The Socio-Economic Status (SES) score methodology used in recurrent school funding arrangements

Research paper

Prepared for the Australian Department of Education and Training
1 November 2017

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MELBOURNE AUSTRALIA

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Centre for International Research on Education Systems

The Socio-Economic Status (SES) score methodology used in recurrent school funding arrangements – Research Paper

ISBN 978-1-76051-341-2 (PDF)

ISBN 978-1-76051-342-9 (DOCX)

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As this is an independent research paper, the issues do not necessarily reflect the views of the Australian Government.

This document must be attributed as the *Socio-Economic Status (SES) score methodology used in recurrent school funding arrangements – Research Paper*.

About CIRES

The Centre for International Research on Education Systems, located at Victoria University, conducts strategic research that identifies how well education systems work, for whom, and how they can be improved to work well for all. The Centre undertakes large-scale survey and policy-related projects covering every state and territory in Australia and every sector of education and training. It also undertakes international comparative research examining the features and performance of education systems around the world.

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Executive Summary

Objective

The Centre for International Research on Education Systems (CIRES) at Victoria University has been commissioned by the Australian Government Department of Education and Training (DET) to prepare a research paper on the Socio-Economic Status (SES) score methodology. The SES score is used to allocate Australian Government recurrent funding to non-government schools, and is intended to measure the capacity of families and school communities to contribute towards the operating costs of non-government schools.

This research paper provides a stocktake of development activities since the SES score was conceived in 1996, and subsequently used to allocate recurrent funding from 2001. The paper then synthesises stakeholder issues and views on the SES score, and identifies areas for possible further exploration.

History of the SES score

In 1997, discussions first commenced on the potential use of a SES measure as a mechanism to allocate Australian Government funds to non-government schools. These discussions formed part of a broader review of school funding arrangements.

At that time the Australian Government used the Education Resources Index (ERI) to fund non-government schools. The ERI approach used information on school financial resources to allocate schools to one of 12 funding categories. This allocation process measured school private income (including income generated by fees) against a resourcing benchmark.

As part of the broader review, the Australian Government, alongside key stakeholders, considered the merits of the ERI mechanism, and five alternative funding approaches. These included: consideration of school resources (e.g. a revised version of the ERI approach); family income; an individual-based model (e.g. vouchers); SES of the school community; and a combination of these approaches.

Following a consultation process, it was agreed an SES measure using data collected by the Australian Bureau of Statistics (ABS) Census of Population and Housing should be progressed. Four separate indexes were tested during a year-long simulation project during 1998, with the current index design validated in 1999, and ultimately legislated by the Australian Government.

While the objective of the SES score has remained unchanged for 20 years—to measure the capacity of non-government school communities to contribute towards the operating costs of their schools—its application in recurrent schools funding has changed.

From 2001 for independent schools, and 2005 for Catholic systemic schools, the SES score determined the percentage of the Average Government School Recurrent Costs (AGSRC) non-government schools received from the Australian Government. The actual funding

received by schools was also influenced by Funding Maintained and Funding Guaranteed arrangements.

Since 2014, and following the 2011 Review of Funding for Schooling, the SES score has been used to discount the base Schooling Resource Standard (SRS) per student amount received by non-government schools.

The SES score calculation methodology

The SES score calculation currently uses Census data at the Statistical Area 1 (SA1) level from four dimensions—education, occupation, household income and income of families with children. The SA1 level is the smallest unit used by the ABS for the release of Census data. SA1s generally have a population of 200 to 800 persons, and an average population of about 400 persons. There were 54,805 SA1s used in the latest SES score calculation in 2013.

Statistical analysis of Census data at the SA1 level is undertaken to create four dimension scores. A weighted average is then used to combine these four dimensions into a single SES score for each SA1—⅓ Occupation, ⅓ Education, ⅙ Household Income, ⅙ Income of families with children.

Following calculation of an SES score for each SA1, this data is linked to student residential address data, collected by the Department of Education and Training from approved school authorities every four to five years. A process called geo-coding then allocates these addresses to an SA1. A school SES score is generated using an enrolment weighted average of the SES scores from the SA1s where students live.

The school SES score is intended to reflect the average SES of a school's students, relative to other schools. However, there may be instances where school leaders consider the calculated SES score does not reflect the average SES of their school community. In these cases an appeal can be made to the Australian Government. Since 2007, 11 schools have successfully appealed their SES score. These appeals were made on the basis of each school's unique family characteristics. Revised SES scores were calculated using actual parental income, collected by survey, alongside adjustments for family size.

The SES score has periodically been subject to discussion, most significantly in 2011 when the Review of Funding for Schooling raised concerns about the appropriateness of the SES score for assessing the capacity to contribute. The Review recommended assessment of the need of individual schools for Australian Government funding should continue to be based upon the capacity to contribute, and that the measure used to assess this need should be examined further.

Concerns and views about the SES score

Stakeholder concerns and views about the SES score have circulated since its introduction, largely relating to four areas:

- purpose and objective—whether the SES score is seeking to measure an appropriate concept, and if an alternative measure should be used
- design—the extent that the design of the SES score is in line with the objective
- accuracy—the extent that the methodology and data used to generate SES scores provides an accurate estimation of the relative capacity to contribute of schools
- timeliness—whether the SES score is able to capture relevant economic and demographic change.

A summary of the identified issues and concerns is provided in Figure ES-1 below.

A key theme of all concerns raised is that there may be systematic bias in the SES score, with certain schools or school sectors receiving an SES score not accurately reflecting the school community's SES. For example, the Census income data used to calculate the SES score may lead to a systematic bias favouring one non-government school sector over another.

Figure ES-1 Summary of stakeholder concerns and views about the SES score

Purpose and objective

Whether the SES score is seeking to measure an appropriate concept, and if an alternative measure should be used

- Measurement of the capacity to contribute should consider school resources
- Schools that set low fees to facilitate access are penalised
- Low fee schools should have a reasonable resource base
- The SES score makes no adjustment for school wealth

Design

The extent that the design of the SES score is in line with the objective

- The relevance of the education and occupation dimensions within the SES score is unclear
- The weights given to the SES score dimensions are arbitrary
- Education, occupation and income are weakly correlated
- Education and occupation are used twice in the SRS: in capacity to contribute and loadings
- Family or household wealth is not used in the SES score

Accuracy

The extent that the methodology and data used to generate SES scores provides an accurate estimation of the relative capacity to contribute of individual schools

The ecological fallacy

- Non-government school students *may not* be representative of their SA1
- The SES score favours schools serving regional students
- Household SES can vary significantly *within* SA1s
- Mesh blocks may overcome inaccuracies

Measurement error

- The income thresholds used in the SES score may not adequately measure affluence
- Families reporting nil/negative income in the Census may still be affluent
- Parents may live in a different location to their child
- Family size is not considered in the SES score estimation

Timeliness

Whether the SES score is able to capture relevant economic and demographic change

- The five years between Censuses means the data becomes quickly outdated

Stakeholder issues and concerns associated with the purpose and objective of the SES score are largely focussed on whether the capacity to contribute should be based solely on SES, or whether school resources should be considered in conjunction with SES. Some stakeholders consider low fee schools are disadvantaged by the current approach, whereas others consider school fee structure shouldn't influence the distribution of funds by the Australian Government to non-government schools.

Stakeholder issues and concerns on the SES score's design are more technical and relate specifically to what and how data calculates the SES score. Some stakeholders have questioned the inclusion of education and occupation data, arguing there is a weak case for their use in a measure also incorporating income data. At the same time, others consider income provides a partial measure of the capacity to contribute. In addition, there is debate about the current exclusion of family/household wealth. This exclusion is difficult to address given the ABS Census does not collect relevant data.

Several issues and concerns have been raised about the accuracy of the SES score in measuring the capacity to contribute:

- the ecological fallacy—it has been argued that students attending non-government schools are not representative of their SA1s, meaning school SES scores generated using data on all residents in an SA1 does not accurately measure the capacity of parents to contribute towards school operating costs
- measurement error—the comprehensiveness and coverage of data used to calculate the SES score means that an inaccurate SES score may be generated.

Other issues raised regarding the accuracy of the SES score are firstly, that data is only used on the SA1 of where students live, and not also the SA1 of where other parents contributing towards the cost of educating their child may live. Secondly family size is not considered—schools that are identical in every SES dimension will receive an identical SES score, even if there is a significant difference in average family size.

The final issue and concern regarding the SES score is its timeliness. With both the ABS Census and SES score calculation only occurring once every five years, there is concern that the resulting school SES scores become quickly outdated. This is of particular concern for areas experiencing significant economic or demographic change.

Potential directions for assessing measurement of the capacity to contribute

Moving forward, we consider there are several areas that could be usefully explored to both validate the current approach, and examine opportunities to improve measurement of the capacity to contribute.

As a first step there is benefit in elaborating upon the purpose and objective of the measure, addressing the stakeholder issues and concerns identified in this paper. This includes which parents are in scope for assessing the capacity to contribute—should it just be the parent a student lives with, or all parents? And what defines school communities—does this include alumni providing financial support to schools?

The second and more analytically intensive task is to validate the appropriateness of the current SES score design, and in the process identify improvement opportunities.

This analysis could be underpinned by a set of principles, potentially building upon those used when the SES score was first developed—transparency, based on reliable data, simplicity, nationally consistent and avoid duplication. Given stakeholder concerns centre largely on accuracy, this could be another guiding consideration.

We have suggested a series of analytical approaches to undertaking this work (see Section 5). Of note is using the Household, Income and Labour Dynamics in Australia (HILDA) Survey to identify whether omitting household assets information biases SES scores in favour of one non-government school sector over another, and examining the importance of occupation and education.

The recent released 2016 ABS Census data could also be used to identify whether SA1 SES scores as currently calculated, are representative of families with children attending non-government schools. There may also be opportunities to more accurately measure SES through using measures such as equivalised income. Equivalised income adjusts household income to reflect factors such as household size and composition. It may also be feasible for an SES measure to use data sourced from the Australian Taxation Office at the SA1 level.

