-matched census collection district scores from the occupation and education index of the Socioeconomic Indexes For Areas (SEIFA) provided by the Australian Bureau of Statistics.

Achievement and sector

Figures 2 and 3 present analyses using student results from 2000 Victorian Certificate of Education (VCE) data. The purpose of the analyses is to address the question "do students of similar prior achievement levels perform differently in

VCE depending on the type of school they attend?". Two outcome variables are used:

1) Mean VCE scores, which represent the average score across all of the units of study undertaken by Year 12 students in 2000.

2) Mean ENTER scores, which represent the tertiary entrance rank of Year 12 students in 2000.

Prior achievement is measured using results from the General Achievement Test (GAT) undertaken by students in Year 12. Students are distributed into quintiles based on their results.

An important feature to note is that student performance in VCE, measured by both mean VCE scores and ENTER scores, varies depending on type of school attended. However, the gaps weaken as prior achievement increases. That is, sector effects become weaker as student prior achievement increases — high achieving students in government schools do nearly as well in VCE as high achieving students in non-government schools. This is not true for low achieving students in government schools.

Figure 2 shows that after controlling for general achievement level as measured by combined GAT scores, sector differences in VCE scores tend to contract towards the high end of the general achievement range and to grow towards the lower end. Both government and Catholic school students narrow the gap between them and VCE students in independent schools as achievement rises, whereas in the lower bands of achievement this gap widens.

Does this imply that independent schools exert their biggest impact on low achievers and their smallest impact on high achievers? This would be an unguarded inference. Young people who complete school in the independent sector and who are low achievers as measured by the GAT represent fewer than 1 in 10 of all Year 12 students in the sector. Catholic schools have nearly double the proportion of students in this low achievement category and government schools have almost

three times the proportion (9.4% independent, 16.3% Catholic, and 27.4% government) (see Table 3 above). The comparatively small proportion of low achievers in independent schools points to the risks of (a) assuming that in each sector the mix of "low achievers" is the same, i.e., that they are drawn from the same population and do not differ in other significant ways, and (b) that the low achievers in independent schools have a similar range of classroom peers as low achievers do in Catholic or government schools and learn within a similar social environment. As these assumptions are untested, it cannot be concluded that independent schools confer a particular advantage on low achievers as compared to average or high achievers.

Again the finding that independent schools make a difference *throughout the achievement range* must be treated with care. As mentioned, students drawn from lower levels of achievement are more likely to attend classes with higher achieving pupils than happens in either Catholic or government schools. This is because about 60 per cent of all Year 12 students in independent schools are in the top two bands of achievement (Table 3). Both average and low achievers are more likely in this context to be mixed in classes attended by high achievers, notwithstanding the effects of ability-based subject choices and streaming or setting practices. Research on peer effects highlights the positive effects on achievement, motivation and behaviour of students in academically-selected settings (e.g. see Kahlenberg, 2001). When VCE results are compared by sector, with level of achievement controlled, the statistical control relates only to an individual attribute (the GAT score), not the classroom context (or indeed the school community) as defined by the ability mix of students. In effect, the low achiever is abstracted from the context of instructional and cultural interactions, which may impact on VCE success. The same applies to average and also high achievers, and the effects may operate in a negative as well as a positive direction. In other words, low achievers may do worse in government or Catholic schools because they attend classes more uniformly composed of other low achievers, not because they attend schools that are government or Catholic.

Figure 2 Mean VCE scores, by General Achievement Test (GAT) quintile and school sector: 2000

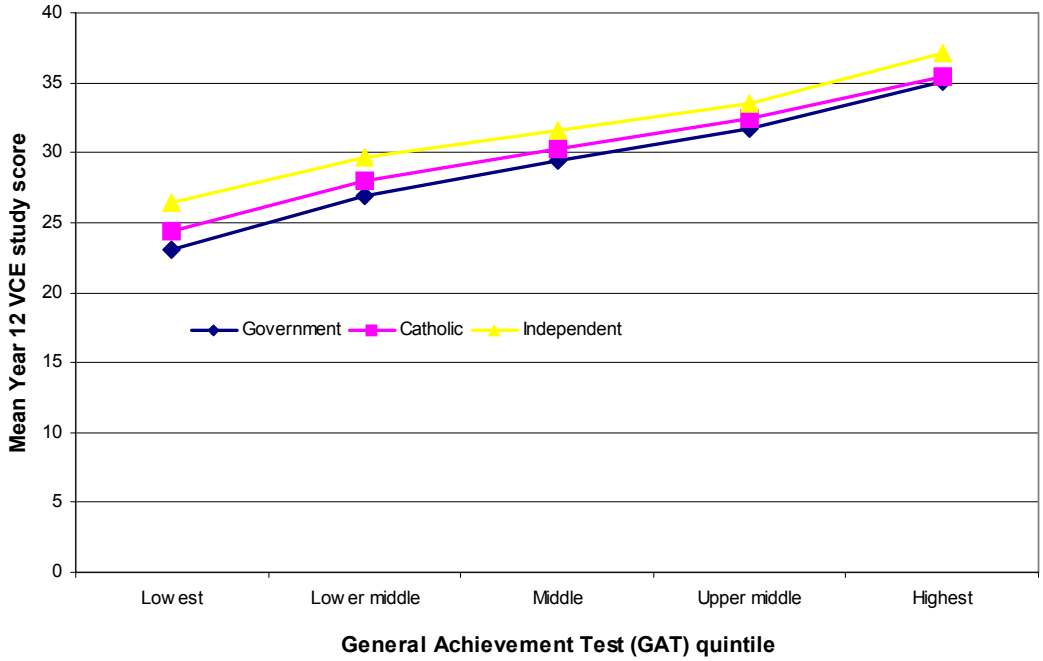
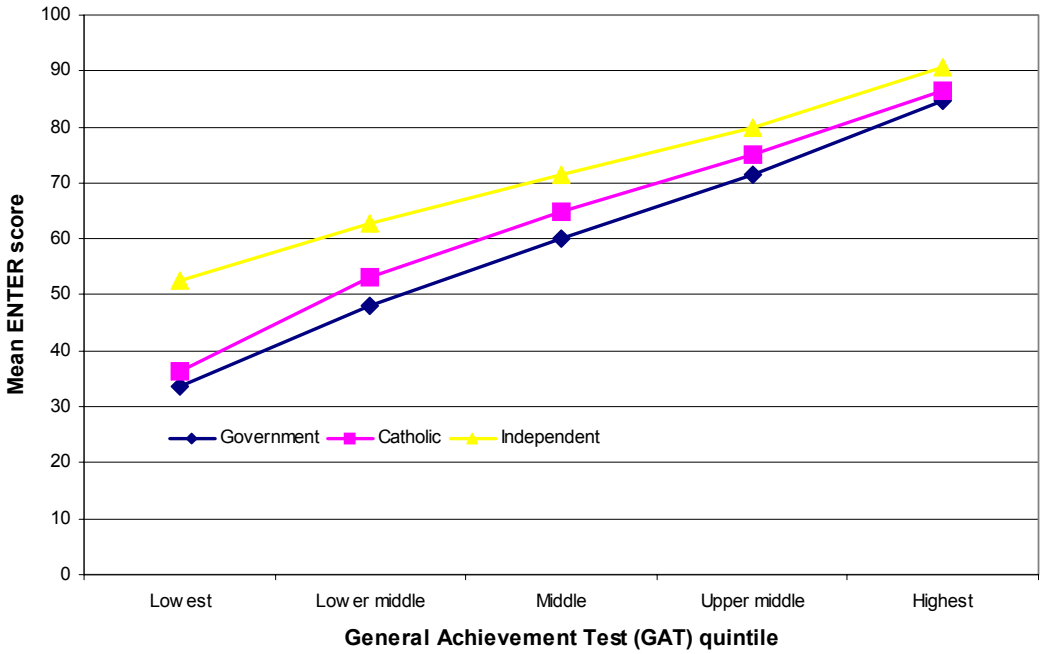


Figure 3 Mean tertiary entrance (ENTER) scores, by General Achievement Test (GAT) quintile and school sector: 2000



The tendency for sector differences in VCE study scores to contract as the scale of student achievement is ascended also occurs with ENTER scores (see Figure 3). As mentioned above, ENTER scores are percentile rankings of tertiary applicants, and they are based on the total of the "three best" study scores plus English (or equivalent) and bonuses for additional subjects, languages and Specialist Mathematics. The raw study scores are rescaled before being added, so that a study taken by students who perform well in their other studies is adjusted upwards, while a study taken by students performing poorly in their other subjects is adjusted downwards. There is a significant difference between a simple aggregation of four raw scores and a percentile rank calculated from rescaled scores plus bonuses. In general, students who take preparatory maths, physical sciences, languages, and certain of the older humanities will have their marks adjusted upwards.

When students are compared on this adjusted measure, the result is to widen the gap between independent and other sectors, and also to widen the gap between Catholic and government schools in the middle ranges of GAT achievement. The most striking difference is the gap in the lower end of the GAT scale. It is among low achievers that the advantage of non-government school attendance is at its greatest. This may be due to the fact that even low achievers in independent schools are more likely than low achievers in other school sectors to enrol in subjects whose scores are scaled up for tertiary selection. Recall that the low achievers in independent schools represent fewer than 10 per cent of students in Year 12 classes. This small minority is likely to be distributed across the curriculum, including in "high stakes" subjects, not only in "low status" subjects such as the newer humanities, business, personal development studies, and VET. If so, they will benefit from rescaling, while low achievers in government and Catholic schools are less likely to benefit. For these groups—proportionately much more numerous in their respective sectors—are more likely to have been relegated into less demanding streams of the VCE and to have their study scores adjusted downwards.

The independent school advantage associated with heavier enrolment in "high stakes" subjects declines as the achievement scale is ascended because high levels of achievement are associated with higher enrolment in scaled-up subjects. The

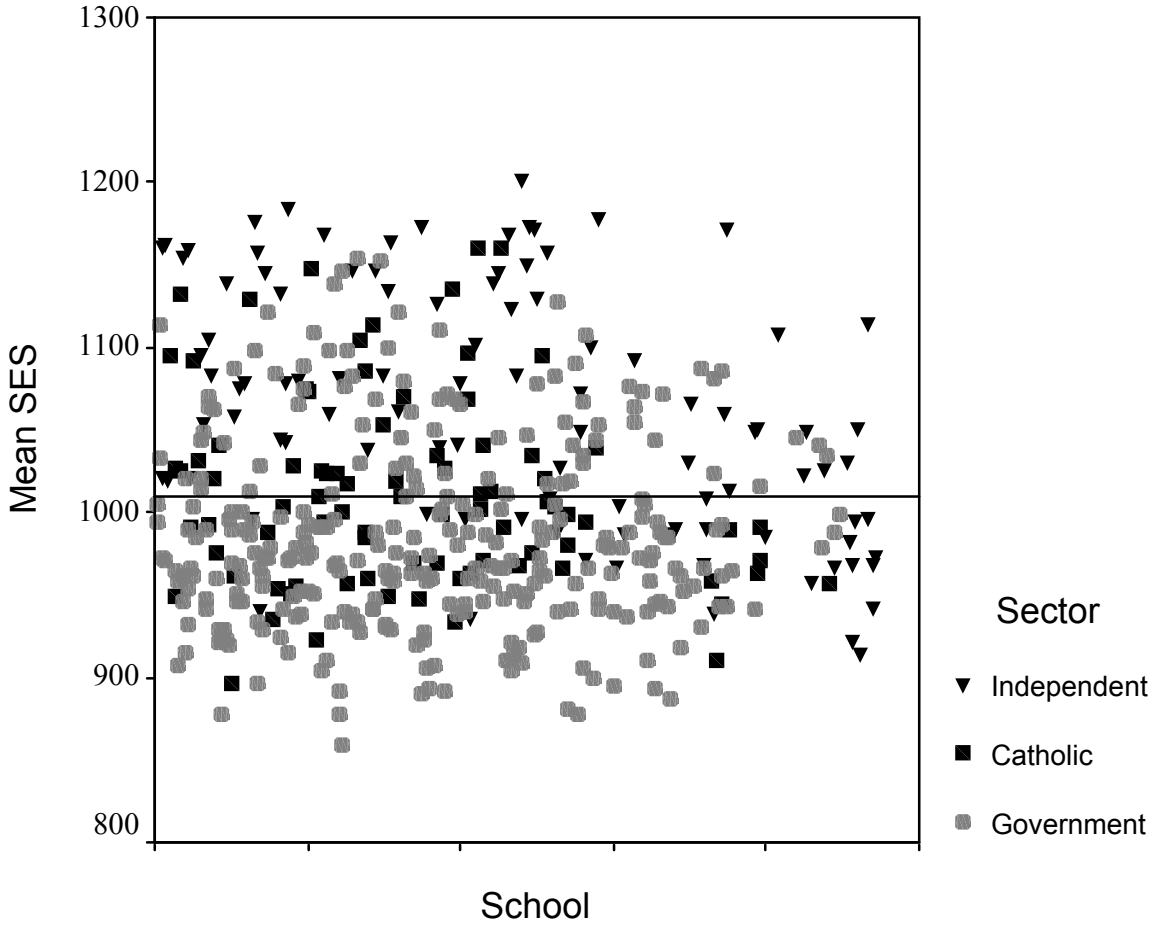
sector gap does not disappear, but it becomes compressed, and at the top end of the achievement scale it is very small.

School analysis

Distributions of schools

Figure 4 presents information on the distributions of Victorian secondary schools according to the mean student SES. The three types of schools — government, Catholic and independent — are marked differently. The SES scale is based on a mean of 1,000 with a range from 852 (low SES) to 1212 (high SES). The distribution shows that mean student SES is much higher in independent schools with most well above the average of 1000, while most government schools are below the average. Catholic schools are spread across the range of SES.

Figure 4 Mean student SES for each Victorian secondary school, by school sector: 2000



Source: Figures derived from 2000 VCE data. SES scores are the mean val;ues by school of student measures derived from address-matched census collection district scores from the occupation and education index of the Socioeconomic Indexes For Areas (SEIFA) provided by the Australian Bureau of Statistics.

While independent schools far more often have higher mean SES scores, this is not true of all independent schools. Approximately one-quarter have a mean SES below the state average, spread within the range from 914 to 998. This is much fewer than the number of government schools below the state average (69 per cent) and the number of Catholic schools (48 per cent), but it reveals that schools comprising the independent sector are not uniformly high SES.

The dispersion of independent schools by mean student SES reflects in part fee-levels and regional location. Table 5 separates independent schools into three categories based on the fees they charged families for each student in 2002: low fee (less than $5,000), medium fee ($5,000-$9,999), and high fee ($10,000 or more). The percentage of each category is presented by regional location. The table shows that low fee independent schools (those charging families less than $5,000 per year for each student) are located more often in rural areas (33 per cent), though over one-fifth are located in low SES urban areas. High fee independent schools are predominantly in high SES urban centres (60 per cent) and few in rural areas (5 per cent).

Table 5 Distribution of independent and government schools, by per capita fee-level and location: Victorian secondary schools (%)

	Capital city			Rural		
	High SES	Middle SES	Low SES	Rural	Total	N=
			Independent schools			
Low $0-4,999	23	21	23	33	100.0	30
Medium $5,000-9,999	28	20	24	28	100.0	25
High $10,000+	60	24	11	5	100.0	37
			Government schools			
Low $0-349	1	18	43	38	100.0	95
Medium $350-599	8	20	17	56	100.0	126
High $600+	46	25	5	25	100.0	65

NOTE: Independent school fee level is based on Year 12 fees charged in 2002. The government school fee level was derived from estimates of the fee revenue component of locally raised funds using data provided by the Victorian Education Department.

The regional distribution of fee levels in government schools in 2002 are presented for comparison. The schools are also categorized according to low, medium and high fee levels. It is important to note that fees and levies applied in government schools are voluntary, and the estimates presented here are not the fees actually

charged, but estimates of the revenue received from annual fees and levies that contribute to the school budget category 'locally raised funds'. The patterns show government schools that receive low levels of revenue from fees (less than $350 per student) are concentrated in low SES urban regions (43 per cent) and in rural areas (38 per cent). Government schools that receive more than $600 per capita — high fee revenue government schools — are concentrated in high SES (46 per cent) and middle SES (25 per cent) urban areas.

Profiles of school achievement

Figures 5 and 6 present analyses using mean school results from 2000 VCE data. The purpose of the analyses is to map the distributions of VCE achievement at a school level against mean GAT scores to identify patterns of school performance. A trend line is added to each figure to assist in identifying schools that are performing above or below the average.

Of note, is the fairly linear relationship between GAT scores and VCE achievement (VCE scores and ENTER scores). However, the distributions of achievement around the mean (represented by the trend line) suggest that there is a spread of performance in each of the school sectors, even though government schools tend on average to have lower scores.

GAT scores should provide a good prediction of VCE scores because the GAT tests are designed to externally validate school assessments and are administered in the same year in which students undertake their Year 12 studies. Figure 5 displays the close relationship between GAT and VCE study scores. However, as indicated, there is also a spread around the estimation line, with some schools performing above expected levels and others performing below. This holds throughout much of the range of the GAT, though at the upper end, there is a pattern in which VCE scores are more frequently under-estimated by GAT than over-estimated. In other words, more schools at this high end of the range out-perform than under-perform.

Another notable feature of Figure 5 is the uneven spread of government and non-government schools across the GAT range. Most schools at the lower end of the

range are government schools, while most schools at the high end are independent schools. Catholic schools are concentrated around the middle of the GAT range. This finding needs to be kept in mind in forming judgements about school effectiveness. Regardless of the effectiveness of government schools *relative to the academic mix of their pupils*, there is a group of independent schools whose academic mix places them at a much higher level of performance in the VCE, and many of these independent schools have features enabling them to perform above expected results at this high end.

The tendency for GAT scores to under-estimate VCE performance at the high end of the achievement range is also found in the relationship between GAT and the percentile rankings of students for tertiary entrance (ENTER) (Figure 6). When combined GAT scores exceed 65, there are few schools lying below the estimation line and a great many lying above it. The GAT model under-estimates ENTER scores just as it under-estimates VCE study scores. Almost all of the schools which exceed expectations are independent schools. The reasons for this are probably related to the focus of these schools on university entrance, a pattern of subject choice aimed at maximizing study scores and benefitting from adjustments and bonuses, and possibly other factors relating to promotions policies, second sittings, and enhancement strategies.

At the lower end of the achievement range, there is a comparatively wide dispersion of schools (mainly government). The model is also weaker at this end, though there are fewer schools involved. In some cases, GAT greatly under-estimates ENTER, while in as many other cases the average ENTER score is well below what GAT predicts. Over-estimation—lower ENTER than predicted—could occur if a group of mainly low achievers in a school did not sit the GAT. If all of this group did nevertheless complete their VCE assessments, the average ranking of all students in the school could be lower than predicted because it was mainly better students who took the GAT. Their participation would have raised the GAT scores beyond what full participation would have achieved, while the low achievers would have driven down the VCE scores on which the ENTER is calculated. Under-estimation—higher ENTER scores than predicted—can occur if schools are better at preparing students for exams than for the GAT. Students are not supposed to be trained for

the GAT and there is no incentive for schools to prepare students specifically for the GAT. If a school places no emphasis on the GAT, while applying a heavy emphasis to examinations, the result may be to achieve higher VCE scores than predicted, and this in turn will be associated with higher average percentile rankings, especially if the academic emphasis involves ENTER-maximizing strategies.

School effectiveness models should be viewed in the context of absolute differences between schools serving different populations. These absolute differences are substantial. Moreover, the perception in the community that large differences in standards do exist—even if not known precisely—stimulates enrolment drift (and also residential migration), which in turn contributes to absolute differences in attainment. It is the absolute achievement, not relative achievement, which determines opportunity and future life chances. Both relative and absolute differences in perspective are important.

Test results in government primary schools show how wide the gap in achievement can be between schools serving different communities (see Figure 7). There are also large gaps in behaviours associated with effective learning, such as student absences. Figure 7 is restricted to government schools and presents mean VCE scores and Year 5 AIM (primary school) results for schools grouped into SES quintiles. Mean annual days of student absences are also reported. The chart shows that there is a strong relationship between the performance of schools on the effectiveness measures and the SES composition of the schools. Students in high SES secondary schools, for example, obtained an average VCE result of 30.5 compared to an average score of 24.9 in schools with large numbers of low SES students.

Figure 5: Mean VCE scores, by mean General Achievement Test (GAT) score and school sector: 2000

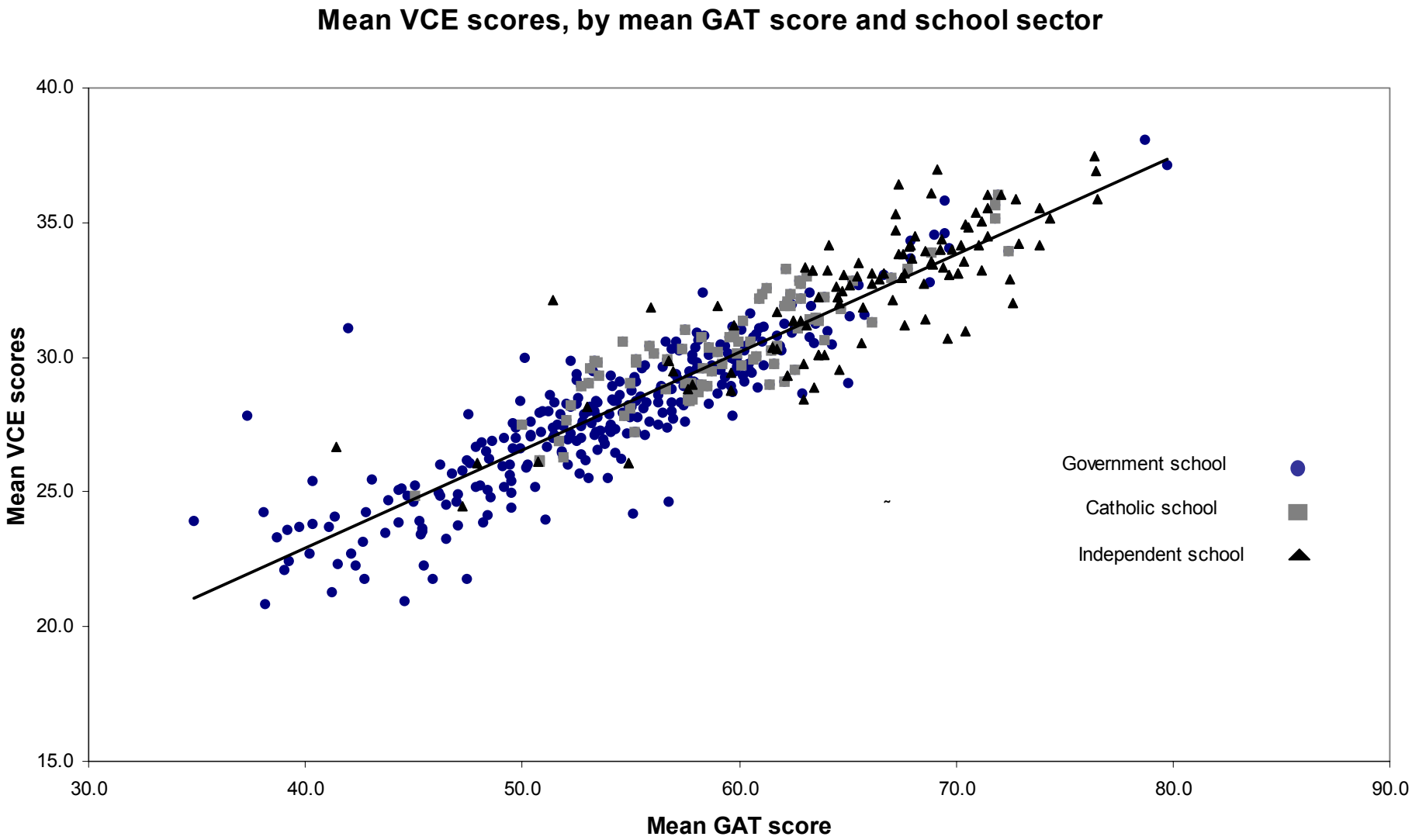


Figure 6: Mean ENTER scores, by mean General Achievement Test (GAT) score and school sector: 2000

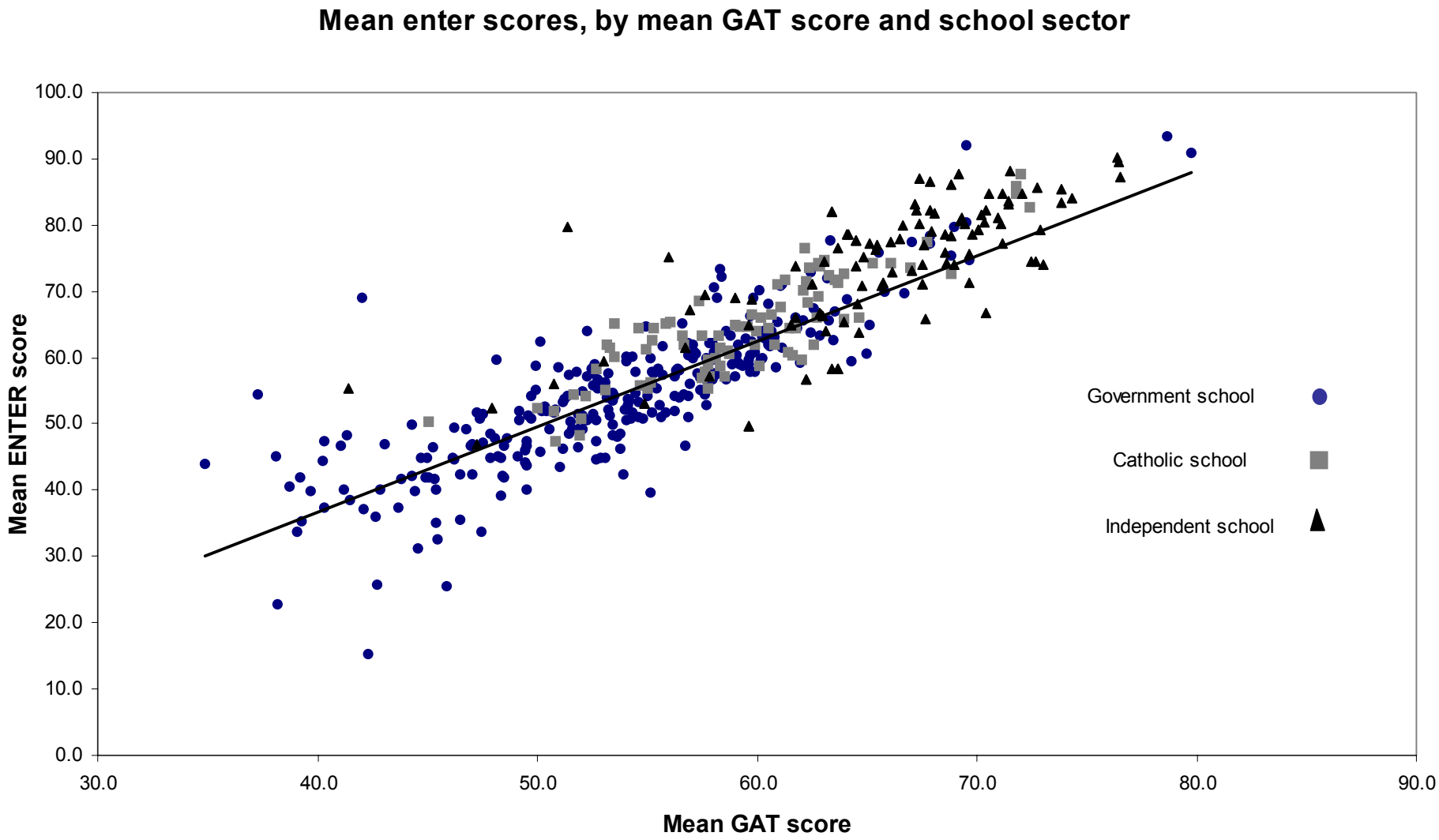
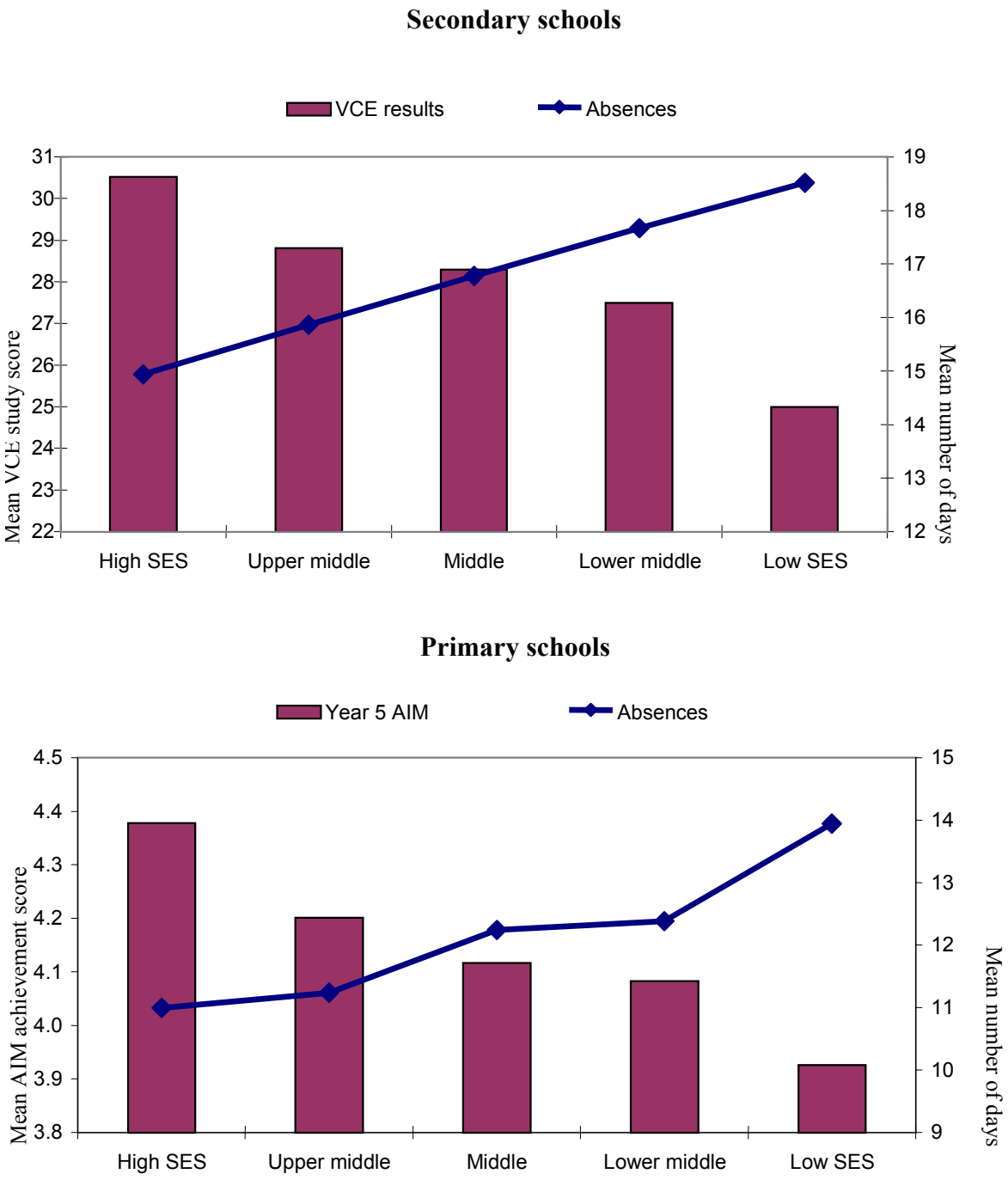


Figure 7: Secondary and primary school achievement and student absences, by SES: government schools, Victoria



Source: Lamb (2004)

The link between effectiveness measured through student absences and social intake is linear. Low SES secondary schools have the highest number of mean student absences — 18.5 days per student on average. As we ascend the categories of schools by SES composition the level of absences declines, falling to 14.9 days per student in high SES schools.