Depending on the findings of the validation process, a range of related activities could examine improvement opportunities. These include identifying whether parent level occupation and education data could instead be sourced from the Australian Curriculum, Assessment and Reporting Authority (ACARA), whether parental income data could be sourced from the Australian Taxation Office (ATO), and alternative approaches to calculating the SES score using Census data. For instance, if analysis using HILDA finds family wealth to be important, alternative data collected in the Census could be used, such as housing tenure type.

Ultimately, there is a need for the Australian Government to use a measure of the capacity to contribute when allocating funds among schools. It is unlikely that an approach can be developed that is ‘perfect; as such the challenge moving forward is to identify an approach that best meets the needs of families, schools and the Australian Government.

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Acronyms

Acronym	Description
ABS	Australian Bureau of Statistics
ACARA	Australian Curriculum, Assessment and Reporting Authority
AGSRC	Average Government School Recurrent Costs
ASCO	Australian Standard Classification of Occupations
ANZSCO	Australian and New Zealand Standard Classification of Occupations
ATO	Australian Taxation Office
CD	Census Collection District
Census	Census of Population and Housing
DET	Australian Government Department of Education and Training
ERI	Education Resources Index
FQ	Financial Questionnaire
HILDA	Household, Income and Labour Dynamics in Australia Survey
ICSEA	Index of Community Socio-Educational Advantage
IRSAD	Index of Relative Socio-economic Advantage and Disadvantage
IRSD	Index of Relative Socio-economic Disadvantage
LSAC	Longitudinal Study of Australian Children
LSAY	Longitudinal Surveys of Australian Youth
PCA	Principal components analysis
SA1	Statistical Areas Level 1
SA3	Statistical Areas Level 3
SEIFA	Socio-Economic Indexes for Areas
SEIFI	Socio-Economic Indexes for Individuals
SES	Socio-economic status
SIH	Survey of Income and Housing
SRS	Schooling Resource Standard
TFN	Tax File Number

1. Introduction

The Centre for International Research on Education Systems (CIRES) at Victoria University has been commissioned by the Australian Government Department of Education and Training (DET) to prepare a research paper on the Socio-Economic Status (SES) score methodology. The SES score is used in the allocation of Australian Government recurrent funding to non-government schools.

This research paper provides a stocktake of development activities since the SES score was conceived in 1996, and subsequently used to allocate recurrent funding from 2001. The paper then synthesises stakeholder issues and views on the SES score, and identifies areas for possible further exploration.

Report context and objectives

The role of the Australian Government in funding non-government schools

The Australian Government first began providing recurrent per-student funding to non-government schools in 1970. This funding varied on the basis of whether students were primary or secondary, and was fixed from 1973 at 20 per cent of the cost of educating a child in a government school. In 1974, a needs-based funding approach was implemented with schools classified into eight categories; this was reduced to six categories in 1976, and then three categories in 1982.

The Australian Government method of funding non-government schools changed again in 1985 with the introduction of the Education Resources Index (ERI). Individual schools were allocated to one of 12 funding categories on the basis of school financial resources. Between 1985 and 1993 the funding rates within these categories were based on an estimated community standard resource level. From 1993, the Average Government School Recurrent Costs (AGSRC) was used to develop funding rates (The Allen Consulting Group, 2011).

The purpose and application of the SES score

In 1997, stakeholder concern over the effectiveness and appropriateness of the ERI funding approach led to the search for an alternative method for allocating funding to non-government schools. It was decided by the Australian Government that a new approach should be based on the capacity of non-government school communities to contribute to the operating costs of their schools. This resulted in the development of the SES score, which was implemented in 2001 for independent schools, and from 2005 for Catholic systemic schools.

Between 2001 and 2013, the SES score was used to determine the percentage of the AGSRC a non-government school received from the Australian Government. Since 2014, and following the Review of Funding for Schooling, the SES score has been applied to capacity to contribute arrangements, to discount the base Schooling Resource Standard (SRS) per student amount received by non-government schools.

A school's SES score is calculated using area-based data on the characteristics of where its students live. SES is measured using Australian Bureau of Statistics (ABS) Census data on the occupation, education level and income of all people living in these areas. According to the most recent available data, from 2016 2,578 non-government schools have SES scores, ranging from 73 (low SES) through to 131 (high SES). The median value is 99, with scores not estimated for 192 schools. These 192 schools are exempt due to being either a majority Aboriginal and Torres Strait Islander school, special school, special assistance school, or sole provider school.

Schools that are part of a system are currently provided an enrolment-weighted system SES score, with school systems allocating funding using their own needs-based distribution arrangements. From 2018, systems will be funded on the basis of individual school SES scores.

Although the application of the SES score in allocating Australian Government recurrent funding to non-government schools has changed since 2001, the SES score has maintained its original intent of measuring the capacity to contribute.

The SES score has periodically been the subject of public discussion, most significantly in 2011 when the Review of Funding for Schooling raised concerns about the appropriateness of the SES score for assessing the capacity to contribute. This concern led to the Review's Recommendation 3—that the Australian Government examine the appropriateness of the SES score for assessing the capacity of parents to contribute towards the cost of educating their child when attending a non-government school (see Box 1-1).

Box 1-1 Recommendations of the Review of Funding for Schooling (2011): SES score

Recommendation 2

In a new model for funding non-government schools, the assessment of a non-government school's need for public funding should be based on the anticipated capacity of the parents enrolling their children in the school to contribute financially towards the school's resource requirements.

Recommendation 3

For the purposes of allocating public funding for non-government schools, the Australian Government should continue to use the existing area-based socioeconomic status (SES) measure, and as soon as possible develop, trial and implement a new measure for estimating the quantum of the anticipated private contribution for non-government schools in consultation with the states, territories and non-government sectors.

Recommendation 20

For the purposes of allocating public funding for non-government systems and schools, all Australian governments should:

- adopt a common concept of need for public funding based on the capacity of the school or system to contribute towards its total resource requirements
- commence work as a priority to develop, trial and implement a better measure of the capacity of parents to contribute in consultation with the non-government sectors.

The Australian Government should continue using the existing area-based SES measure until this better measure is developed.

Source: Gonski, et al. (2011), pp. 79, 81, 177.

The Review of Funding for Schooling also recommended that assessment of school need for Australian Government funding continue to be based upon the capacity to contribute.

Report structure

The remainder of this research report is structured as follows:

- Section 2 provides a history of the SES score since being first conceived in 1996, and then developed for introduction from 2001
- Section 3 provides an overview of the SES score calculation methodology, including how the SES score is calculated for individual non-government schools
- Section 4 summarises concerns and views raised about the SES score at the time of its development and introduction, and over the subsequent 16 years
- Section 5 identifies potential directions for measuring the capacity to contribute.

2. History of the SES score

This section summarises the history surrounding the development and application of the SES score. Key events are identified in Figure 2-1, encompassing a 21-year period from 1996 to 2017. Three distinct time periods are examined. Firstly, the development of the SES score between 1996 and 2001. This is followed by the implementation of the SES score as part of the SES funding model between 2001 and 2013. The section concludes by examining the application of the SES score from 2013 as part of the SRS funding model.

Development of the SES score: 1996 to 2001

Seeking a successor to the Education Resources Index

The predecessor of the SES score was the Education Resources Index (ERI), which was in place between 1985 and 2001. The ERI mechanism allocated schools to one of 12 Australian Government funding categories. This allocation was based on a school's ERI rating, calculated by dividing a measure of financial resourcing per student, by a resourcing benchmark. Between 1985 and 1993, this resourcing benchmark was the 'community standard of educational and financial resources'. This standard was replaced from 1993 by the AGSRC (Department of Employment, Education, Training and Youth Affairs, 1997).[1]

An overview of the ERI funding mechanism is provided in Box 2-2 below. The main aspect of the ERI mechanism—the allocation of schools to a funding category—is relatively straightforward. What made the ERI mechanism increasingly complex was associated measures, such as funding guarantees if a school's ERI category changed, and requiring schools to increase operating expenditure and private income.

In 1996, the Liberal-National Coalition government commissioned a review of the ERI. This review had three elements—operational issues, administrative processes and future arrangements (including alternative funding approaches).

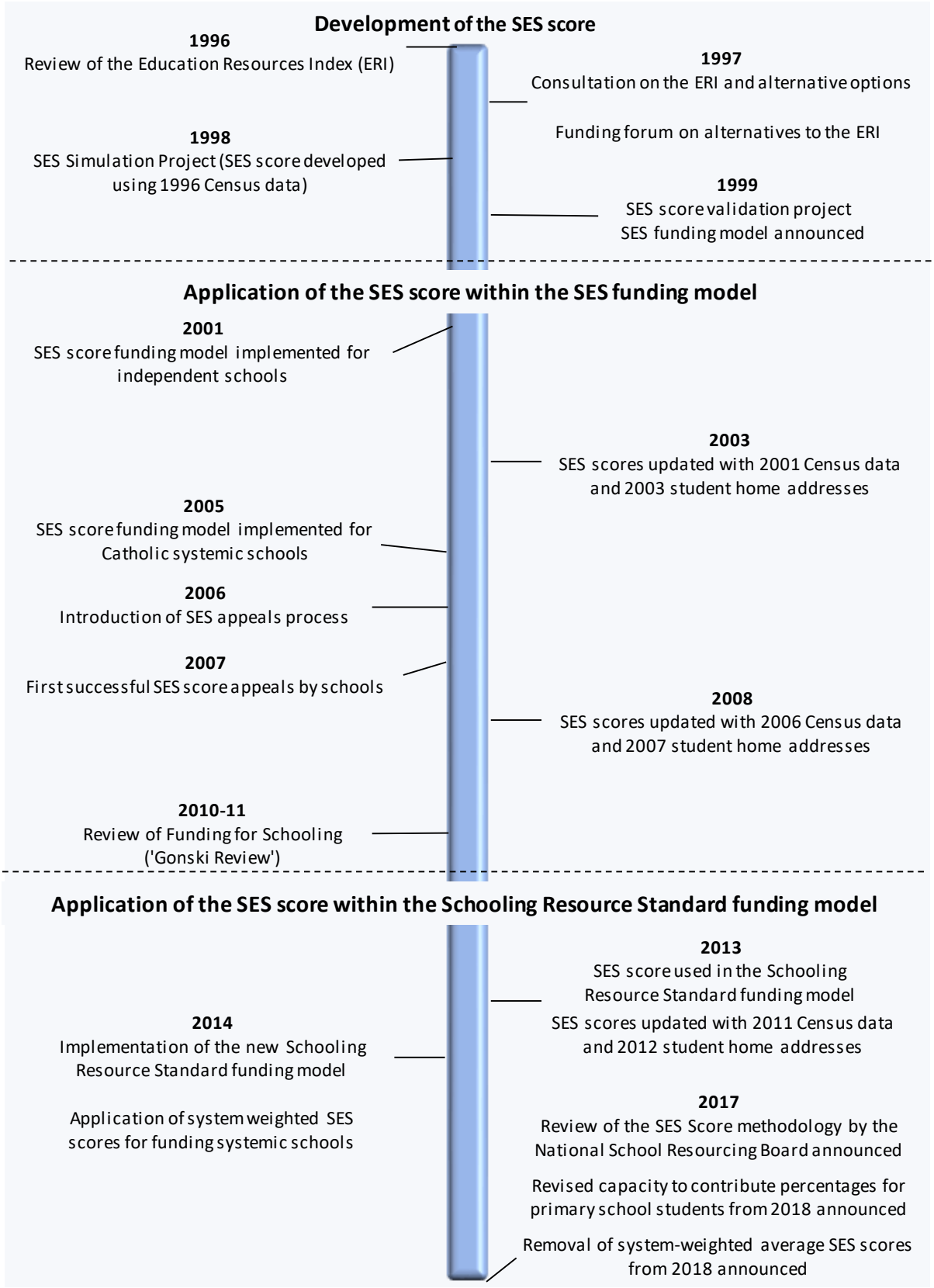
The first phase of the review comprised an evaluation by KPMG Management Consulting assessing the ERI mechanism against five criteria—acceptability, transparency, robustness, sensitivity and practicality. The evaluation found the ERI mechanism wanting against these criteria, leading to the overall finding that the 'ERI fails to meet most of the tests of an effective indicator of need' (KPMG Management Consulting, 1996, p. 76).