Similar patterns appear for primary schools. Year 5 AIM results on average fall as we move from high SES schools to low SES schools and student absences increase.

Differences in performance between government schools serving different social groups are consistent and substantial. In terms of VCE results, for example, 43 of the 49 schools from the high SES band had a higher average than the best performing school from the lowest SES quintile of schools. The lowest performing high SES school had an average VCE performance lower than only 5 of the 49 low SES schools. In terms of effectiveness measured using learning outcomes most low SES schools have massive ground to make up to match the performance of even the worst performing high SES schools.

3. School performance: school-level analysis

How effective are schools in raising levels of student performance? One way to address this question is to compare mean school scores on student achievement against a state or national average to assess the effectiveness of each school. Given that schools serve different populations of students and that the variations in concentrations of students from different social backgrounds are likely to affect their performance it is important to compare schools taking into account the context of the kinds of students attending each institution. This type of "value-added" approach has received considerable support among researchers examining school effectiveness (see Jesson, 2001). In this section several analyses of performance are presented using school as the unit of study after appropriately controlling for differences in student intake. The first set of analyses focuses on secondary schools and senior certificate results. A range of measures is used including VCE scores, ENTER scores and individual subject results. The analyses were undertaken using regression models in which various intake and other attributes were included to permit analyses of residual variance after controlling for school population differences. They examine the extent to which a school's achievement is better than predicted based on the background characteristics of its students—schools that can considered to be doing producing superior achievement. Standardised residuals were generated and saved to identify schools performing above predicted performance levels given their intake. The analyses also identify schools that are underperforming according to the results.

The control variables included in each regression were mean general achievement (GAT scores), mean SES, school size based on enrolments, and rural or urban location. General achievement provides a measure of control for the academic composition of schools. Schools with higher mean general achievement are likely to do better on the academic outcome measures because of the superior general aptitude levels of students. Similarly, it is important to control for SES composition because of the well-documented relationship between SES and student performance (e.g. see, Teese, 2000). School size and regional location can also influence the

performance of schools. The OECD study presenting PISA results, for example, reports a significant relationship between school enrolment size and reading skill levels (OECD, 2001). Regional location, according to several studies in Australia, is an important dimension of school performance that needs to be considered in assessments of effectiveness (e.g. see Teese, 2000; Teese & Polesel, 2003).

The second set of analyses relates only to government primary schools and examines Year 5 achievement. The achievement measure is a composite score based on Achievement Improvement Monitor (AIM) data which measure the literacy and numeracy skill levels of students. The results were derived from regression models in which various intake and other attributes were included to help identify schools that are doing better than expected. Included in the control variables were Year 3 achievement (AIM) results from two years earlier. The inclusion of the Year 3 results as a control permits a more robust analysis of effectiveness because the Year 5 achievement results are based on a population that contains many of the same students, two years later. The other control variables included in the regression were the mean SES, school size, density of indigenous students, density of students from mobile or transient families, and school location.

Secondary school performance

Figure 7 is a graphical representation of schools according to VCE performance, after adjusting for social intake, size, location, sector and achievement intake as measured by the GAT. Schools are represented in terms of their distance from the level of performance that would be expected, given their average GAT score. Those above the horizontal axis are performing at higher than expected levels. Those below the axis are under-performing. The amount of distance is expressed in units of VCE scores. Each unit of VCE score represents one standard deviation. A school located at one standard deviation above zero (which represents the mean) achieves on average for its students a gain of 1.2 VCE scores. VCE scores are based on a scale of 50 with a mean of 30.

The residual is the amount of variation in scores unaccounted for by the model (controlling for social intake, sector, size urban or rural location, GAT). The standardized residual is this amount represented in units of VCE scores.

It will be seen from Figure 7 that throughout much of the range in GAT, there are schools which perform at over one standard deviation above the mean (gaining an average for its students of 1.2 points on the VCE scale). These can be described as high performing schools. They include many government schools, mainly operating at average or lower levels of the GAT. However, a few government schools located in the upper ranges are also high performers.

There are also under-performing government schools in the middle to lower ranges of the GAT (though practically none in the upper ranges). Conversely, as we ascend the GAT scale, we begin to meet some independent schools which are under-performing with a few others high performing.

It appears that the greatest variability in observed over expected performance occurs in the lower ranges of the GAT and mainly with respect to government schools. Some schools are greatly out-performing expectations (achieving an average gain of 6.0 points or even 7.2 points about the expected level given their GAT and social intake), while others are greatly under-performing (some producing a loss of 4.8 points on average below what could be expected given their intake). However, though the spread is widest at the lower end of the GAT range, over- and under-performance are not confined to this range or to the government sector.

The performance of schools can also be displayed relative to social intakes (Figure 8). The SES measure in this case is based on the ABS *Index of Educational and Occupational Status* applied to the census collection district of a student's home address. As in the previous analysis, schools are represented in terms of standardized residuals expressed in the original units of VCE scores. Controlling for SES brings about a more stable and consistent relationship across the range of the intake variable than was the case with achievement (GAT). Throughout much of the social range in which government schools operate, there are many government (and Catholic) schools performing above expected levels. There are a

few cases at extremes (four to six standard deviations above the mean, representing 4.8 to 7.2 VCE scores above their expected level of performance based on intake). Some government schools towards the high end of the social range are gaining an average of 1.2 to 3.6 points more for their students. Against this are the government (and Catholic) schools serving poor communities and which are performing below expectations. A notable feature of the chart are the mainly independent schools serving the most economically and socially advantaged communities. Here there is a handful of schools operating at between one and three standard deviations above the mean, or an average gain of 1.2 to 3.6 points on the VCE scale.

If social intakes provide a good measure of prediction of success, it is also clear from this analysis that other factors are also important. Some schools are able to recruit highly able students from poor families. The poor location of the student's address lowers the average social level of the school, while the student's ability raises the performance profile of the school above levels expected purely from social intake. Selectivity and cross-regional movements to attend schools of choice can contribute to this, as well as practices such as scholarships.

By contrast, a school whose social prediction of success is low may perform still more poorly if it tends to be a refuge for young people who are not accepted elsewhere in the local community because of behavioural or other problems. Again schools serving the same community and having broadly similar social intakes may divide along lines of academic emphasis, with some choosing to concentrate on university preparation and others running VET programs. In this context, when performance is measured on the VCE, the school serving the less academic populations may under-perform against the social prediction, while the school which has chosen to focus on university (and may have constrained the curriculum accordingly) may over-perform as a result. Figure 8 does not provide a community perspective on schools, but considers each one as an isolated entity.

The patterns of distribution in VCE scores and performance across school sectors are summarized in Figures 9 and 10. Figure 9 presents a box plot of standardized VCE scores. The scores are unadjusted for intake. The spread of scores shows that there is no crossover between the performance of the middle 50 per cent of

government schools and those of independent schools: government schools record lower achievement levels. Almost 75 per cent of government schools are below the median score for independent schools, while only 7 per cent of independent schools are below the government school median.

The spread of raw scores shows the effects of a highly segregated system. Independent schools achieve much higher results than government schools thanks to selected social intakes. The spread of scores highlights the powerful influence that social intake has on school achievement levels. It represents one of the major policy challenges facing school systems. If the aim is to raise overall levels of achievement, then it will be necessary to address the large social gaps in performance.

There is little doubt about the effects of social intake. Figure 10 presents a box plot of the standardised residuals obtained from the model of VCE scores after controlling for various intake factors. The changes between Figures 9 and 10 represent the effects of intake on school performance between the sectors. After adjusting for social and achievement composition as well as location and school size there is considerable crossover between the performance levels of the middle 50 per cent of schools. The comparison highlights the massive impact of social and academic intake differences. It suggests that if the aim is to provide learning opportunities for all students, irrespective of their home backgrounds, then school policy needs to address the problem of how to better develop students from disadvantaged backgrounds. The contrast between Figures 9 and 10 suggests that schools tend to reinforce rather than weaken existing patterns of social inequity.

As well as an intake effect there also appears to be a sector effect. There is an amount of variation in performance between sectors, though far less than raw scores would suggest. About 39 per cent of government schools are above the median for independent schools, while 60 per cent of independent schools are above the government school median. Many government schools are performing well against non-government schools, after taking into account the populations of students they serve.

Additional analyses of school performance are offered in Figures 11 and 12, with percentile rank for tertiary entrance as the outcome measure. These analyses display similar patterns to those reported for VCE scores. High performance in ENTER scores is not restricted to schools with particular social intakes or achievement (GAT) profiles. Schools performing well above average levels of performance for like schools (in terms of intake) are found across the achievement and SES composition scales. The same is true of schools that are under-performing. Extremes, however, (that is schools three or more standard deviations above or below the average, representing average gains or losses of 14.7 or more points on the ENTER scale) are more often concentrated in schools with middle and lower densities of GAT achievement. For SES, it is more often in schools within the middle range of densities based on SES.

Figures 13 and 14 present a summary of the ENTER distributions. The box plot in Figure 13, displaying standardized ENTER scores unadjusted for intake, shows a large gap between non-government and government schools. When it comes to tertiary entrance scores, independent schools are obtaining far higher levels of performance at a school level. Only 3.7 per cent of government schools have a median score above the median of independent schools. But much of this gap is due to differences in intake.

Figure 14 shows substantial crossover in standardized residuals obtained after adjusting for social and achievement composition as well as school size and location. A sector difference in the spread of results still remains. Approximately 61 per cent of government schools are performing below the median for independent schools. About 72 per cent of independent schools are above the government school median. This sector disparity in ENTER scores, relative to VCE scores, is likely to reflect the stronger concentration of focus in independent schools on the parts of the curriculum (such as Physics, traditional humanities and languages) which maximize ENTER scores. This itself is partly linked to the platform of social intake on which independent schools are able to organize and manage pupils to focus on the most profitable parts of the VCE curriculum, profitable in terms of tertiary entrance scores.

Figure 8: Adjusted school performance on VCE study scores, by General Achievement Test (GAT) score and school sector: 2000

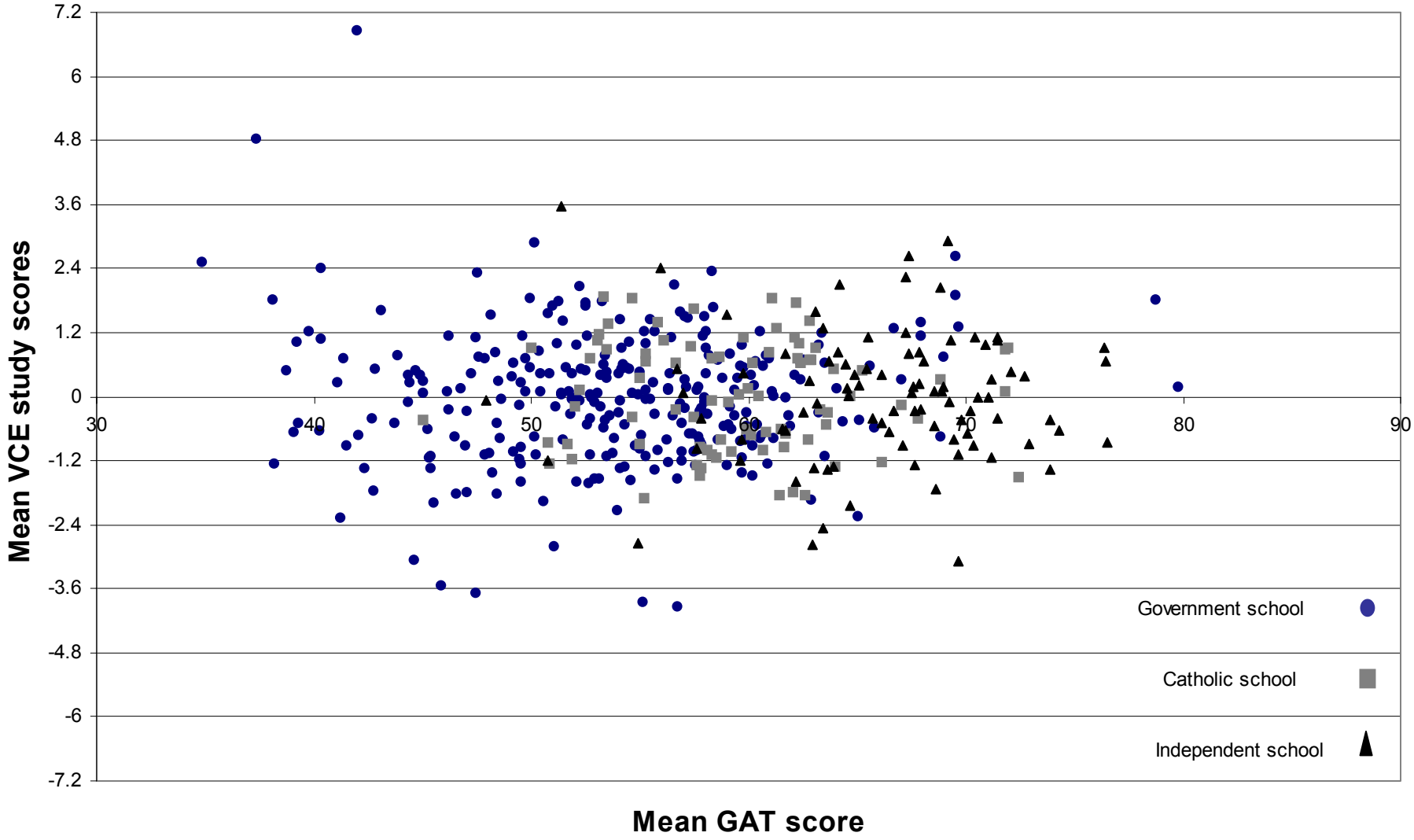


Figure 9: Adjusted school performance on VCE study scores, by mean student SES and sector: 2000

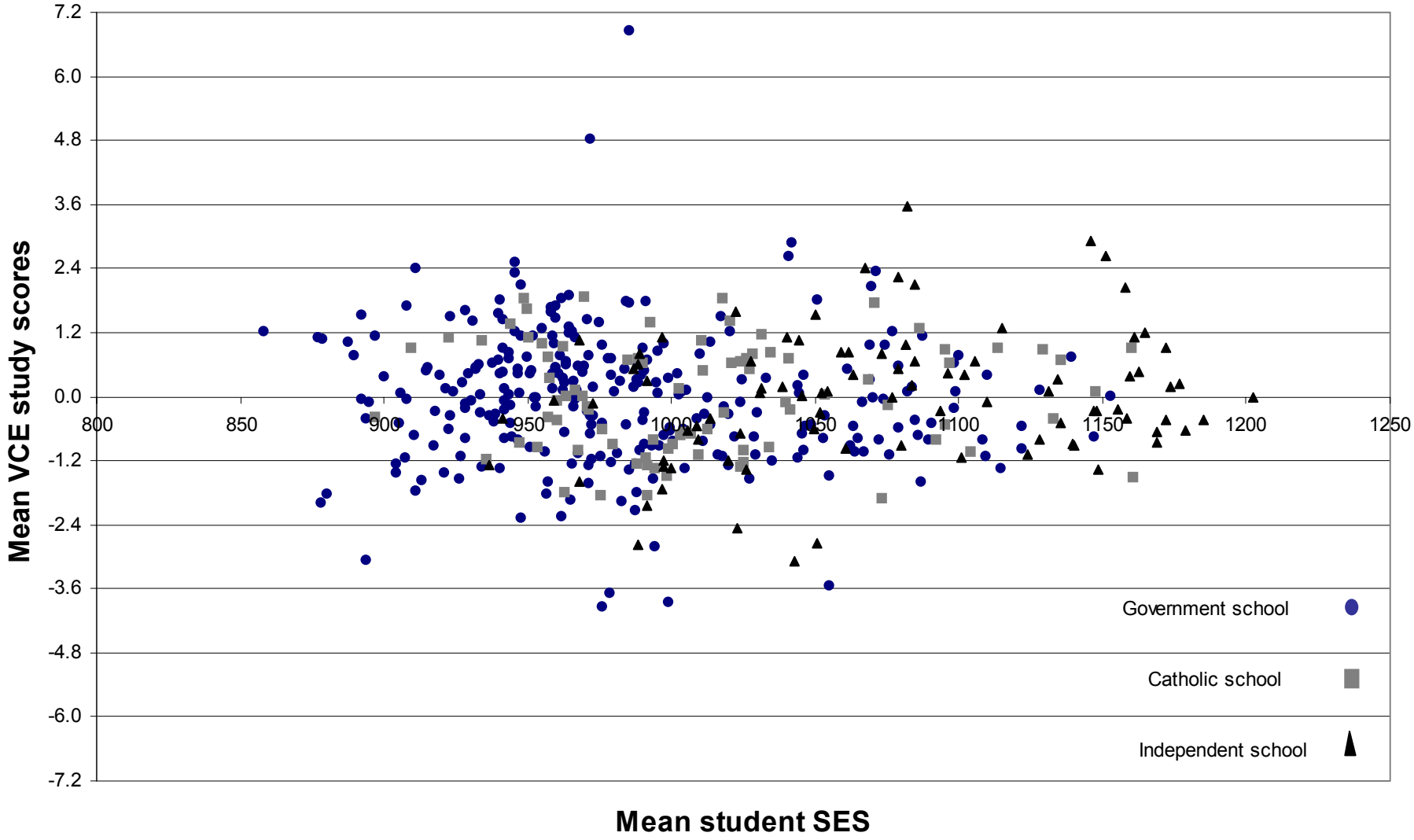


Figure 10: Distributions of standardised mean VCE study scores, by school sector

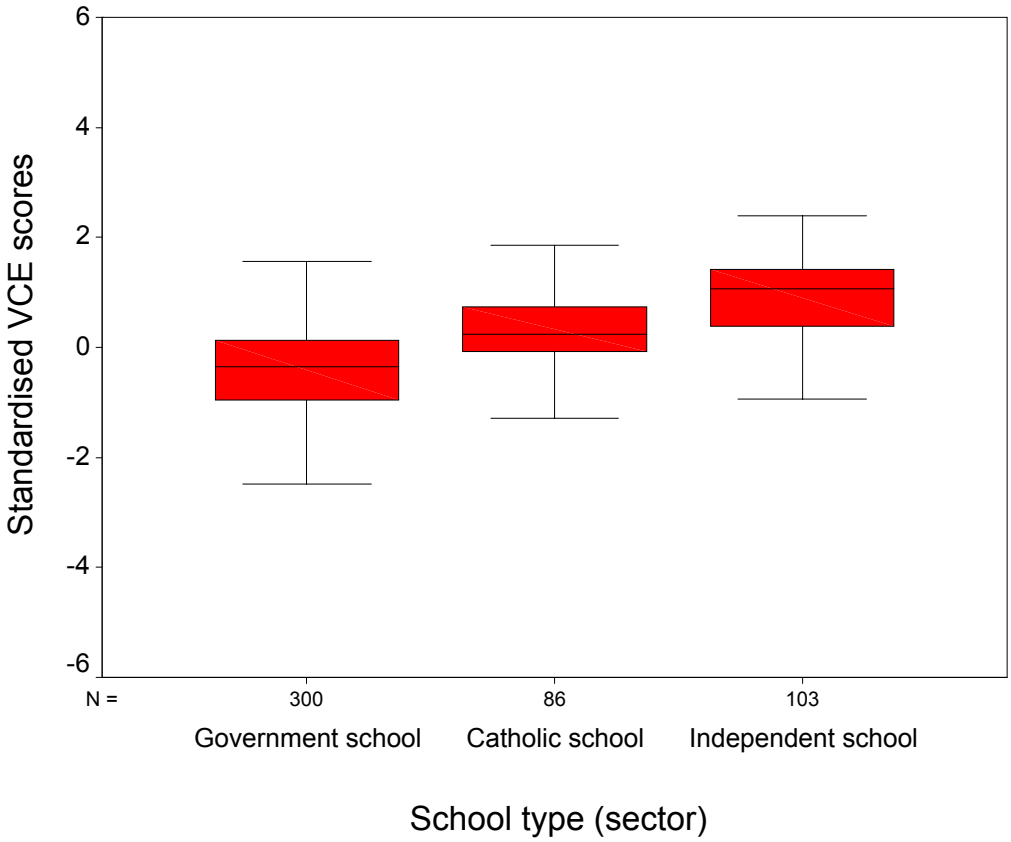


Figure 11: Distributions of adjusted school performance on VCE scores, by sector

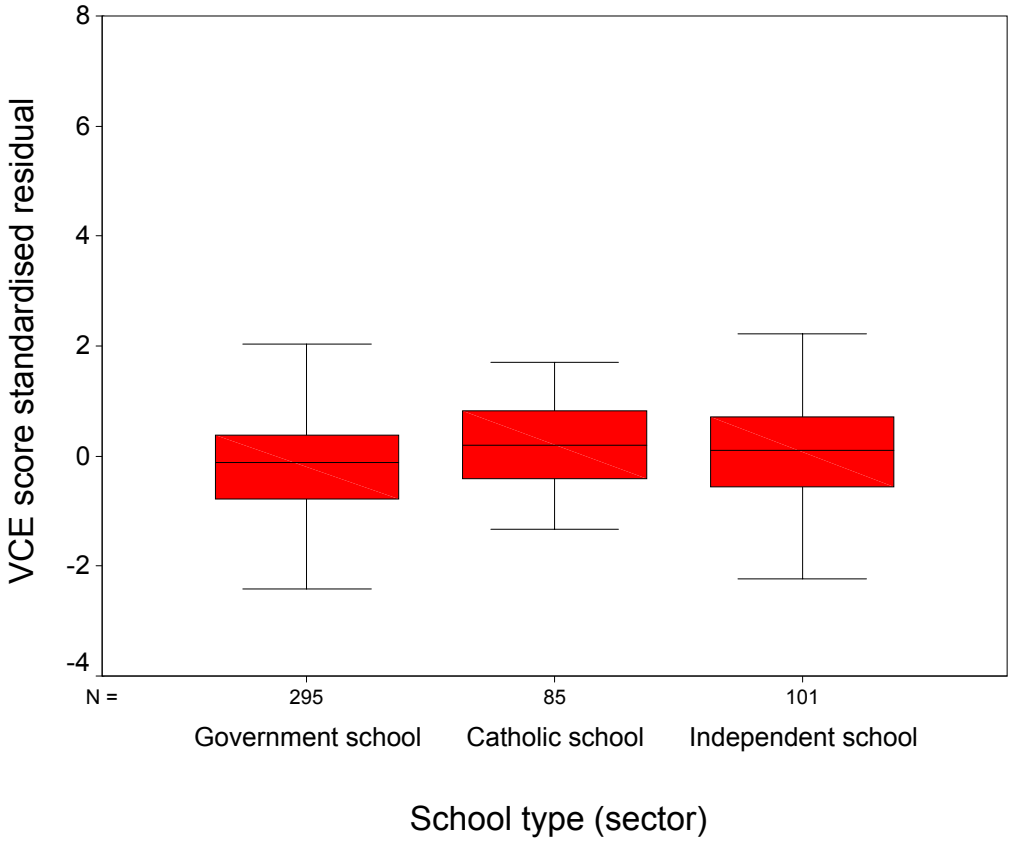


Figure 12: Adjusted school performance on tertiary entrance (ENTER) scores, by GAT score and school sector: 2000

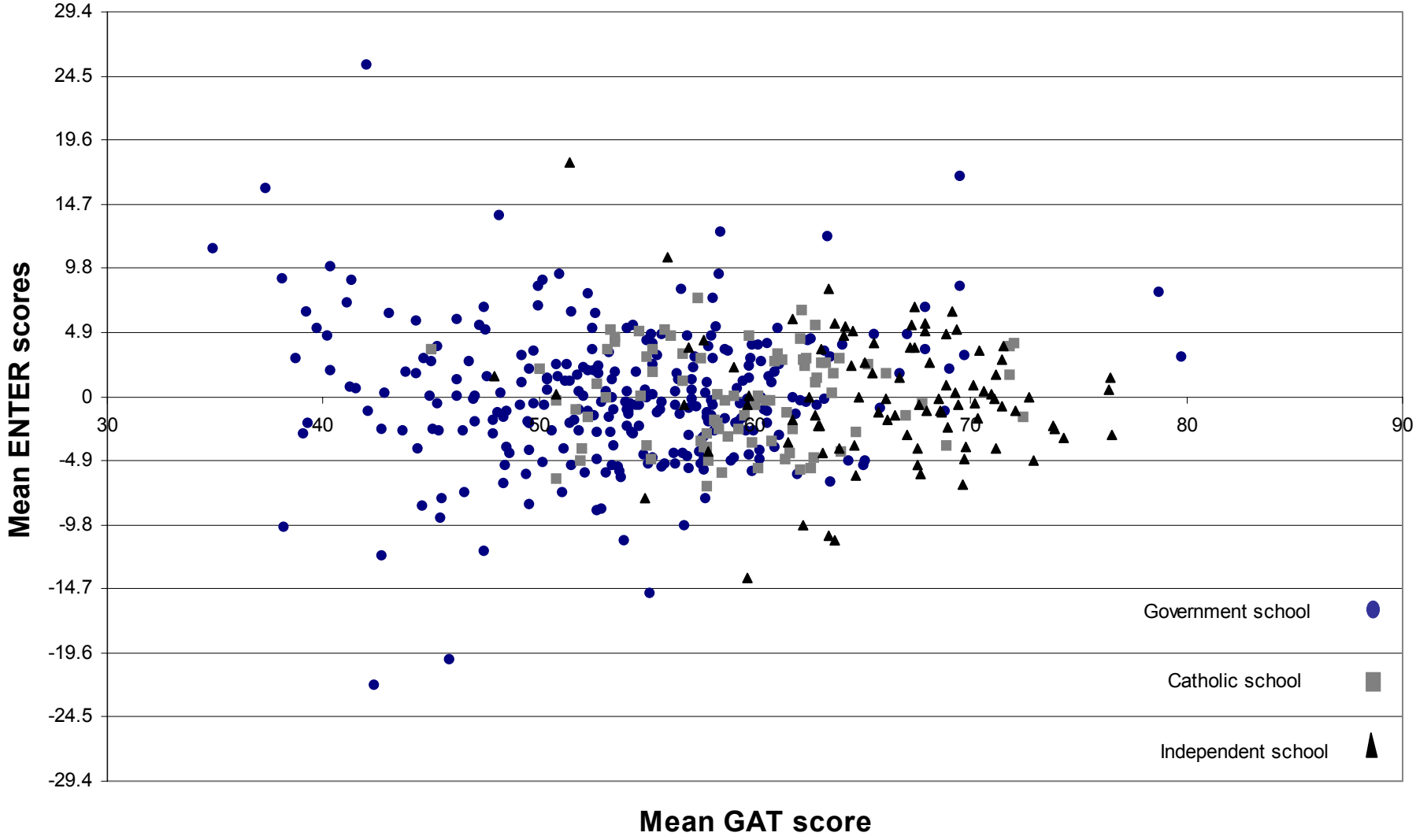


Figure 13: Adjusted school performance on tertiary entrance (ENTER) scores, by mean student SES and school sector: 2000