In 1997, the Australian Government commenced an extensive consultation process, including stakeholder workshops, a public submission process and an overseas study tour. Workshops were held in all capital cities and were attended by 189 people including representatives of

[1] The 'community standard' reflected judgements about standards required in all schools. These included desirable class sizes; time allowances for teacher professional duties; and the number of specialist and ancillary staff (Wilkinson, Caldwell, Selleck, Harris, & Dettman, 2006).

peak bodies, school system authorities, individual schools and parent groups. A total of 89 submissions were made to the review.

Figure 2-1 SES score timeline



Box 2-2 Operation of the Education Resources Index funding mechanism

The ERI funding mechanism was underpinned by an assessment of the financial capacity of non-government schools. This assessment led to schools being given an ERI rating and then allocated to one of 12 funding categories. The highest financial capacity schools (ERI rating 0-10) were allocated to funding category 1. The lowest financial capacity schools (ERI rating of 88+) were allocated to funding category 12. For each funding category there was a corresponding per primary or secondary student funding rate. In 1997, funding category 1 schools were provided $501 and $795 per primary or secondary student respectively. Category 12 schools were provided $2,217 and $3,239 per primary or secondary student respectively

A school's ERI rating was determined by the percentage value generated by the following formula:

higher of:

Net Private Income per student (boarding and capital allowances deducted)

or

Operating Expenditure per student (State/Territory and Commonwealth grants deducted)

divided by:

Total Assessment Standard: 'Community standard' (1985 to 1993), AGSRC (1993 to 2001)

Equals:

ERI rating percentage

Under the ERI funding model, systemic schools were allocated to a single ERI rating and thus funding category, for their system. A system rating was determined from the enrolment weighted average of the individual ratings of each school within a system.

ERI funding to non-government schools was also influenced by several other requirements:

- Maintenance of Effort (MOE) and Private Income (PI)—schools were required to maintain their expenditure on recurrent resources, and to increase private income by at least 3 per cent per annum. Both these requirements had to be met if a school's ERI rating changed to the extent that a school was allocated to a higher funding category.
- Limit on Private Income—schools were allowed to increase their private income by up to 5 per cent per year, without this affecting the school's funding category.
- Funding Guarantees—If a school was assessed as moving into a lower funding category, funding was held, in nominal terms, at the pre-existing level until indexation of funding rates resulted in the lower category funding rate equalling the 'guaranteed' funding amount.
- Capital Concession—If approved by the Australian Government, schools could deduct private capital income in excess of a specified capital allowance, from the private income used in the ERI rating formula.

Source: Department of Employment, Education, Training and Youth Affairs (1997)

The overall consultation finding was that key elements of the ERI funding mechanism were considered 'unfair or anomalous' by the non-government school community (Department of Employment, Education, Training and Youth Affairs, 1997, p. 33). Specific concerns included:

- the complexity of the ERI mechanism, which forced schools to undertake 'mathematical acrobatics' to maintain their funding
- school-level educational and management decision-making was unduly influenced by the ERI mechanism

- the formula for calculating the ERI rating was discouraging private investment, and providing a disincentive for schools to raise additional income through fund raising or other means
- no consideration was made of school facilities and infrastructure, or the financial position of schools (i.e. assets or liabilities)
- the Maintenance of Effort and Private Income requirements
- schools with similar student populations were receiving very different ERI ratings and thus Australian Government funding levels (Department of Employment, Education, Training and Youth Affairs, 1997).

The consultation process also considered five alternative options for the future provision of Australian Government funding to non-government schools:

- a school resource approach, such as an amended ERI, an income-expenditure approach or other model
- an income-based approach, using family income information
- an individual-based approach, including flat-rate or means-tested vouchers
- an approach to funding based on the SES of the school community
- a tiered approach, combining a base grant with another needs-based component (Department of Employment, Education, Training and Youth Affairs, 1997).

These options, and a summary of commentary provided in the associated consultation report, are presented in Table 2-1. The consultation report did not include detailed assessment of these five options. Rather, it noted issues raised during the consultation process, alongside design or implementation considerations.

Stakeholder response to the consultation report echoed the view that the ERI mechanism should not be continued without amendment. There was support for an alternative school-resource based approach, particularly among schools in the higher ERI funding categories. Other approaches were considered more intrusive and less educationally accountable. There was also support for further consideration of an individual-based approach so as to maximise school choice and responsiveness. Finally, there was interest among the non-government school community in a funding model based on the SES of school communities (Department of Education, Training and Youth Affairs, 1998).

Two approaches were the focus of a funding forum in December 1997—an approach based upon the family income of students, and an SES measure of a school's community. Both were intended to measure the 'capacity to support the school', and were selected for further discussion as they were relatively unfamiliar. This unfamiliarity contrasted with school resource approaches, which were known to the Australian Government and non-government school stakeholders. It was noted at the time that none of the alternative approaches had been ruled out (Department of Education, Training and Youth Affairs, 1998, p. 4).

Concerns around the reliability of currently available data, administrative difficulties, privacy, and funding stability led to the family income approach not being supported by stakeholders attending the forum. Instead further consideration and development of an SES measure approach was endorsed (Department of Education, Training and Youth Affairs, 1998).

Table 2-1 Options considered for allocating funds to non-government schools

Approach	Features	Summary of commentary on alternative funding options
School resource approaches	Options included funding based on: • reported tuition fee income • published fee schedule • school recurrent expenditure compared to benchmark • income/expenditure differential • comparison with government schools	**Tuition fee based approaches—**Funding would be based on either reported tuitions fees, or the published fee schedule. These were considered poor measures of need, with concern raised that school financial data may be manipulated. The published fee schedule approach was also seen as complex to administer, with concern that it may encourage schools to reduce fees, thus increasing reliance on government funding. **School recurrent expenditure compared to a needs-based resource benchmark—**This would involve comparing school recurrent expenditure to a benchmark. This benchmark would take into account factors influencing expenditure (e.g. size, location), and could become quite complex. There was concern at the time that this approach could encourage schools to 'mask' expenditure (e.g. parents provide services to schools in lieu of fees). **Income/expenditure differential—**Schools would be allocated to six funding bands, with total private recurrent income per student placement determining band placement. Need would be validated by examining the percent of recurrent expenditure attributable to government funding, and recurrent expenditure as a percent of recurrent income. **Comparison with government schools—**This approach was taken from British Columbia, Canada where schools are placed in four groups–Group 1 and 2 schools receive 50 and 35 per cent of government school costs respectively. Classification is based on school resourcing compared to government school resourcing, and the level of school regulation. Group 1 schools operate at (or below) government school costs. Group 2 operate above government school costs. Group 3 and 4 schools are unfunded due to opting out of school regulation. Assessment as part of the consultation process identified the challenges of this approach. These challenges included there being two government funders of schools in Australia, limited differentiation between schools, and the maximum funding amount (50 per cent) would likely be inadequate for disadvantaged schools reliant on government subsidies.
Income-based approaches	Means-tested payments to schools (based on family income and/or assets test)	Income-based approaches would apply a means test, and potentially reflect 'parental capacity to pay'. Concern was raised about data collection effort, and the accuracy of income and assets data (as recorded by the Australian taxation and welfare system) in measuring family resources. It was noted that the taxation system is underpinned by individual assessment, not family assessment, and is focussed on taxable income, excluding assets.

Approach	Features	Summary of commentary on alternative funding options
		There was concern about privacy and confidentiality if families were required to provide income data to schools. There was also concern that an approach based on individual students would move the focus of government funding away from funding schools to students.
Individual-based approach: vouchers	Options considered: • flat rate voucher • means tested voucher • voucher adjusted for educational need	The individual-based approaches considered were characterised by a voucher, whereby a student would attract the same level of subsidy, regardless of the non-government school they attended. The voucher could be paid either to schools, or to families. It was noted at the time that such an approach could increase choice and funding control by parents, and would be a significant departure from the ERI approach, where funding was based on school income or expenditure. A means tested voucher would reflect family capacity to contribute. Adjusting voucher value for educational need was noted as requiring an assessment process, and could potentially create disincentives for schools to improve educational standards.
School community socio-economic status	An index of a school's socio-economic mix, measuring: • capacity to contribute • educational need of school communities • relative resource need of schools	The existing application of SES indexes to allocate school funding was discussed, along with indexes developed by the ABS, and the creation of a new index using ABS Census data. It was noted that a new index could use data on adults with school-age children, or with children attending non-government schools. Attributes identified for potential inclusion in an index comprised family income, educational attainment, unemployment, occupation, household occupancy and Aboriginality. It was noted that the specific purpose of the index would guide the selection of attributes and their weighting. Concern was raised as to whether a single index could provide a good measure of relative need including in the Northern Territory, Australian Capital Territory, and rural areas. It was observed that an SES index approach would ensure that schools with students from a similar socio-economic background would receive the same level of funding, and that funding would adjust in response to changes in the socio-economic mix of students in schools.
Tiered approach	Comprises three funding elements: • base operating costs grant • voucher/entitlement based on parental income, or per capita payment based on school SES • costs associated with educational need.	This approach combined elements of those summarised above. The combination of several methods raised concern that the tiered approach would be unduly complex. It was also noted at the time that the introduction of a tiered approach would require significant administrative change, and agreement between the Commonwealth and State/Territory governments.