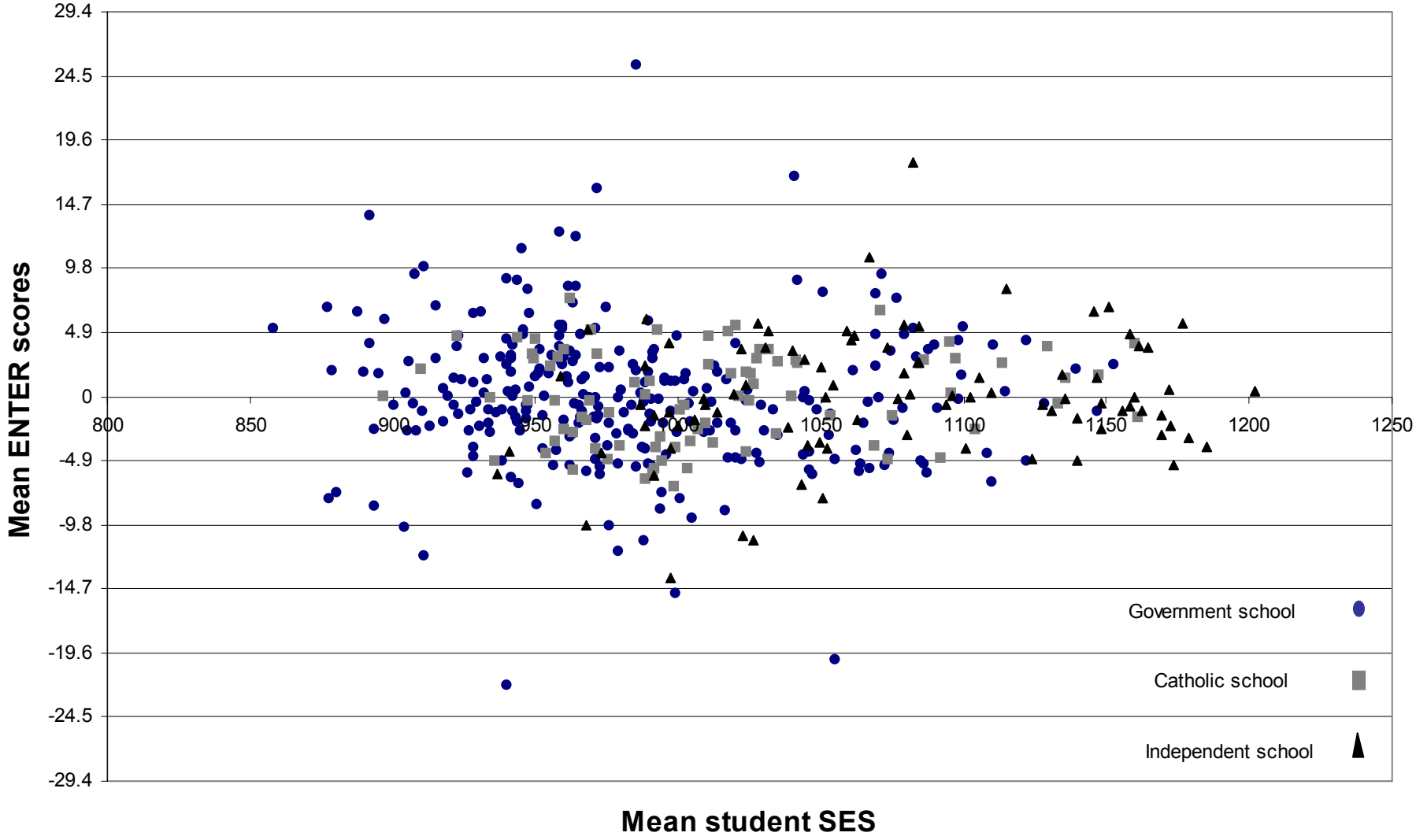


Figure 14: Distributions of standardised tertiary entrance (ENTER) scores

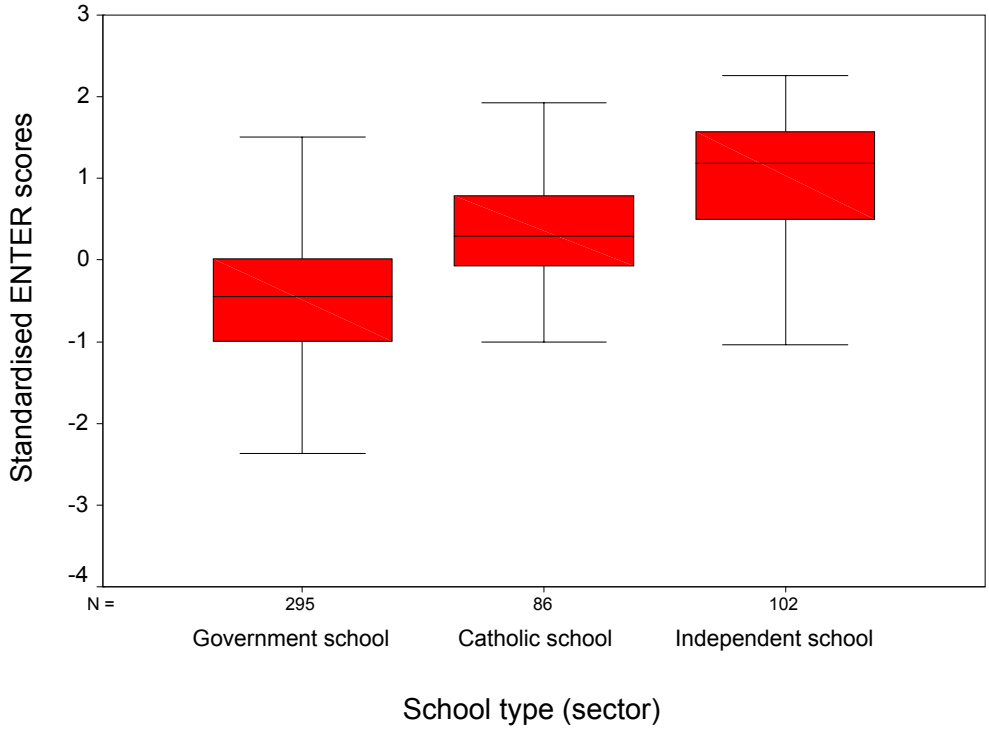
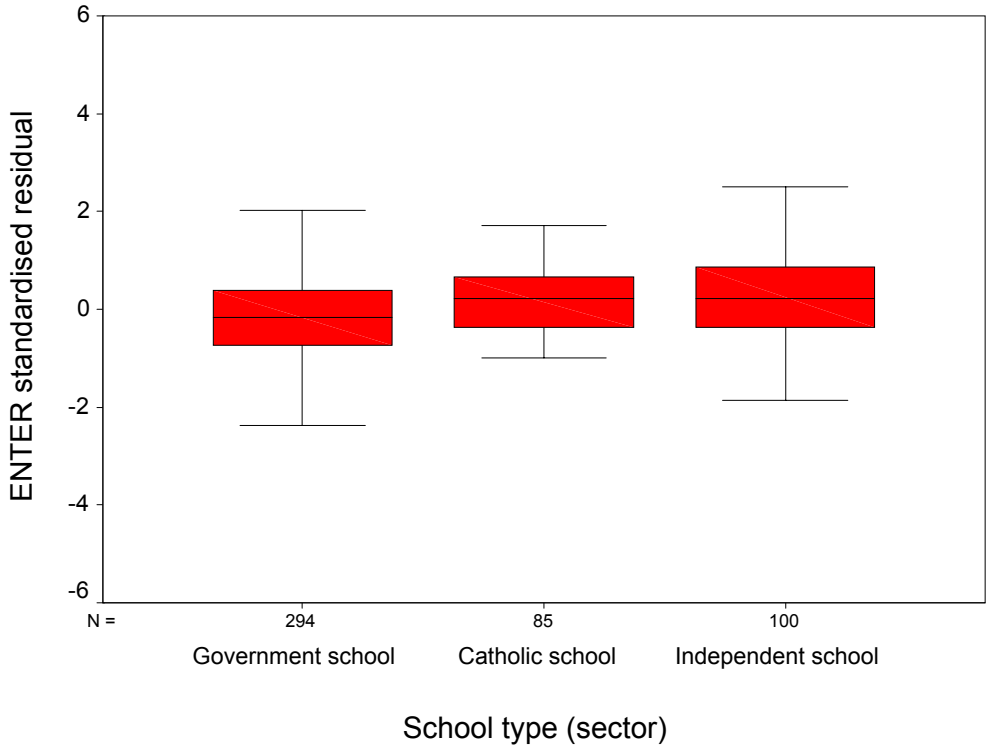


Figure 15: Distributions of adjusted school performance on ENTER scores, by sector



School effectiveness related to post-school student outcomes

Much of the previous discussion has focused on school differences in cognitive achievement such as in Year 12 study scores. Yet school effectiveness can be assessed through other measures of student outcomes. Rates of transition from school to further study and work are examples. Transition rates indicate how well schools function to encourage and support students to continue to engage in education and training after leaving school as well as to find employment. Such indices increasingly have become recognized as important measures of school performance.

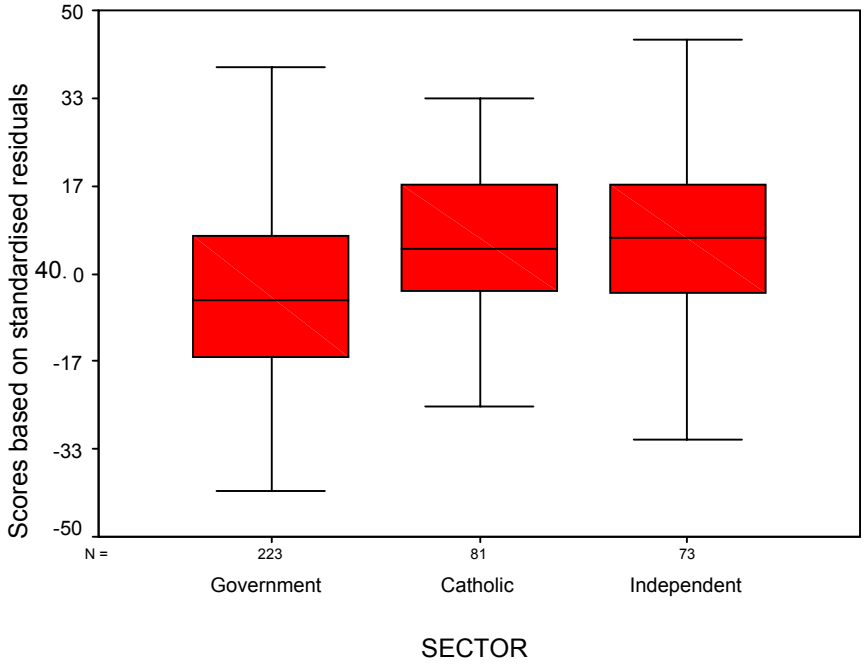
Figures 15 to 18 present information on school effectiveness across four transition measures: entry to university, entry to apprenticeships, entry to other forms of vocational education and Training (VET), and entry to employment. Data are for Victoria and from the On-track survey of the 2003 destinations of Year 12 school leavers from 2002. The survey involved over 36,000 school leavers and 400 schools. The figures are box plots of the spread of standardized residuals derived from regression analyses in which student transition rates are adjusted for differences in the social and academic contexts of schooling. The residuals are the amounts of variation in rates unaccounted for by the regression models (controlling for social intake and achievement). The standardized residuals are the rates expressed in percentages.

One problem in comparing schools on transition measures is that a rate of participation or transition for a particular measure is relative to all other rates of participation or transition. For example, if a school obtains a high rate of entry to university it may well have a low rate of entry to employment. Schools, therefore, may well appear ineffective on one measure because they are effective on another. To overcome this potential bias in the measurement of school effectiveness, the residuals have been calculated sequentially with the population of participants in a previous activity excluded from the analysis. The order of analysis was (1) university entry, (2) apprenticeship entry, (3) entry to other forms of VET, and (4)

entry to employment. The rates for apprenticeship entry, for example, were calculated after excluding students participating in university. Estimations for employment were derived after excluding students participating in university, apprenticeships, and other forms of VET. For estimating school performance related to transition to employment, the analysis was based only on those students who were not participating in education and training and therefore were those most likely to be seeking entry to work.

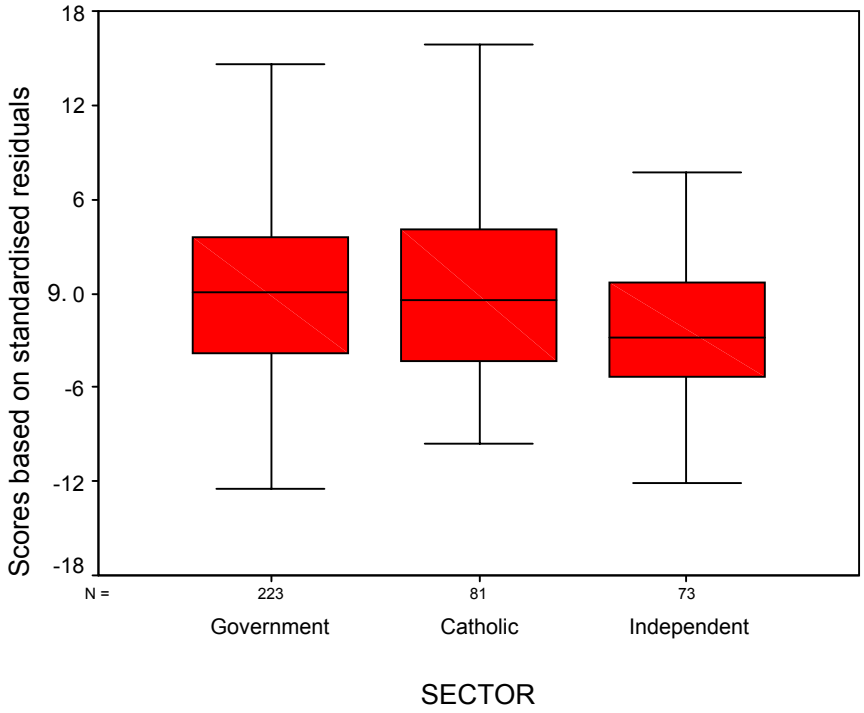
Figure 15 shows that after adjusting for differences in social and academic composition, there is substantial variation in the effectiveness of schools in promoting entry to university. In each school sector there is a spread of schools doing better than expected and some doing worse than expected all else equal. While there is variation within sectors there is also variation across sectors. The adjusted median entry rate to university is higher in Catholic (45.2 per cent) and independent schools (47.1 per cent) than in government schools (34.4 per cent). Of course what must be kept in mind in comparing the performance of schools across sectors are the goals that schools in each of the sectors pursue. Historically, non-government schools have placed a heavy emphasis on university entry for their graduates. The adjusted transition rates suggest that non-government schools, both Catholic and non-Catholic private, do better than would be predicted based on their social and academic intakes in achieving this goal. In terms of transition to university there would appear to be a sector effect. This is confirmed in part by the figures presented in Table 6 which show the percentage of effective schools in promoting entry to university. Effective schools are those which recorded a standardised residual of more than one from the regression modeling. That is, these schools had much higher than predicted rates of entry after controlling for social and academic composition. According to the results in Table 6, about one in four Catholic schools and one in four independent schools performed well above expectations in terms of transition rates to university compared to about one in eight government schools.

Figure 16: Effectiveness in promoting entry to university*



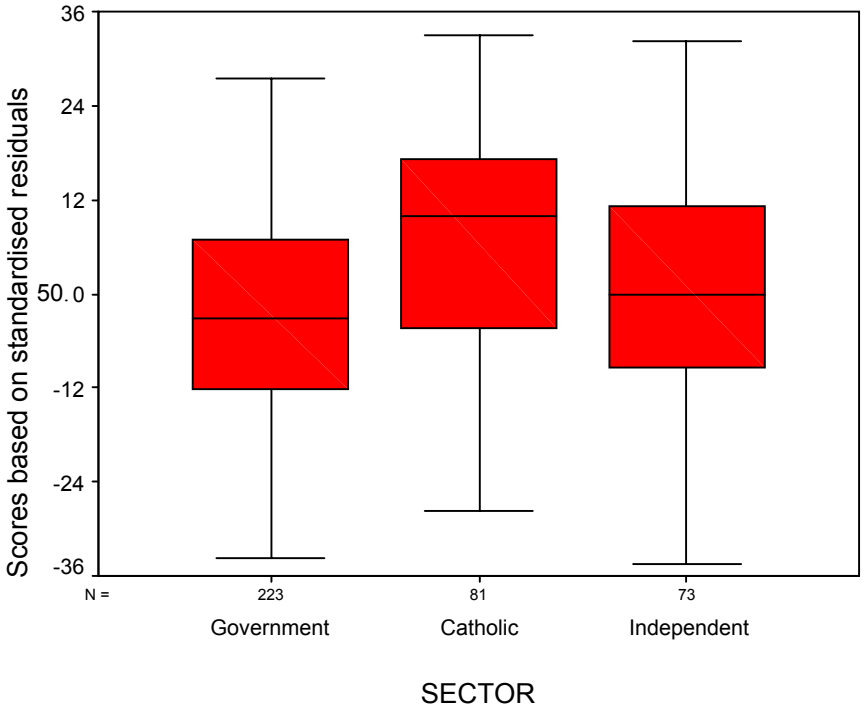
* One standardized residual=17 percent. Median=40.

Figure 17: Effectiveness in promoting entry to apprenticeships



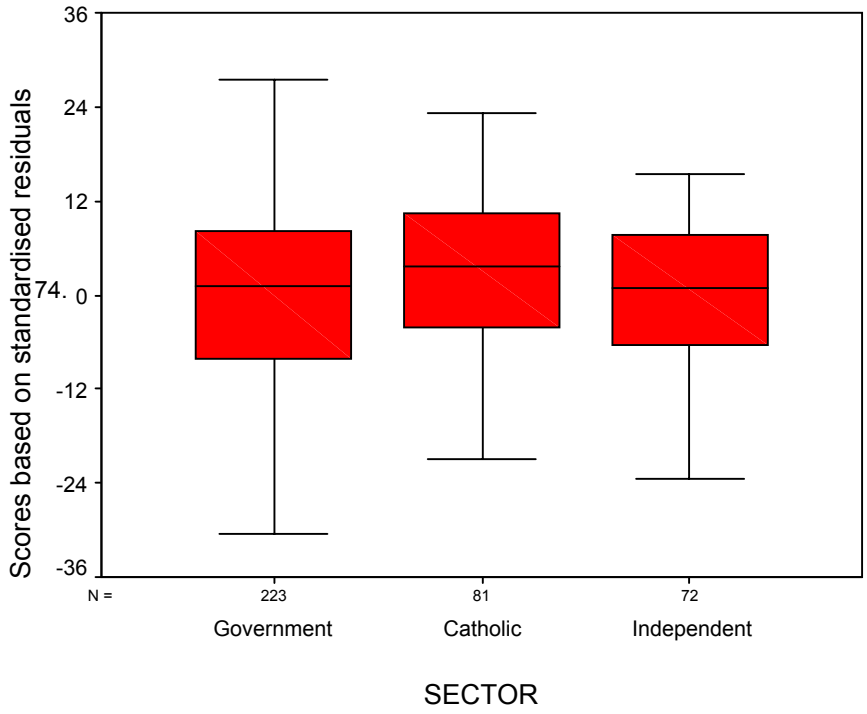
* One standardized residual=6 percent. Median=9.

Figure 18: Effectiveness in promoting entry to other forms of VET



* One standardized residual=12 percent. Median=50.

Figure 19: Effectiveness in promoting entry to work rates



* One standardized residual=12 percent. Median=74.

Table 6: School performance based on student outcomes: percentages of effective schools, by sector*

	Government	Catholic	Independent
Entry to university	12	26	26
Entry to VET			
Apprenticeship	19	17	10
Other VET	11	35	19
Entry to work	13	21	8

* Effective schools are defined as those with a standardised residual greater than +1.

While government schools do not do so well as a group in promoting entry to university, many are successful in gaining higher than expected rates of entry into apprenticeships (see Figure 17 and Table 6). Table 6 shows that 19 per cent of government schools are effective on this measure — that is they have entry rates to apprenticeships much higher than would be predicted after controlling for intake using the regression models. About 17 per cent of Catholic schools appeared to be effective in promoting high rates of entry to apprenticeships while only 10 per cent of independent schools were.

As well as promoting higher rates of entry to university, non-government schools are also effective in promoting access to TAFE for those students who do not enter university or apprenticeships (see Figure 18 and Table 6). Catholic schools in particular are effective in promoting entry to non-apprenticeship forms of VET. Over one-third of Catholic schools were effective on this measure, obtaining entry rates to TAFE and other forms of VET much higher than predicted based on academic and social intake. Table 6 also reveals that 19 per cent of independent schools were effective in promoting entry to VET compared with 11 per cent of government schools.

Looking only at those students seeking entry to the labour force on leaving school, there is variation in effectiveness across schools in terms of rates of students gaining employment (see Figure 19 and Table 6). About 13 per cent of government schools had school to work transition rates substantially above what could be explained by their social and academic intake based on the results of the regression analysis. Effective government schools outnumbered effective independent schools (8 per cent), but were themselves outnumbered by Catholic schools (21 per cent). Higher proportions of Catholic schools, it would seem, are associated with higher than expected successful school to work transition rates as well as with higher rates of participation in further education and training.

Some schools consistently do well

An important issue is whether schools that produce achievement gains above expected levels do so over time or only on occasions. The preceding analyses have focused on results from individual years. It is possible that some schools did well for that year, but not in previous or ensuing years. Schools are likely to vary in their performance over time, however schools that sustain levels of value-added performance over many years are obviously more effective than those which appear to do so in one year but not in the next.

Table 7 presents the percentages of schools performing above expected levels in Year 12 VCE English over a four-year period from 2000 to 2003. 'Value-added' performance is based on whether or not schools obtain a mean result more than one standard deviation above what would be predicted given their intake, enrolment size and location. The results are presented separately by school sector.

The table shows that in the government sector almost one-quarter were effective in producing above expected English results in at least one of the four years. The percentages of schools that were effective for more than 1-year fall are fewer in number, however. For government schools, 6 per cent were effective for two years and 4 per cent were effective for three of the four years. One in 25 government schools produced gains in all four years, i.e. they obtained well above expected results in VCE English every year.

The percentages of consistently effective schools are higher in the Catholic and Independent sectors. About one in ten Catholic schools and one in six Independent schools obtained above expected results in English for every year over the four-year period.

Many schools in each sector did not record above expected results for any year. This applied to one-third of independent schools, about two-fifths of Catholic schools and two-thirds of government schools.

Table 7 Superior performance in VCE Year 12 English results over a four-year period, by sector (%)

	Government	Catholic	Independent	Total
Years of superior performance				
0 years	64	39	34	53
1 year	23	20	26	23
2 years	6	13	16	10
3 years	4	18	7	7
4 years	4	10	16	8
Total	100	100	100	100

NOTE: Derived from VCE data containing Year 12 English results for 2000, 2001, 2002, 2003. Schools defined as 'superior performers' are those that obtain VCE English results more than 1 standard deviation above their predicted results after controlling for SES, GAT, School size and location.

Table 8 Superior performance across four subjects, by sector (%)

	Government	Catholic	Independent	Total
Subject areas				
0 subjects	46	42	36	43
1 subject	28	25	30	28
2 subjects	14	19	15	15
3 subjects	9	12	7	9
4 subjects	3	2	11	5
Total	100	100	100	100

NOTE: Derived from VCE data. Schools defined as superior performers are those that obtain VCE results in each subject area more than 0.5 standard deviations above their predicted results after controlling for SES, GAT, School size and location.

As well as consistency over time, it is also important to consider the extent to which schools have 'strengths' and 'weaknesses', that is, whether their effectiveness is an 'across the board' phenomenon or contained to particular subject areas. Table 8 presents performance in four Year 12 subjects. The results are from 2003. It is an exploratory analysis only. The Year 12 curriculum includes many subjects or units of study and Table 8 reports on four subjects which are more academic in focus: English, Biology, Mathematics Methods, and Chemistry. A more thorough review

of performance across all subject areas is required, but beyond the scope of this report. Here we are simply trying to assess whether or not school performance is consistent across different learning areas.

Table 8 shows that some schools do well across different subject areas suggesting that their effectiveness is broadly based. About 12 per cent of government schools attain better than expected results across three or more subjects. This applies to 14 per cent of Catholic schools and 18 per cent of independent schools.

Primary school performance

The impact of schools on achievement levels can be displayed in the case of primary as well as secondary schools. Figures 20 and 21 report results for government schools, mapped against prior achievement (Figure 20) and SES of students (Figure 21). Data are available only for government schools. The results for schools are based on a regression analysis in which Year 3 achievement, mean SES, school size, densities of students from mobile families and indigenous backgrounds, and urban or rural location were included as controls.

Mapping schools against prior achievement (Figure 20) shows that throughout the range of achievement, many schools do better than would be expected. A great many primary schools fall into this category, and they include schools with many children who were low achievers in Year 3. However, there are also a good many primary schools that appear not to be building on achievement levels to the extent that would be expected. They are under-performing relative to prior achievement level, and they are found right across the achievement range. The schools that under-perform most happen to be at the high end of the achievement range. This is not the case with high performing schools.

Figure 20: Adjusted primary school performance in Year 5 achievement, by Year 3 achievement score: Government schools, 2003

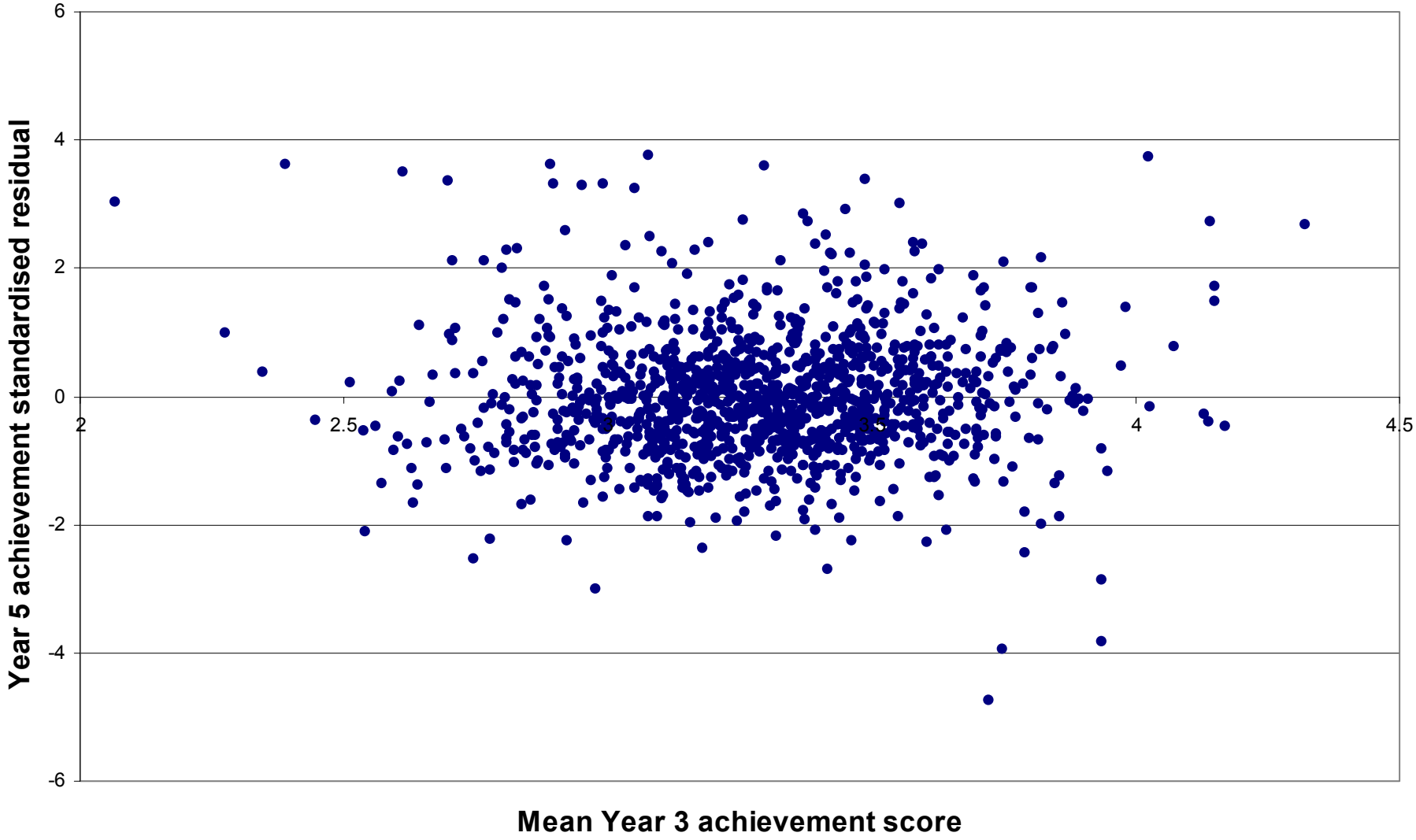
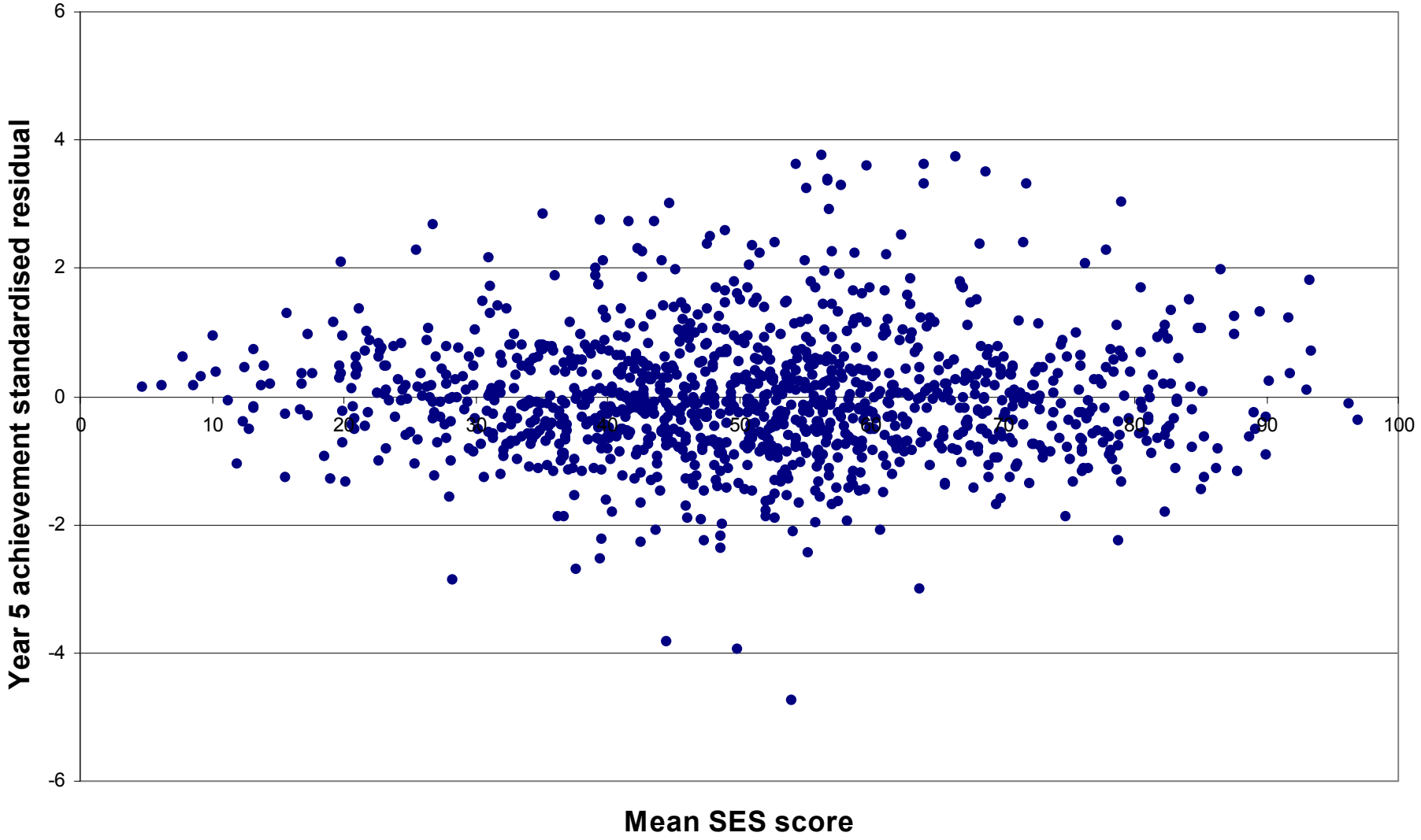


Figure 21: Adjusted primary school performance in Year 5 achievement, by mean SES score: Government schools, 2003



In terms of SES (Figure 21), it is also clear that many government primary schools take their pupils to a higher level of achievement than would be expected, given social intakes. Superior performance appears to be more common than under-performance, with a large number of schools located at two standard deviations above the mean. However, there are also some schools that greatly under-perform, including a few at four standard deviations below the mean.