Source: Department of Employment, Education, Training and Youth Affairs (1997).

Calculation of the SES score in the SES Simulation Project

The Australian Government, with the cooperation of non-government school peak bodies, progressed consideration of an SES measure through the SES Simulation Project. This project was intended to test the validity of an SES-based model, examine how it might work, and ultimately estimate an SES score associated funding allocation for each non-government school. This funding allocation would then be compared to that provided by the ERI approach.

A clear objective for an SES measure underpinned this work—to:

> *'show the relative capacity of schools to generate funds on their own behalf from the community they serve.'*

with the design of the SES measure to also:

> *'avoid duplicating specific aspects of educational disadvantage which are directly addressed in targeted programmes.' (Department of Education, Training and Youth Affairs, 1998, p. 15)*

Consideration of an SES measure was also guided by five principles:

- transparency—independently formulated and based on reliable data. The relationship between source data, indicators and relatively funding level of individual schools should be clearly demonstrable.
- based on reliable data—method is reliant on data collected independently of the purpose of the funding program.
- simplicity—index should be as simple as possible, while being accurate as measuring the relative 'capacity to contribute'.
- nationally consistent—measure is applicable nationally without disadvantaging particular states/territories, or groups.
- avoids duplication—only dimensions related to the purpose of the index should be included (Department of Education, Training and Youth Affairs, 1998).

The methodology used to estimate the final SES measure is explained in Section 3. In brief, the simulation project involved collecting student home addresses from 2,262 schools (almost all Catholic systemic schools, and 720 independent schools). Student address details were then geocoded, enabling identification of the specific Census Collection District (CD) that a student resided in. An attraction of an SES-based approach using ABS Census data and student home addresses was schools not being required to collect new data.

Four SES index approaches were developed with the aim of generating an SES score for each CD (see Table 2-2 below).

The key difference between the four approaches were the variables used, and their relative importance. The focus upon family economic resources led to selection of several dimensions for examination, including occupation, education level, income and accommodation.

Table 2-2 Indexes trialled in the SES Simulation Project

Index and dimensions	Feature	Stakeholder assessment
Index A ⅓ Occupation + ⅓ Education + ⅓ Income	Comprises three equally weighted dimensions: • Occupation—based on major occupation group and gender, including unemployment status • Education—educational attainment of all members of the household aged over 15. • Income—households with income less than $36,000 per year, or greater than $78,000.	Index A and index modified A had a broader spread of scores, compared to H3 and modified H3. The spread of scores was considered an advantage, as it enabled greater differentiation between schools. The Steering Committee overseeing the SES Simulation Project considered the A indexes were simpler, and led to greater school differentiation, than the H3 indexes. Index Modified A was ultimately preferred due to its inclusion of income of families with children.
Index Modified A ⅓ Occupation + ⅓ Education+ (⅙ Household Income + ⅙ Income of families with children)	Identical to index A, with the inclusion of data on income of families with children. The income groupings for this additional variable were identical to that in index A.	
Index H3 (2 × (Occupation + Education + Income) + Family Stability + Accommodation + Tenancy) / 9	Comprised the same dimensions as index A, with the inclusion of elements on: • Family stability—measuring family structures such as single parenthood, separation and divorce • Accommodation—families in accommodation that is temporary or of low standard • Tenancy—households in government housing, renting privately, purchasing or owning their own dwelling.	Non-government school stakeholders from smaller states with particular demographics preferred H3 or modified H3. As the two H3 indexes considered more social factors, and moderated economic factors, there was a greater concentration of schools with the same SES score.
Index Modified H3 (2 × (Education + Income) + Occupation + Occupation excluding unemployment + Family Stability + Accommodation + Tenancy) / 9	Identical to index H3, with the inclusion of an occupation dimension that excluded unemployment status.	

Source: Department of Education, Training and Youth Affairs (1998), p. 16.

Calculation of the SES indexes largely used data on all households within CDs—it did not focus on families of school-aged children, or families with children attending non-government schools. The exception was elements focusing on families with children, and family stability.

In November 1998, non-government school representatives met to discuss the SES score analysis, and to select a preferred index to be recommended to the Australian Government. It was acknowledged that consideration of the SES score analysis was 'both subjective and objective', and was based on a set of agreed principles and the funding implications for individual schools and school systems (Department of Education, Training and Youth Affairs, 1998, p. 20).

The Modified A index was selected, using data on Occupation (⅓), Education (⅓), Household income (⅙) and Income of families with children (⅙). The data in brackets denotes the relative importance (or weights) of each component in the index. This index was subsequently called the SES score. The choice of weights in the Modified A index was a policy decision made in consultation with stakeholders, and not one based on any specific analysis findings.

Although the objective of the index was to measure financial capacity, education and occupation were included due to a desire to develop a more precise and stable profile of schools. It was noted that education level and occupation type were highly correlated between themselves, and with income. The Modified A index was ultimately preferred by school representatives as it generated a broader spread of scores between schools (Department of Education, Training and Youth Affairs, 1998).

Validation of the SES score

Following the initial calculation of the SES score, a validation exercise was undertaken in 1999 by the (then) Department of Education, Training and Youth Affairs to:

> *'test whether a measure of the relative need of non–government school communities based on an SES approach using data gathered from the Census matched other measures of need' (Department of Education, Training and Youth Affairs, 1999, p. 1).*

This validation comprised the SES score being compared with three other measures:

- the occupation, education and wealth of parents for schools, generating using data collected in the Longitudinal Surveys of Australian Youth (LSAY)
- parental means as assessed under the Australian Government AUSTUDY payment, available to students aged 16 and over
- family means as assessed by means-tested allowances provided to school students by three state governments (Victoria, South Australia and Tasmania).[2]

[2] At this time only Victoria, South Australia and Tasmania provided means-tested allowances to students in non-government schools.

Analysis was undertaken to identify whether the SES scores generated for individual schools were related with estimates generated using each of the above measures. The specific methods and findings are summarised in Table 2-3 below.

Table 2-3 SES score validation approaches

Approach	Method	Findings
Longitudinal Surveys of Australian Youth (LSAY) data	Student data was used for the 76 non-government schools participating in LSAY 1995, to construct a school-level SES index. The data used comprised father's occupation and education, and household possessions. Rankings from the four SES index options and the LSAY index were compared using regression analysis.	The rankings from an LSAY derived index had a correlation coefficient of 0.85 with rankings of all four SES index options. A coefficient of 0.85 indicates a strong relationship.
Australian Government AUSTUDY data	Data on the percentage of students receiving AUSTUDY in individual New South Wales and Victorian non-government schools in 1997, was compared to each school's SES score. The reported analysis used school SES score groups, and not individual schools.	The analysis found that the lower the school SES score, the greater the percentage of students in a school receiving AUSTUDY.
Means-tested allowances provided to school students by three state governments	Three states (Victoria, South Australia and Tasmania) provided allowances to low income families with school children. Eligibility was based on different measures of parental means. The reported analysis used school SES score groups, and not individual schools.	The analysis found that the lower the school SES score, the greater the percentage of students in a school receiving means tested allowance.

Source: Department of Education, Training and Youth Affairs (1999).

A relationship was found between the SES score and the three comparison approaches, leading to the Department concluding that:

> *These findings support the view that a Census based SES measure produces a good proxy for parental income, without the intrusiveness and administrative complexity inherent in measuring parental income more directly (Department of Education, Training and Youth Affairs, 1999, p. 2).*

Application of the SES score within the SES funding model: 2001 to 2013

Announcement of the SES funding model

The introduction from 2001 of the new SES funding model was announced as part of the 1999 Australian Government Budget. In the Second reading speech introducing the requisite legislation in June 2000—the *States Grants (Primary and Secondary Education Assistance) Bill 2000* (Cth.)—the Minister for Education, Training and Youth Affairs stated that the SES funding model would:

> *…provide a more transparent, objective and equitable approach to funding non-government schools.*

> *Under the new arrangements general recurrent funding will be distributed according to need and schools serving the neediest communities will receive the greatest financial support. This means that parents at all income levels will now have a realistic capacity to choose the most appropriate schooling for their child (Kemp, 2000, p. 18565).*