School funding and effectiveness

A key issue in examining school effectiveness is whether or not resource levels and increased spending on education are associated with school performance. Some researchers have struggled to detect a relationship. Hanushek and Luque (2001), for example, have argued that funding policies such as reduced class sizes and increased school resources do not necessarily lead to improvements in academic performance among students. Such arguments have been used to support the view that increasing funds in education and training will not have much impact on student achievement and other outcomes. Other work, though, suggests that funding policies for education and training do matter. Some studies on class size, for example, suggest that academic performance is stronger in smaller classes and the gains in output justify the increased expenditure (e.g. Achilles, 1996).

A critical aspect in looking at the relationship between funding and effectiveness is determining whether or not, having controlled for intake and other factors, different levels of expenditure on schools affect school performance. To examine this requires the use of statistical procedures such as multiple regression. However, with this type of procedure used to measure the impact of funding on effectiveness there is often the problem of multicollinearity. Where two or more predictor variables in a multiple regression or partial correlation are highly correlated with each other, problems can arise in estimating relationships between each predictor and the dependent variable. In the case of funding, the increase in confidence intervals would work against finding a significant association between spending and outcome, having controlled for student background and other differences. Nevertheless, it is worth considering whether a relationship between funding and performance exists once the issue of multicollinearity has been addressed statistically.

One method of dealing with multicollinearity in a regression analysis of the effects of funding on school performance is to regress the dependent variable (achievement) onto the predictor variables (in this case, the student background characteristics, school size, school location) and save the residuals (variation left unexplained by the model). Then one regresses the residuals onto the predictor variable of interest (in this case, spending per pupil).

When this is done for Year 12 results in government secondary schools and for Year 5 achievement test results in government primary schools the results show that there is a small but significant positive effect. That is, schools with higher amounts of total per capita funding achieve better outcomes, all else equal.

In models in which the VCE results for secondary schools and Year 5 AIM results for primary schools are regressed onto the separate income sources, the results show that locally raised funds (including fees paid by parents) and rurality and isolation funding have significant impact and contribute to explaining variation in achievement (see Table 9). For secondary schools, locally raised funds account for almost a third of the variation in explaining Year 12 results.

These results suggest that funding does matter to the performance of schools.

Table 9 Impact of funding components on Year 12 results and Year 5 achievement: Victorian schools (%)

	Secondary	Primary
Core	16.8	3.4
Locally raised funds	30.9*	19.1*
SLN funding	2.1	8.0
Disabilities funding	12.2	7.1
Overseas student funding	0.3	16.6
ESL funding	16.3	8.6
Priority program funding	5.0	9.4
Rurality and isolation funding	16.4	27.9*

NOTE: Figures represent residual variance in Year 12 study scores and Year 5 achievement test results associated with different funding components based on the results of OLS regression analysis.

* p>.05

Figure 22 Mean raw tertiary entrance (ENTER) scores, by sector and fee level

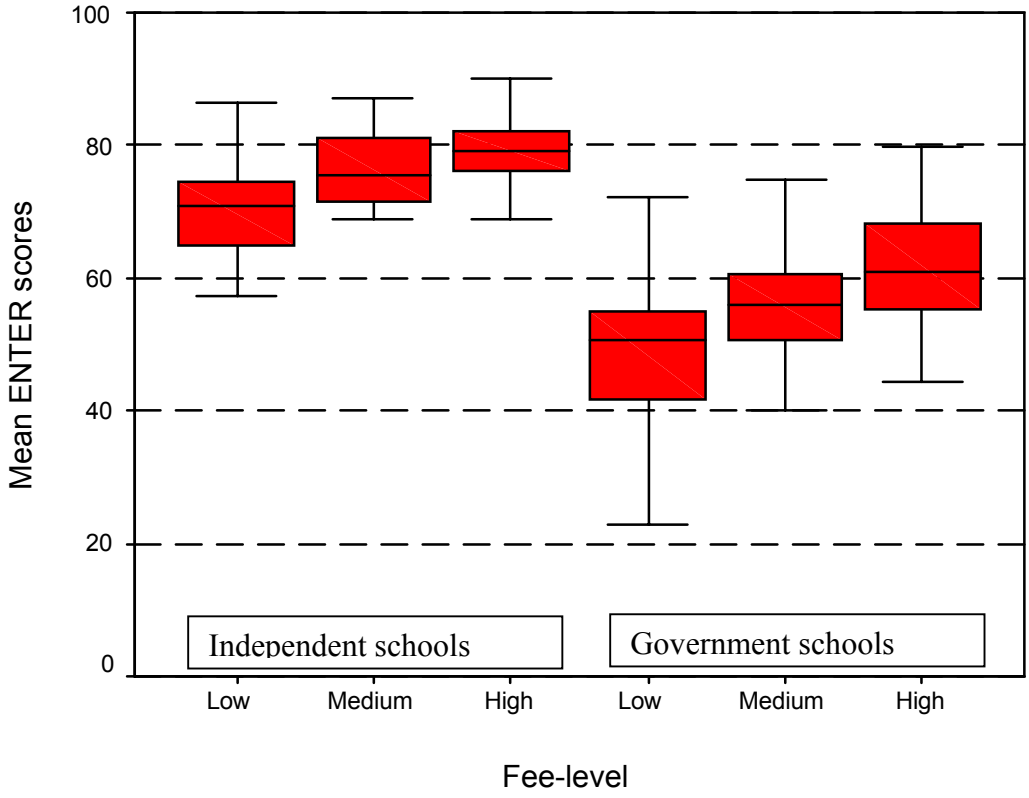
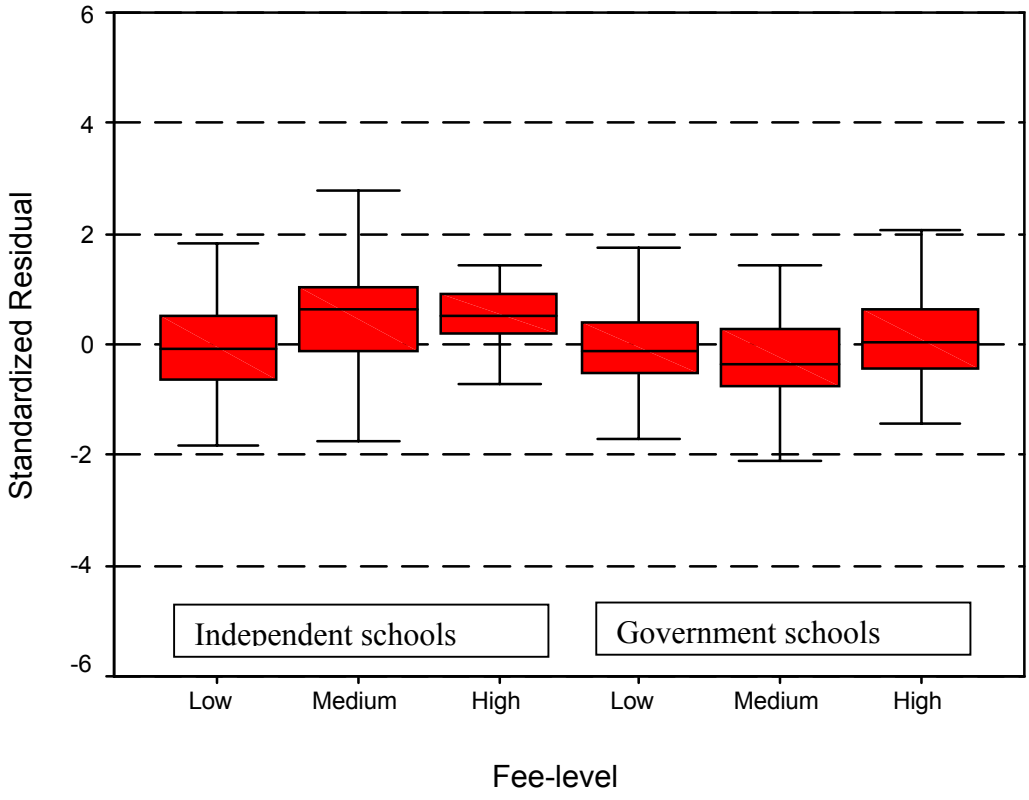


Figure 23 Adjusted tertiary entrance (ENTER) scores, by sector and fee level



Resources are also related to performance in independent schools, at least to the extent gauged by differences in performance across fee levels. Figure 22 presents raw tertiary entrance (ENTER) scores for Year 12 students in Victorian independent schools by fee levels. Government schools, categorised according to income received from fees and levies, are presented for comparison.

High fee independent schools (those that charge over $10,000 per year) achieve the highest average tertiary entrance scores. Not only do these schools achieve the highest scores on average they also have relatively little variation in scores: uniformly they tend to produce high average ENTER scores. Low fee independent schools, alternatively, have a wider range of performance with a lower median score. The score at the 25th percentile of schools for high fee independent schools is higher than the score of the school at the 75th percentile of the low fee independent schools.

Even after adjustments are made for student background and other factors high fee independent schools still outperform low fee schools in terms of ENTER scores. Figure 23 shows that while adjustments for intake compress differences across categories of schools, high fee independent schools still have higher positive effects on achievement.

This finding suggests that the superior performance often noted for independent schools in measures of school achievement may well be heavily influenced by the high fee independent schools which as a group tend to do very well. Figure 23 suggests that this may be due in part to the levels of resources that these schools possess, or, more accurately, to the level of income that these schools receive.

4. School performance: multi-level analysis

What can schools do to achieve better results and improve performance, particularly for disadvantaged students? The preceding analysis suggests that some schools perform better than expected while some under-perform. This is apparent across a range of performance measures. What is not apparent is how schools do better than expected. What are some schools doing to achieve higher than expected performance in Year 12 results, tertiary entrance scores, completion rates and achievement?

This chapter aims to do some preliminary exploration of this issue using available data. Examining how some schools achieve higher than expected performance really requires extensive further research, including fieldwork. Having identified schools that are performing well-above expected levels, researchers need to identify the schools where this is occurring consistently and then undertake rigorous case study work in the schools to document the factors that may be contributing to the levels of performance — such things as quality and background of teachers, pedagogy, pupil management, curriculum breadth and programs, subject planning, extra-curricular program provision, school-community relations, management and leadership, and decision-making. Such information is not available for the current report, though some data on features of schools that may contribute to higher-than-expected performance, provided through existing large-scale surveys of schools, give some initial avenues for analysis. These will be explored here.

The chapter presents the results of multi-level models developed to measure the effects of schools on outcomes for individual students. The multi-level modeling was undertaken to identify (1) the level of variation linked to schools as distinct from individuals (between-school and between-individual variance), and (2) some of the factors that may be contributing to school effects.

The analyses in the preceding chapter focused on comparisons of schools using school-level aggregates of student-level measures. Some researchers have questioned the merits of effectiveness analysis that focuses only on schools (see

Goldstein, 1987; Raudenbush & Bryk, 2002). In this section, the analyses include individual-level measures to estimate the effects of school on student outcomes. They were undertaken using a multi-level modeling regression procedure. Multi-level modelling is a relatively recent development within regression analysis and permits researchers to model student-level outcomes within schools and then to identify and model any between-school differences that exist (Goldstein, 1987; Raudenbush & Bryk, 2002). Multi-level modelling procedures enable researchers to account more accurately for variance in outcome measures by partitioning within and between school differences more appropriately and to more accurately control for student-background characteristics in estimating school effects. The technique is now widely used by investigators to measure variability both within and between schools.

In the present study the interest is on variability within and between schools. Several analyses were undertaken to measure the levels of variation. Some are based on the VCE results for Victoria, others based on the Longitudinal Surveys of Australian Youth (LSAY) and the Third International Mathematics and Sciences Survey (TIMSS). LSAY and TIMSS involved national samples of schools and students. These data sets are appropriate for multilevel modelling because they contain samples of students clustered within schools.

Each of the analyses includes an analysis of variance to estimate the amount of variance explained by each level — between students, between schools. The general procedure to do this is to estimate a model without any student or school-level predictors. This is the first model run in each analysis. The models following this focus largely on school factors (level-2 predictors) because the interest is on identifying the school-level factors that may contribute to outstanding school performance.

Achievement

Table 10 presents the results of the multi-level modelling analyses for mathematics achievement in junior secondary school. The variance components estimates are presented in the bottom panel of the table. In the second column is the amount of

variance contributed by schools (level 2) and individuals (level 1). This is then presented as percentages of variance (intra-class correlations) in mathematics achievement located at each level — student and school. The following columns contain the percentages of variance explained at each level after controlling for the different groups of variables.

As a first step, a model was tested without any student or school-level predictors. This model, what is sometimes termed a one-way ANOVA with random effects, estimates the amount of variation in achievement that can be attributed to students and to schools. The results suggest that in Australia there is considerable variation in mathematics achievement at the school level. Approximately one-quarter of the variation in students' mathematics achievement is due to differences in the schools they attend. This means that about three-quarters is due to differences between students including family background, place of residence, attitudes and outlooks and other factors. These results show that differences between schools are an important source of variation in mathematics achievement — they confirm the findings on school differences reported in the previous section.

By examining changes in the size of the variance components estimates after the addition of different school variables it is possible to measure the effects of school-level factors that influence differences in mathematics achievement. In this way it is possible to estimate the extent to which factors linked to schools rather than individuals influence achievement.

The second model in the analysis involved adding a range of school organisation and composition factors — school size, social composition based on mean SES, achievement composition measured by average literacy scores, and type of school attended (government, Catholic, independent) — to the model of mathematics achievement. The results presented in column 3 show that the combined effects of the mean SES of the school, school size, average class size, admissions policy, and features of school climate explain roughly 86 per cent of the variance between schools (about 21 per cent of the total variance).