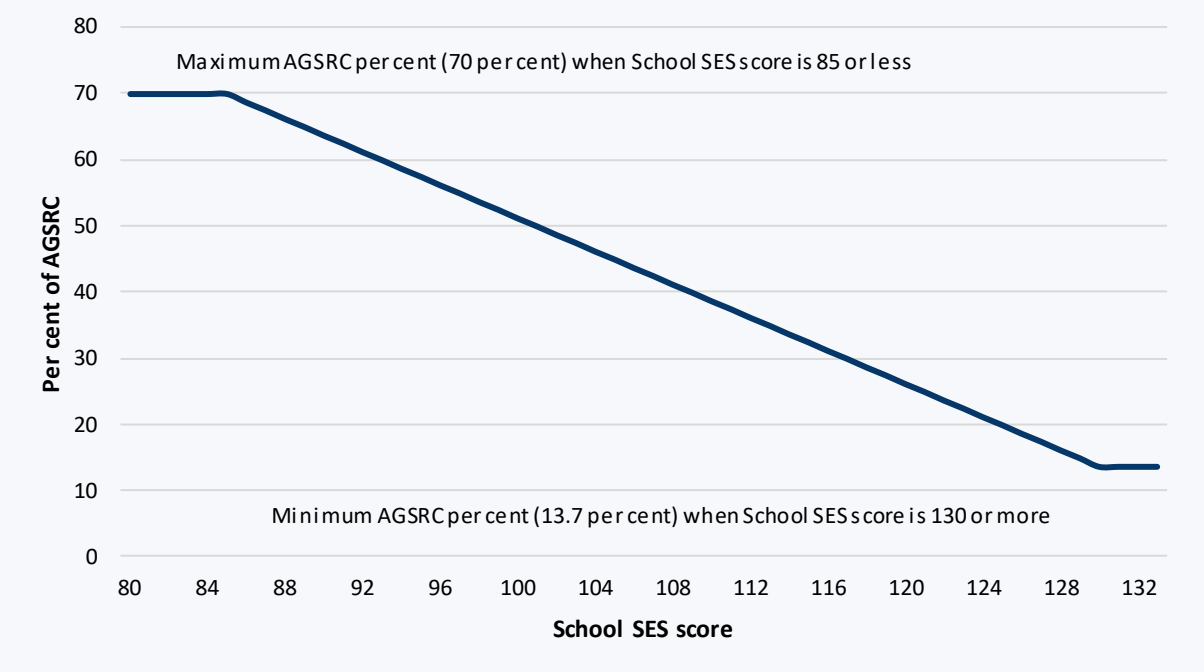
The new funding model was implemented for independent schools for the 2001-2004 quadrennium. Separate arrangements were put in place for Catholic systemic schools. This involved Catholic systemic schools in the Australian Capital Territory being funded at a determined SES score of 100, and all other schools at a determined SES score of 96. These determined SES scores attracted per-student funding at 51.2 and 56.2 percent of the AGSRC respectively (Wilkinson, Caldwell, Selleck, Harris, & Dettman, 2006).

Several reasons have been publicly documented for the new SES funding model not including Catholic systemic schools. These include that the National Catholic Education Commission did not support the Australian Government allocating funds to non-government schools on the basis of SES alone, as this would ignore past and current school resourcing. Catholic system representatives were also concerned about funding stability under the new approach, and also preferred that funding for Catholic systemic schools be treated differently to that of independent schools (Hinz, 2016).

Implementation of the SES funding model for independent schools

The SES score was used in the SES funding model between 2001 and 2013. Under this funding approach the SES score of a school corresponded to a percentage of the AGSRC a school would receive (between 13.7 and 70 per cent) (see Figure 2-2).

Figure 2-2 School SES score and funding as a per cent of the AGSRC



Source: *Schools Assistance Act 2008* (Cth.), Schedule 1.

Schools with an SES score of 85 or less (a very low SES school) received 70 per cent of the AGSRC. In contrast, high SES schools with an SES score of 130 or more received 13.7 per cent of the AGSRC. Non-government schools received the maximum funding rates if they were a:

- special school
- special assistance school
- majority Indigenous student school (schools with 80 per cent or more Indigenous enrolments
- very remote schools with 50 per cent or more Indigenous enrolments) (Gonski, et al., 2011).

A number of independent schools that would have been entitled to less funding as a result of the SES funding model had their existing funding levels preserved. These schools were classified as Funding Maintained, with this classification explored at length in the Review of Funding for Schooling (Gonski, et al., 2011, pp. 73-74, 82-83). As at 2013, 15 per cent of independent schools were Funding Maintained.

Implementation of the SES funding model for Catholic systemic schools

In 2004, agreement was reached between the Australian Government and the National Catholic Education Commission that Catholic systemic schools would enter the SES funding model for the 2005-2008 quadrennium. As a result, all Catholic systemic schools would be funded with an SES score of 96, attracting 56.2 per cent of the AGSRC. Similar to arrangements offered to the independent sector, some schools were classified as Funding Maintained when application of the model resulted in a funding reduction (Wilkinson, Caldwell, Selleck, Harris, & Dettman, 2006). As at 2013, 50 per cent of Catholic systemic schools were Funding Maintained.

Periodic updating of the SES score

Following the release of new Census data every five years, school SES scores were re-calculated in 2003 (using 2001 Census data), 2008 (using 2006 Census data) and 2013 (using 2011 Census data). Student home address data was collected at these times as part of this re-calculation.

As discussed in Section 3, this updating did not result in any significant changes in the SES score parameters. Rather, the most significant change was the move from using CDs to Statistical Areas Level 1 (SA1s) as the resolution for SES score calculation. This change was a consequence of the ABS introducing a new geography classification scheme (see p. 26 below).

The other change as part of this periodic updating was replacing certain variables used in the SES score calculation. The introduction of a new occupation classification standard by the ABS necessitated change to the variables used in the occupation dimension.

From 2005, a ‘funding guarantee’ scheme was introduced for non-government schools that would see a reduction in their funding due to a change in their SES score (Wilkinson, Caldwell, Selleck, Harris, & Dettman, 2006).

Introduction of an appeals process

The school SES score is intended to reflect the average SES of a school's students, relative to other schools.

For those circumstances where these assumptions did not hold, the Australian Government introduced a mechanism for schools to appeal to alter the estimated SES score. An appeal could be made if a school considered its SES score had not been determined correctly, or did not reflect the socio-economic circumstances of the school's community. This mechanism was initially implemented administratively through the *Schools Assistance (Learning Together—Achievement Through Choice and Opportunity) Act 2004* (Cth) s. 52. The *Schools Assistance Act 2008* (Cth) s. 72(2) replaced this administrative mechanism by providing a legislatively defined process. Since 2007, 20 schools have appealed their SES score, of which 11 were successful.[3]

In the case of five schools from a single denomination, their SES scores were reduced from 'the low 120s or high teens to 92 or below' (Hain, 2017, p. 18). The argument made by these five schools was that their family's SES was well below that of the CD they were living in. A revised SES score was determined on the basis of actual parental income, with adjustments also made for family size (Australian Council of Jewish Schools, 2017).

Findings of the Review of Funding for Schooling

Following reaffirmation that Australian Government funding for non-government schools should continue to be based on the school community's capacity to contribute private funds, the Review of Funding for Schooling examined the SES score. The various concerns and issues from the Review are summarised in Section 4. The Review drew upon evidence generated in the 10 years following implementation of the SES funding model, alongside views put forward in submissions.

In response to concerns regarding the accuracy of the SES score, the Review suggested that even smaller area data could potentially be used from the Census, or that parental SES be directly measured. At the time it was suggested that Mesh Block level data could be used. In the 2011 ABS Census there were approximately 347,000 Mesh Blocks, with residential Mesh Blocks containing approximately 30 to 60 dwellings (Australian Bureau of Statistics, 2010).

The Review identified that a precedent already existed for the development of an index using data collected from parents—the Index of Community Socio-Educational Advantage (ICSEA). The ICSEA was, and continues to be, used to identify 'like schools' for comparison on the *My School* website. When first introduced, ICSEA used direct parental level and indirect area-based data from the ABS Census. The Review noted, however, that ICSEA is unsuitable for use

[3] Advice from the Australian Government Department of Education and Training.

in allocating funding to non-government school due to its objective being to measure socio-educational advantage, not capacity to contribute.

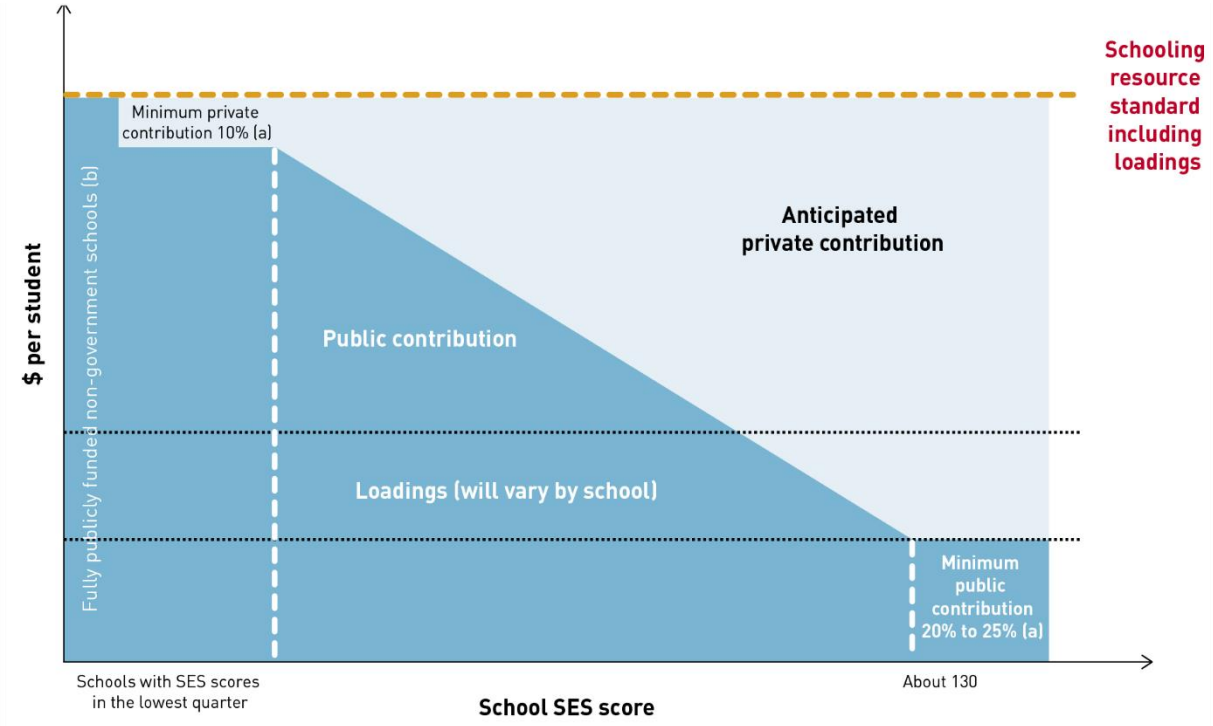
Until such time as an improved measure is developed, the Review recommended the continued use of the SES score to measure the capacity to contribute.

The conceptual approach put forward by the Review for how the SES score should be applied in funding non-government schools is summarised in Figure 2-3. This approach is underpinned by an explicit presentation of the anticipated private contribution to be made by schools.

The main features of Figure 2-3 comprise:

- schools with the lowest SES scores (up to between 90 and 95) are expected to make the minimum private contribution of 10 per cent of the base SRS per student amount
- schools with the highest SES scores (above around 130) are expected to receive the minimum public contribution of around 20 to 25 per cent of the base SRS per student amount
- for schools falling between these two categories (lowest and highest SES) there is a 'sliding scale' for the public contribution as a per cent of the base SRS per student amount.

Figure 2-3 Review of Funding for Schooling: Anticipated private contribution in non-government schools



Note: (a) As a percentage of the resource standard for the system or school without loadings. (b) Where schools serve students and communities with very high levels of need.
Source: Gonski, et al. (2011), p. 178.

The Review was cognisant that other parameters of the proposed funding model had yet to be finalised, such as the base SRS per student amounts. As a result the Review indicated that the above parameters required further examination, particularly the nature of the 'sliding scale' that indicated the per cent of the base per student amount schools would attract on the basis of their SES score.

The Schooling Resource Standard funding model: 2013 to 2017 and beyond

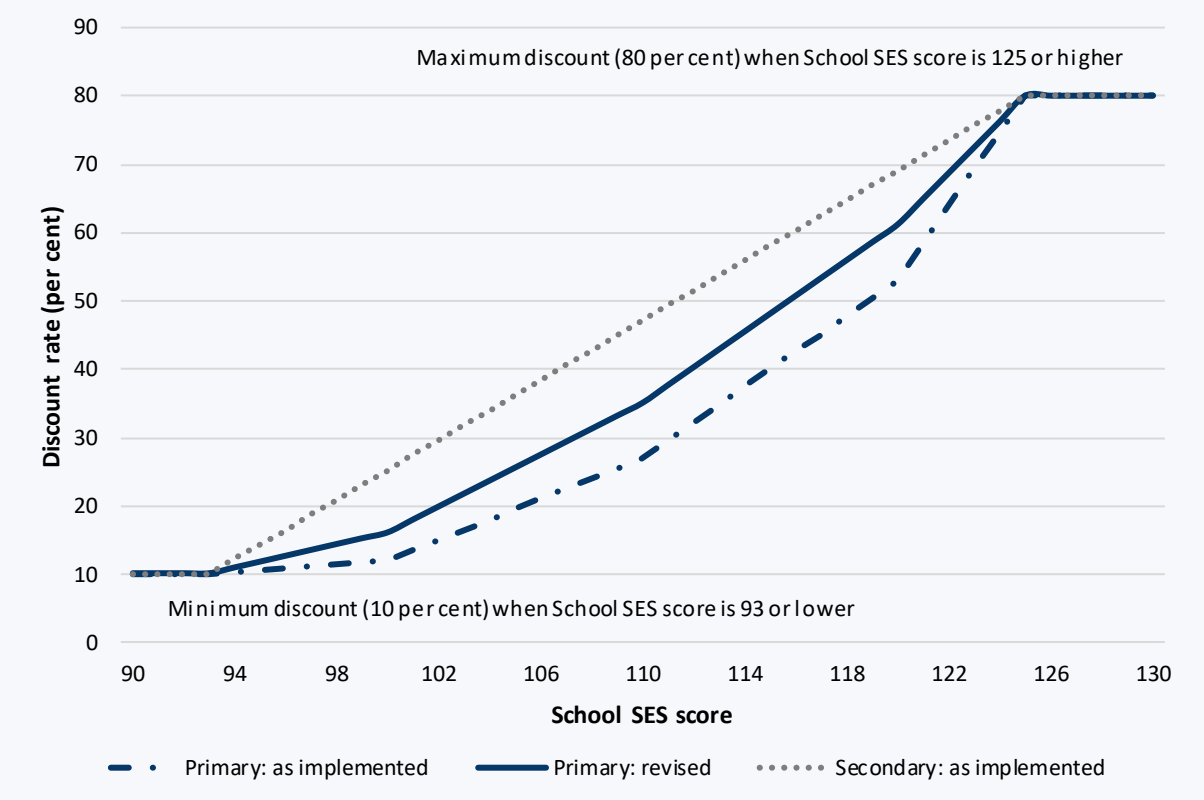
Implementation of the capacity to contribute

In 2013 the Australian Government moved to implement the recommendation of the Review of Funding for Schooling to use the SES score to measure the 'capacity to contribute'. The specific parameters applied by the Australian Government are identified in Figure 2-4.

Under this approach, the focus is upon the discount applied to a school's base SRS per student amounts. The lowest SES score schools (93 or lower) have a discount of 10 per cent applied. In contrast, the highest SES score schools (125 or higher) have a discount of 80 per cent.

Non-government schools were funded from 2014 by this new approach.

Figure 2-4 School SES score and the capacity to contribute

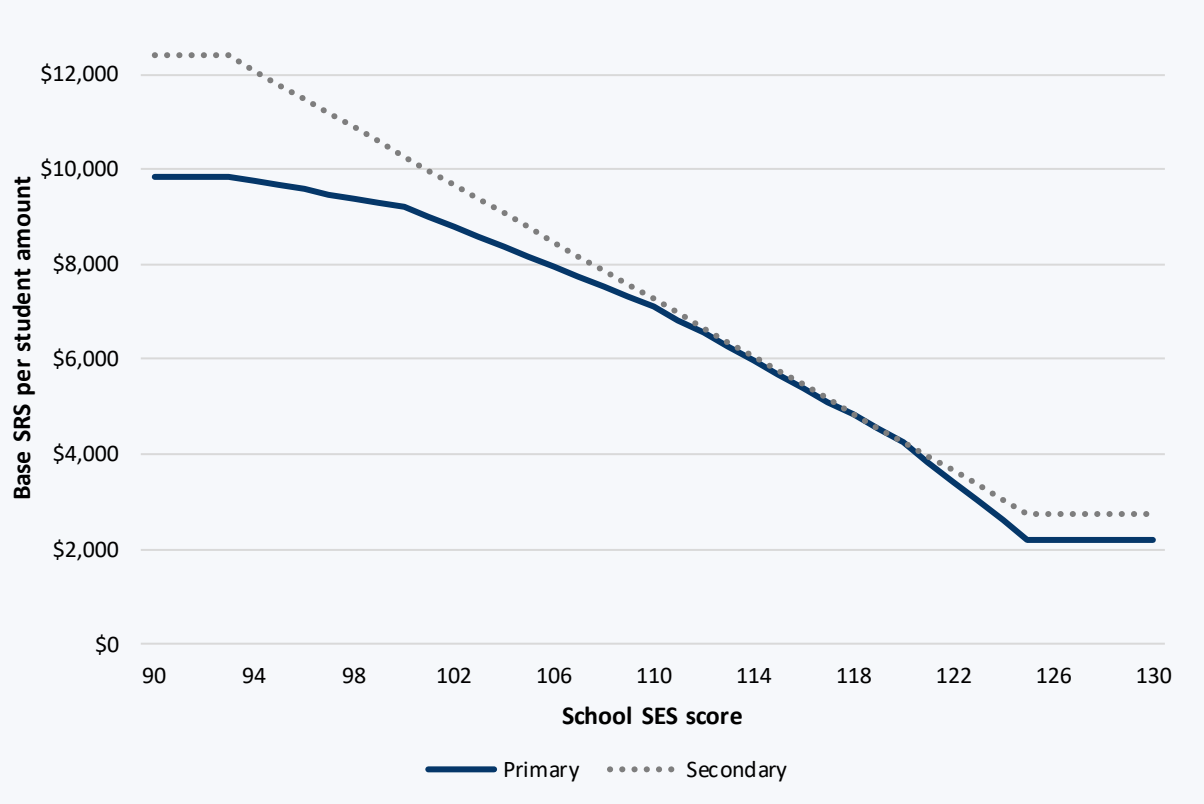


Note: The revised primary discount rates are those to be implemented from 2018.
Source: *Australian Education Act 2013* (Cth), s. 54 and *Australian Education Amendment Act 2017* (Cth), s. 36.

Different discount rates are applied for primary and secondary students, which was not a recommendation of the Review of Funding for Schooling. Despite this, the application of the discounts between 2014 and 2017 to schools with an SES score of between 108 and 122 led to primary students attracting a higher funding rate than secondary students. Addressing this issue will see the primary student discount revised upwards in 2018 as part of the *Australian Education Amendment Act 2017* (Cth).

Applying the 2018 base SRS per student funding rates, in combination with the discount rates in Figure 2-4, Figure 2-5 presents the base SRS per student funding schools will receive in 2018. The most disadvantaged schools with an SES score of 93 or less will receive $9,858 and $12,388 per primary or secondary student respectively. The most advantaged schools with an SES score of 125 or higher will receive $2,191 and $2,753 per primary or secondary student respectively.

Figure 2-5 2018 base SRS per student funding rates applying capacity to contribute



Source: *Australian Education Amendment Act 2017* (Cth), s. 12, 13 and 36.

Application of weighted average SES scores to school systems

Between 2013 and 2017, approved system authorities could apply to the Minister for Education for their member schools to be assigned a single SES score. If a system made such a request, a weighted SES score was calculated using an enrolment weighted average of all individual system school SES scores (Australian Government, 2017).

The *Australian Education Amendment Act 2017* (Cth) removed the ability of the Minister for Education to assign a single system SES score to systemic schools. In place of the weighted SES score approach, from 2018 SES scores will be applied at the individual school level for all schools. Systems will still have the ability to redistribute funding among their schools.

The Australian Government has committed to provide funding to approved system authorities in 2018 equivalent to what would be provided by the system-weighted SES score average approach (Department of Education and Training, 2017).

3. The SES score calculation methodology

This section summarises the method used to estimate the SES score of individual schools. Building upon the content of Section 2 (pp. 10-13), only the final SES score index—known as Index Modified A—is examined.

Reflecting the stages of the SES score calculation process, this section has three distinct elements (see Figure 3-6):

- SES score construction for each SA1
- geocoding student home addresses to identify the numbers of students in each SA1 for each school
- combining the results of the above to calculate the SES score for individual schools.

With the exception of responding to modest changes to the ABS Census and family/household income growth, the methodology used to estimate school SES scores has remained unchanged since 1998.