Table 10 School differences in junior secondary school mathematics achievement (TIMSS)

		Null model	Level 2 model – school organisation variables	Level 2 model – teacher experience variables	Level 2 model – teaching style variables	Level 1 model – student background variables	Level 1 model – student mediating variables
Intercept		521.6**	521.6**	521.6**	521.5**	522.3**	522.7**
Student-level variables							
Background variables							
Female						-2.0	-1.4
SES						8.7**	5.6**
Ethnicity						0.4	-0.0
Mediating variables							
Word knowledge							5.4**
Positive attitudes towards maths							10.4**
Perceived importance of maths							-0.2
School -level Variables							
School organisation variables							
School size			0.9	1.3	1.1	0.9	1.7
Mean SES			10.8**	9.8**	8.9**	0.2	3.3
Mean achievement			16.5**	16.2**	15.7**	16.0**	9.9**
Sector:							
Catholic			1.1	4.2	-0.4	0.2	-0.8
Independent			-2.8	-0.9	-4.2	-4.6	-4.0
Teacher variables							
Background							
Age				7.1	5.0	5.1	6.7
Educational qualifications				0.5	1.5	1.6	0.8
Years in teaching				-0.1	-0.0	-0.0	-0.0
Teaching							
Teaching style: discipline centred					-1.7*	-1.7	-2.1*
Teacher satisfaction with job					5.0**	4.8**	4.2**
Variance analysis							
Variance	Individual	7103	7103	7103	7103	6764	5494
	School	2233	320	307	278	278	278
Between-Levels (%)	Individual	**76**					
	School	**24**					
Explained (%)	Individual		**0**	**0**	**0**	**5**	**23**
	School		**86**	**86**	**88**	**88**	**88**

Source: Data were derived from the Third International Mathematics and Science Survey (TIMSS). The sample included 13,922 students in 180 schools. For a description of the variables, see Lamb & Fullarton, 2002.

*p < 0.05 **p < 0.01

Reading the table: The coefficients represent the increase or decrease in mathematics achievement related to each variable. For example, using the results in column 3, 10.8 is the estimated increase in mean maths achievement associated with a one-unit increase in the mean SES of the school, all else equal. This is a significant effect (represented by the two asterisks which indicate that the mean SES effect is significant at the 0.01 level). Similarly, 1.1 is the estimated mean difference in maths achievement associated with Catholic schools. This is not a significant effect. The variance figures at the base of the table show how much in percentage terms the group of variables explain of the variance in achievement. For example, the 86 at the base of column 3 shows that 86 per cent of the variance *between schools* is explained by the school variables included in the model.

The significant coefficients for SES and achievement suggest that high concentrations of middle class students (mean SES) and high achieving students (mean achievement) provide schools with a platform on which they can build successful outcomes. Like physical resources, pupils provide a resource which helps some schools organize their teaching and other programs in ways which help raise levels of achievement.

As well as composition of student intake, the results suggest that quality of teachers reflected in teaching styles and levels of satisfaction with teaching are influential. Features of teaching (column 5) are significantly related to student achievement. All else equal, higher concentrations of teachers who are satisfied with their job (itself likely to be linked to the school environment) help produce better results. Teaching styles are also important. In schools where teachers rely more often on traditional methods rather than more innovative teaching practices the results are lower, all else equal.

Teacher background variables, including age of teachers, qualifications and experience (measured by years in teaching), were not significant predictors of achievement, though age was positively related to outcomes suggesting that maturity as represented by age tends to be associated with stronger achievement in mathematics.

Final year results

The importance of school organization and composition variables is also evident in looking at end of school results. Table 11 presents statewide data for Victoria on VCE results measured as average scores for students across all VCE units of study.

The variance analysis in the bottom panel of the table shows that almost 30 per cent of the variation in VCE scores is due to differences between schools. The other 70 per cent is due to student background and other individual level factors.

Table 11 School differences in Year 12 VCE study scores: Victoria, 2000

	Null model	Level 2 model	Level 1 model
Intercept	29.293**	29.500**	29.421**
Student-level variables			
Female			0.991**
SES			0.002**
General achievement (GAT)			0.209**
School -level Variables			
School organisation variables			
Mean GAT		0.311**	0.093**
Mean SES		0.006**	0.005**
Catholic		0.554**	0.543**
Independent		0.674**	0.756**
Rural		0.258	0.033
Size		0.001**	0.002*
Variance Analysis			
Individual-level	24.2	24.1	13.8
School-level	10.3	1.1	1.1
Variance at each level (%)			
Between individuals	**70.1**		
Between schools	**29.9**		
Variance explained			
Between individuals		**0.3**	**43.0**
Between schools		**89.3**	**89.3**
Variance explained total		26.8	56.8

Source: Data provided by the Victorian Curriculum and Accreditation Authority. SES is based on address-matched census collection district scores from the occupation and education index of the Socioeconomic Indexes For Areas (SEIFA) provided by the Australian Bureau of Statistics. The GAT scores measure the results of students on general achievement tests. The school-level measures for SES and GAT are the mean student values.

*p < 0.05 **p < 0.01

Almost 90 per cent of the variance linked to school is removed once achievement, SES, sector, rural location and school size are included. All of the predictors have a significant impact on performance, except for rural location. It suggests that the density of students from middle class backgrounds and the density of high achievers influences school performance. This may be because, as mentioned above, of how schools organize their curriculum and how they approach teaching given the sorts of students that they have.

Sector also contributes an independent effect on VCE scores. Students attending Catholic and independent schools on average achieve more highly than similar students in government schools.

While not a significant influence, school size is positively related to outcomes in VCE performance. Larger schools, possibly through economies of scale and breadth of provision, obtain better results than smaller schools. As indicated in section 2, larger schools also more often have higher concentrations of high SES students.

ENTER or tertiary entrance scores are also an element of final year performance in secondary schools. Table 12 presents an analysis of ENTER scores using a national sample of students and schools (LSAY). The results from the variance analysis presented in the second half of the table show that schools have a substantial impact on ENTER scores. About 45 per cent of the variance in ENTER scores is attributable to the schools that students attend and about 55 per cent to differences in the populations of students attending school.

The social composition of student intake is a significant influence on ENTER results. Intake factors account for about one-quarter of the large amount of school variance. The density of students from middle class backgrounds is linked to superior levels of performance. Schools with higher concentrations of middle class students do better, all else equal, than schools with lower densities of middle class students.

Also important in helping schools produce achievement gains is the academic climate schools create reflected in the behaviour of students, broad aspiration levels, and peer group culture. All else equal, schools in which students as a group have higher aspirations (possibly linked to school climate and other features of school) perform better on the ENTER score measure. At the same time, students attending schools in which peers are less likely to engage in school life, more likely to be alienated and therefore misbehave and be truant, watch more hours of television and do less hours of homework have significantly lower ENTER scores than if they attended schools where students as a group are more engaged.

Table 12 School differences in tertiary entrance (ENTER) scores: Australia (LSAY)

		Null model	Model 2	Model 3	Model 4	Model 5
Intercept		71.5**	71.5**	71.5**	71.5**	71.3**
Student	Female					1.30**
	SES					1.08**
	LBOTE					1.31**
	Year 9 achievement					0.16**
School	Sector					
	Catholic		-0.86	-1.84	-2.39	-1.50
	Independent		-1.17	-2.62	-3.24	-3.34
	Region					
	Provincial		0.11	0.10	0.11	0.08
	Rural		1.26	1.52	1.81	1.64
	Mean SES		12.07**	11.34**	5.15**	3.79*
	Quality of teachers			3.09	2.13	4.89
	School climate			17.38*	11.926	5.10
	Peer culture				-2.96*	-3.05*
	Peer aspirations				5.39**	5.96**
Variance explained						
Variance	Individual	133.0	133.0	133.0	133.0	119.3
	School	109.7	81.7	78.5	72.6	68.9
Each level (%)	Individual	**54.8**				
	School	**45.2**				
Explained (%)	Individual		**0.0**	**0.0**	**0.0**	**10.3**
	School		**25.5**	**28.4**	**33.8**	**37.2**

Source: Figures derived from the Y95 cohort of the Longitudinal Surveys of Australian Youth. The base-year sample for LSAY included 13,613 students in 301 schools. SES is a composite measure based on parental education, parental occupation and resources in the home. Year 9 achievement measures results on standardized literacy and numeracy tests administered in Year 9. Quality of teachers, school climate, peer culture, and peer aspirations are based on mean student responses to items on aspects of teaching, teachers, climate, quality of life and aspirations.

*p < 0.05 **p < 0.01

Schools that produce gains adopt policies facilitating student engagement, through such things as the provision of formal programmes, extra-curricular programs and student support. The quality of teachers (as measured by student perceptions of expertise, interest in students, capacity to maintain discipline, engaging style of teaching) is also important, as the effects in Table 12 show a positive relationship, though the impact on ENTER scores is not significant relative to other factors.

Table 13 School differences in student retention: Australia (LSAY)

		Null model	Model 2	Model 3	Model 4	Model 5
Intercept		5.263**	5.253**	5.254**	5.249**	5.305**
Student	Gender					0.241**
	SES					0.127**
	Language background					0.205**
	Year 9 achievement					0.020**
School	Sector					
	Catholic		0.141*	0.116	0.064	0.103
	Independent		0.026	0.045	-0.075	-0.023
	Region					
	Provincial		-0.210**	-0.216**	-0.159**	-0.056
	Rural		-0.199**	-0.207**	-0.145*	-0.049
	Mean SES		0.535**	0.482**	0.018	0.106
	Quality of teachers			0.132	-0.122	-0.048
	School climate			1.082*	0.374	-0.079
	Peer culture				-0.183**	-0.122*
	Peer aspirations				0.524**	0.208**
Variance analysis						
Variance	Individual	1.655	1.655	1.655	1.655	1.439
	School	0.222	0.109	0.106	0.067	0.062
Each level (%)	Individual	**88.2**				
	School	**11.8**				
Explained (%)	Individual		**0.0**	**0.0**	**0.0**	**13.1**
	School		**50.9**	**52.3**	**69.8**	**72.1**

Source: Figures derived from the Y95 cohort of the Longitudinal Surveys of Australian Youth. The base-year sample for LSAY included 13,613 students in 301 schools. SES is a composite measure based on parental education, parental occupation and resources in the home. Year 9 achievement measures results on standardized literacy and numeracy tests administered in Year 9. Quality of teachers, school climate, peer culture, and peer aspirations are based on mean student responses to items on aspects of teaching, teachers, climate, quality of life and aspirations. Retention is based on a six category variable based on the stage of school at which the student left school: (1) before Year 10, (2) at the end of Year 10, (3) during Year 11, (4) at the end of Year 11, (5) during Year 12, and (6) at the end of Year 12.

*$p < 0.05$ **$p < 0.01$

Student retention

Table 13 reports the results of an analysis of student retention in school. In many studies retention is recorded simply as rates of Year 12 participation or completion. However, in the analysis reported here it is based on the stage of schooling at which the student left school: (1) before Year 10, (2) at the end of Year 10, (3) during Year 11, (4) at the end of Year 11, (5) during Year 12, and (6) at the end of Year 12. With the majority of young people now remaining to the end of Year 12 in Australia, the levels of school variation are not as great as those recorded for achievement. Even so, over 10 per cent of the variation in student retention is related to the school and the features of the school that a student attends rather than the effects of powerful non-school factors such as family background and place of residence.

Much of the variation at a school level is due to intake and location. Unlike with achievement, urban or rural location has an effect on the student retention in school. Schools in rural and provincial centres have lower rates than those in urban areas, all else equal. Social intake is also influential with higher SES schools having a significant impact on retention. Other things equal, students in schools with stronger densities of high SES students (those at least with a higher mean student SES score) remain at school longer on average than schools with lower densities of high SES students.

Peer culture, school climate and peer aspirations also have a significant influence on student retention. Schools which promote higher levels of engagement through policies and programs that foster stronger levels of participation in school activities and help form higher levels of educational aspirations among students produce higher rates of retention. Further work is needed to identify the specific programs, features and policies that are influential.

5. Conclusion

This study has examined patterns of school performance in Australia. It shows that social and cultural factors are strong influences on school performance. Schools that serve largely middle class populations do better on a range of scholastic and student outcomes measures. The high levels of segregation of students in Australia, due in large part to residential segregation and the sector organization of schools, tends to reinforce patterns of inequality and strengthen differences in school performance. It means that students from disadvantaged SES backgrounds tend to do worse because of the extent of segregation. One upshot of this, according to a recent OECD study of PISA results, is that much talent remains unused and human resources are wasted (OECD, 2001).

There are several policy options to address the impact of segregation on the performance of Australia's schools. One is differential resourcing to provide schools serving larger numbers of disadvantaged students with the resources to address the more intensive educational needs of their students. There is a substantial body of research, both local and international, demonstrating that children from socially disadvantaged backgrounds tend to achieve less well at school, are less likely to stay on at school or enter further or higher education and are more likely in the future to be unemployed or in low paid jobs (see, for example, Audas & Willms, 2001; OECD, 2001; Lamb & McKenzie, 2001). These students have higher levels of need and require additional support to achieve the same outcomes attained by other groups of students. This means that schools with larger numbers of disadvantaged or high need students must spend more than other schools to meet any given standard of effectiveness.

Another option is to address current selection and funding arrangements that work to intensify segregation. Current levels of funding may contribute to continuing levels of educational inequality in Australia. While total funding of school education increased during the 1990s (and has led to real increases for all sectors) it has been directed disproportionately to non-government schools (Lamb, Long & Baldwin, 2004). Total government expenditure on non-government schools

increased by 107 per cent between 1991 and 2000, while the growth in funding for government schools was less than half that rate — 52 per cent. It means that the share of funding being directed to non-government schools increased from 16 to approximately 21 per cent. The growth in funding for non-government schools has far outstripped what could be expected on the basis of changes in enrolments. Funding to non-government schools by the Commonwealth government is currently provided without the same levels of accountability as public funding for government schools. The funding is provided despite the fact that average combined per capita funding from both private and government sources is as much as 40 per cent higher in independent schools than in government schools (Lamb, Long & Baldwin, 2004).

School policies and school features are also important to consider. The results of this study show that policies and practices in schools themselves can play a vital role in raising levels of achievement, promoting greater effectiveness and improving student outcomes. Some schools obtain gains in achievement for their students over and above what would be expected given their student intake. This occurs for schools in each of the sectors. High performance is not limited to non-government schools. After adjusting for the effects of intake, there are many government (and private) schools performing well above expected levels.

The results of analyses reveal that there is a range of factors that may be contributing to superior performance in some schools. Aspects of classroom practice and quality of teachers reflected in teaching styles and levels of satisfaction with teaching are examples. In analyses of mathematics achievement certain features of teaching were significantly related to student achievement. All else equal, higher concentrations of teachers satisfied with their job (itself linked to the school environment) help produce better results. Teaching styles are also important. In schools where teachers rely more often on traditional methods rather than more innovative teaching practices the results are lower, all else equal. Also important in helping schools perform at high levels is the academic climate schools create reflected in the behaviour of students, broad aspiration levels, student views on teachers and school and engagement in school life. Schools that do well in achievement terms adopt policies facilitating student engagement, through the provision of programs, extra-curricular programs and student support.

School performance is linked to a range of factors which each need to be considered in explaining why some schools have better results than others. Targetting improvements will need to take account of the interplay of these factors including resources, classroom practices, programs and teachers.

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