This section is intentionally non-technical—readers seeking a more technical description are referred to the reports documenting the original and most recent calculations (Department of Education, Training and Youth Affairs, 1998; Farish, 2013).

SES score construction for each Statistical Areas Level 1

Extraction of ABS Census data

The first step in the SES score construction comprises extracting data from the ABS Census for each SA1 across four dimensions:

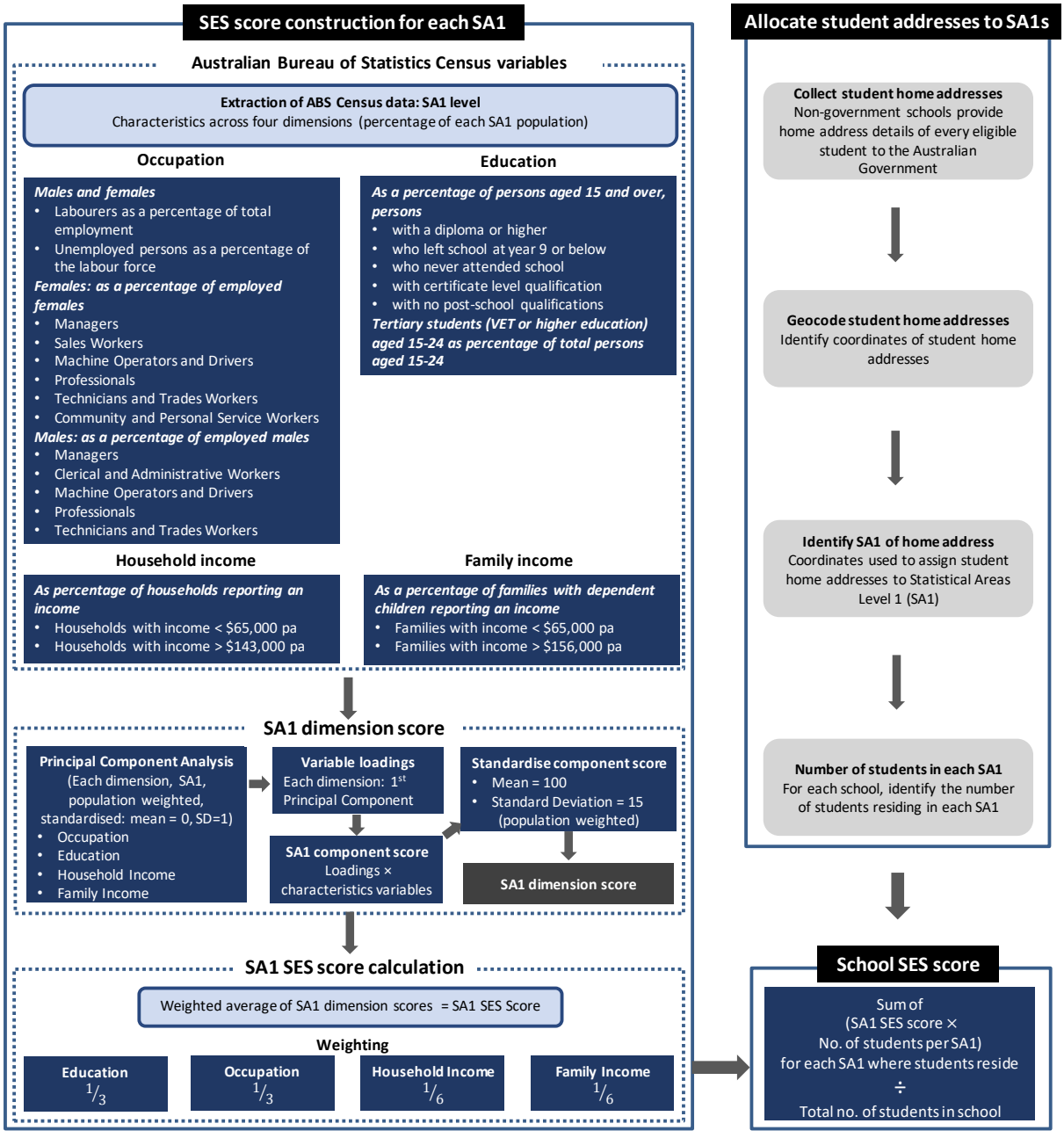
- Occupation
- Education
- Household income
- Income of families with dependent children.[4]

Data on the percentage of people in the categories listed in the box 'Australian Bureau of Statistics Census variables' within Figure 3-6 is extracted. The specific variables used in the SES score construction have either a 'positive' or 'negative' relationship with SES. For example, the full range of educational attainment is included, ranging from 'never attended school' through to the percentage of persons aged 15 or over with a Diploma level or higher qualification. The rationale provided for the inclusion of 'positive' and 'negative' variables was

[4] As noted earlier, this extraction was originally at the CD level. From the 2011 ABS Census, data was reported at the SA1 level.

the desire to consider the full spectrum of SES (Department of Education, Training and Youth Affairs, 1998).

Figure 3-6 School SES score calculation process



Note: The Census variables reported in Figure 3-6 are those used in the latest SES score calculation in 2013, using data from the 2011 ABS Census. SD= standard deviation.

National averages of the 2006 and 2011 ABS Census variables used in the SES score calculation are presented in Table A-1 (p. 41). Across most variables there has been modest change in the national averages over a five-year period.

Calculation of SA1 Dimension scores using Principal Components Analysis

The second step in the calculation process uses a statistical technique called principal components analysis (PCA). PCA is an analytical method from the branch of statistics known as multivariate statistics (Dunteman, 1989). The most common application of PCA is data reduction, where a large number of variables are replaced with a smaller number called components. This data reduction is achieved through identifying relationships between variables.

An example of these relationships is identified within the 2011 Census education dimension data used in the most recent SES score calculation. On average, the greater the proportion of people in an SA1 with a diploma or higher, the lower the proportion of people with no qualifications. Furthermore, the proportion of tertiary students aged 15-24 in an SA1 increases as the proportion of people with a diploma or higher increases.

PCA is used in the SES score calculation process to calculate the 'SA1 component score' (known as the first principal component score) for each of the four dimensions. This requires four separate PCAs to be undertaken. These PCAs first generate what are called variable loadings (known as eigenvectors)—a value between -1 and +1—for each variable included within the PCA.[5] These loadings are then multiplied by the respective SA1 value for each variable used in the PCA, to generate the SA1 component score. The SA1 component score is then standardised to have a mean of 100 and a standard deviation of 15.

The strength of an SA1 component score in representing the variables used in its generation is measured by its eigenvalue. The eigenvalue measures the amount of variation in all the variables explained by a component score.

SA1 SES score calculation

Following calculation of the dimension scores for each SA1, it is a relatively straightforward process to estimate the SES score of each SA1. This is a weighted average using the following formula:

> *SA1 SES score = (⅓ Occupation+⅓ Education+(⅙ Income+ ⅙ Income based on families with children)*

As noted on p. 12, the choice of weightings used in the above formula was based on a policy decision made in consultation with stakeholders, and not one based on any specific analysis findings.

Allocating student addresses to Statistical Areas Level 1s

A prerequisite for assigning an SES score to a school is first identifying the SA1 where each student in a school resides. This identification occurs every five years via schools electronically

[5] Variables within a PCA are standardised to have a mean of 0 and standard deviation of 1.

submitting the home addresses of each student to DET (Department of Education and Training, 2017). This collection last occurred between 1 March and 31 May 2017. This identification process has not changed following the ABS transitioning from CDs to SA1s.

A feature of this data collection is that student information is de-identified, with no student name or date of birth information submitted to DET.

Following the receipt and review of address data submitted by schools, DET undertakes what is called geocoding. Geocoding involves taking an address and identifying its geographical coordinates. This coordinate information is then used to identify the SA1 a student's home address is within.

Following this process, DET is able to identify the number of students residing in individual SA1s for each school. This information is required for the next step of calculating a school's SES score.

Calculation of school SES scores

The final steps in the SES score calculation process brings together data on the SES scores of individual SA1s, and the number of students for a school within each SA1. A worked example is provided in Table 3-4 below for a hypothetical 1,000 student school. In this example, between 100 and 400 students live in five different SA1s. In these five SA1s the SES score is between 83.24 and 93.21.

A school's SES score is an enrolment weighted average of the various SA1 SES scores. In the example in Table 3-4, this results in a school SES score of 88.96. Calculated SES scores are then rounded to the nearest whole number, such that in this example the school SES score is 89.

Table 3-4 Worked example: calculation of the SES score for a hypothetical school

SA1	Students in SA1	SA1 SES score	Enrolment share	Weighted SES score
	A	B	C=A÷(Total A)	D=B×C
1	100	91.2620	10%	9.1262
2	200	93.2067	20%	18.6413
3	100	92.6521	10%	9.2652
4	400	88.1879	40%	35.2752
5	200	83.2359	20%	16.6472
Total	1,000			**88.9551**

Changes to the SES score calculation: ABS Census methodology

As noted above (p. 15), the release of new ABS Census data every five years provides the impetus for updating the SES score. This updating does not simply involve a replication of the original method first developed in 1998. Rather, two changes in the ABS Census methodology have flowed through to the SES score calculation methodology:

- new or revised ABS Census variables
- introduction of a new ABS census geography classification scheme.

Methodological changes associated with changes in ABS Census variables

Occupation variable classification

In 2006, the ABS introduced the Australian and New Zealand Standard Classification of Occupations (ANZSCO) for classifying occupations. The ANZSCO replaced the Australian Standard Classification of Occupations (ASCO). The key difference was that ANZSCO had eight major occupational groups, in place of the nine major occupational groups in ASCO.

These changes led to the number of variables used in the occupation dimension reducing from 14 to 13.

Education variable classification

Some modest changes to how the ABS reported education data also affected the SES score calculation. This comprised replacing a measure of the proportion of people that had left school at age 15 (included in the 1996 Census), with a measure of the proportion that left school after year 9 (included from the 2001 Census onwards).

Separately the 2008 SES score calculation (using data from the 2006 Census) added a variable denoting the proportion of people aged 15-24 years that were tertiary education students.

Implications of income growth

The variables used in the two income dimensions were also updated to reflect income growth between census releases. For instance, the 1998 SES score calculation using data from the 1996 ABS Census identified lower income households as having an income of less than $36,000 per annum, and higher income households as having an income of greater than $78,000 per annum.

By the time of the 2013 calculation (using 2011 Census data), the threshold for lower income households had increased to $65,000, and higher income households to $143,000.

Similar increases have been implemented for the income of families with children dimension.

Changes to dimension variable loadings

As at September 2017, the SES score has been estimated four times. The variable loadings generated in each calculation, and the associated eigenvalues, are reported in Table A-1 (p. 42).

Generally there has been modest change in the variable loadings. The most significant change is associated with the introduction of new or revised variables—the introduction of the

variable ‘tertiary student aged 15-24’ in the education dimension was associated with changes in the magnitude of other variable loadings.

The eigenvalues reported in Table A-1 indicate that the percentage of variation explained by the loadings associated with each dimension has either remained steady, or improved.

Introduction of a new ABS census geography classification scheme

The initial calculation of the SES score used CDs. At the time of the first SES score calculation using 1996 Census data there were 34,500 CDs across Australia. In urban areas CDs had an average of 220 dwellings. In rural areas the number of dwellings per CD is generally lower, reducing as population densities decrease (Australian Bureau of Statistics, 1999).

From the 2011 Census, the ABS introduced a new geography classification scheme. This resulted in SES scores being generated using SA1s. In 2011 there were 54,805 SA1s across Australia. SA1s generally have a population of 200 to 800 persons, and an average population of about 400 persons (Australian Bureau of Statistics, 2010).

Changes to estimated SES scores following periodic updating

At the time of each periodic updating of SES scores using new ABS Census data, analysis was undertaken to examine the extent to which SES scores had changed since the preceding calculation. The comparisons reported in 2004 and 2008 compared CD level SES scores.

Due to the change from CDs to SA1s, the comparison reported in 2013 using 2011 ABS Census data applied postcode level data. After first limiting the analysis to ensure CD comparability, the comparison found little change in SES scores between calculations. In all cases, there was a high correlation between the estimated SES scores (Farish, 2004; Farish, 2008 & Farish, 2013).

4. Concerns and views about the SES score

This section provides a summary of stakeholder concerns and views raised about the SES score since it was first developed in the late 1990s, and implemented from 2001. These concerns and views are largely those of stakeholders, including system authorities.

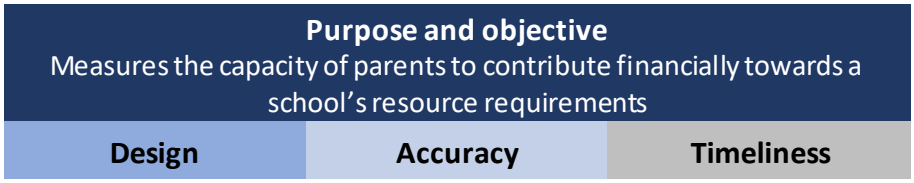
The focus is upon the purpose and objective of the SES score, its calculation methodology, and the resulting SA1 and school SES scores. This discussion is underpinned by the current objective of the school SES score—to measure the capacity to contribute, reflecting that:

> *some parents and school communities are more able than others to contribute financially to their school's operating costs (Australian Government, 2017).*

A framework considering four elements is applied to categorise concerns and views on whether the above objective is being met (see Figure 4-7):

- design—the extent that the design of the SES score is in line with the objective
- accuracy—the extent that the SES score provides an accurate estimate of the relative capacity to contribute of individual schools
- timeliness—that the SES score is timely and up-to-date.

Figure 4-7 Elements for considering concerns and views on the SES score



These elements are not mutually exclusive—concerns about the design of the SES score will undoubtedly also apply to accuracy. In these cases the issue or concern is identified under the most relevant element. The following analysis also considers issues raised about the objective of the SES score itself—many issues and concerns raised over the years relate to the objective of the SES score, rather than how it is estimated.

Concerns and issues have largely been drawn from school funding focussed materials, with related issues raised in non-school funding contexts, such as in analysis of area-based measures of SES undertaken by the ABS.

Purpose and objective of the SES score

Consideration of school resources

Issues and concerns with the SES score's objective question the sole use of SES to measure the ability of parents to contribute financially towards a school's resource requirements. Two papers—one by a researcher in 2004, and another by a peak body in 2011—argue that

funding provided to non-government schools should not just be based on parental capacity to contribute (see Table B-1).

The 2004 paper argues that consideration of school private income should be limited to private recurrent income from endowments or donations (Watson, 2004). The point is made that this limited approach would avoid returning to the problems associated with the ERI-funding mechanism that led to the introduction of the SES score (see Section 2, p. 4).

In contrast, the 2011 paper, which was a submission to the Review of Funding for Schooling, argues that *all* school private income should be considered, as well as school SES, in the provision of Australian Government funding to non-government schools (National Catholic Education Commission, 2011, pp. 22-24). The consideration of all school private income would have parallels to the earlier ERI funding mechanism. Documentation on the SES score development process does not mention consideration of a funding approach incorporating both school SES and private income (Department of Employment, Education, Training and Youth Affairs, 1997).

A book published in 2014 argues that the SES score does not consider the resources accumulated by a school in the past. This issue alludes to considering not just school fee income, but also accumulated resources. The author does not elaborate on what specific accumulated resources should be considered—they may have been referring to school financial and fixed capital assets (Maddox, 2014).

A different point was made in a separate 2011 submission to the Review of Funding for Schooling, stating that consideration should be given to ensuring low fee independent schools have an adequate resource base. This submission indicated that low fee independent schools in the lower SES score bands have limited capacity to raise private income. As this feedback was focussed on the previous SES funding model, it is not known whether the current SRS funding model has addressed these issues (Independent Schools Council of Australia, 2011).

The policy choice identified by the Review of Funding for Schooling

In its report, the Review of Funding for Schooling conceptualised the policy choice of how the Australian Government provides funding for non-government schools being based on either:

- *the capacity for parents and a school community to contribute towards the cost of schooling through fees and other private assistance*
- *the actual extent to which […] [parents and school communities do contribute towards the cost of schooling], which may reflect the extent to which they are asked to contribute by schools or are willing to contribute (Gonski, et al., 2011, p. 75).*

As identified in Section 2 (p. 16), the Review of Funding for Schooling recommended that the capacity to contribute concept continue to be applied.

Whether the measurement of the capacity to contribute should consider school resources, or be based solely on the SES of school communities, is a fundamental issue requiring further

consideration. A specific question requiring decision is whether Australian Government funding for two different non-government schools should vary where parents have exactly the same SES, even if one school has higher fees and private income than the other? In this case the parents at each school are choosing pay different fees, despite having an equal capacity to contribute.

Design of the SES score

Several issues and concerns have been raised regarding the design of the SES score:

- the inclusion of the occupation and education dimensions in the SES score calculation
- the weighting applied to the four SES score dimensions when calculating a school SES score
- similar data used in the SES score being applied in the application of SRS loadings
- household wealth not being included in the SES score
- the treatment of family size in the SES score.

Inclusion of the occupation and education dimensions in the SES score calculation

The inclusion of the occupation and education dimensions in the SES score calculation, and the weighting for these dimensions—occupation (⅓) and education (⅓)—has been the subject of questioning.

As discussed in Section 3 (p. 12) the rationale for including the occupation and education dimensions, and their weights, was that this resulted in a broader spread of school SES scores, and a more precise and stable profile of schools. Furthermore, it is understood that the choice of dimension weighting was a policy decision made in consultation with stakeholders, and not one based on any specific analysis findings.

At the time the SES score was developed, it was noted that education level and occupation type were highly correlated between themselves, and with income (Department of Education, Training and Youth Affairs, 1998). This relationship has also been questioned by a stakeholder using parental data from the Longitudinal Study of Australian Children (LSAC) to analyse relationships between occupation and income, and education and income. The cited finding from Marks (2016) contrasts with other Australian research, which finds 'higher levels of education are estimated to be associated with significantly higher wages (Forbes, Barker, & Turner, 2010, p. XII).

The relevance of including occupation and education in the SES score calculation could be explored by first examining the relationship between both dimensions and income. Further, it is appropriate to also examine whether SES scores are made more stable over time when also using education and occupation, in combination with income.

The use of occupation and education variables in two SRS elements: SES score and ICSEA

Variables representing education and occupation are used in two elements that ultimately form part of the SRS—the calculation of SES scores and ICSEA. Students in ICSEA quartiles 1 and 2 attract low SES loadings within the SRS.

ICSEA is generated using data collected from schools on the education level and occupation of parents and guardians. In contrast, the SES score uses data on residents in SA1s.

The implication of these two uses of education and occupation data is that these measures, albeit collected differently, play a greater role in the allocation of funding to non-government schools than was the case under the SES funding model. This situation contrasts with the imperative at the time of the original SES score calculation to avoid duplication of measures of educational disadvantage used to allocate other Australian Government funding for schooling (Department of Education, Training and Youth Affairs, 1998).

In the first instance analysis could be undertaken to first understand specific contribution of occupation and education to allocating funding within the SRS.

Consideration of household wealth

The current SES score approach considers education, occupation and income. Household wealth is not currently considered as an element of the capacity to contribute. One stakeholder has noted that this approach contrasts to the means testing undertaken by the Australian Government for various income support payments, which considers both income and assets. It is suggested that the omission of wealth means that the SES of higher income families may be understated, with analysis of ABS data suggesting that high income households represent a lower share of total income than they do of total wealth—high income households with 48.5 per cent of total income have 62.1 per cent of total wealth.

At present the ABS Census does not collect information on household wealth, with it acknowledged that the inclusion of household wealth in an assessment of the capacity to contribute would create a range of complexities, including the need to collect new data from school families. These complexities are similar to those identified at the time of the original SES score development when the collection of family level income data was discussed (Department of Education, Training and Youth Affairs, 1998).

The importance of household wealth, and whether its omission from SES score calculation is significant, could be explored using data such as the Household, Income and Labour Dynamics in Australia (HILDA) Survey. If wealth is found to be significant in estimating SES, it may be feasible to use alternative Census data as a proxy, such as housing tenure or house size.

Accuracy of the SES score

The most common issues and concerns raised by stakeholders with the SES score relate to its accuracy in estimating the capacity of families and communities to contribute to individual schools, and can be grouped into three categories:

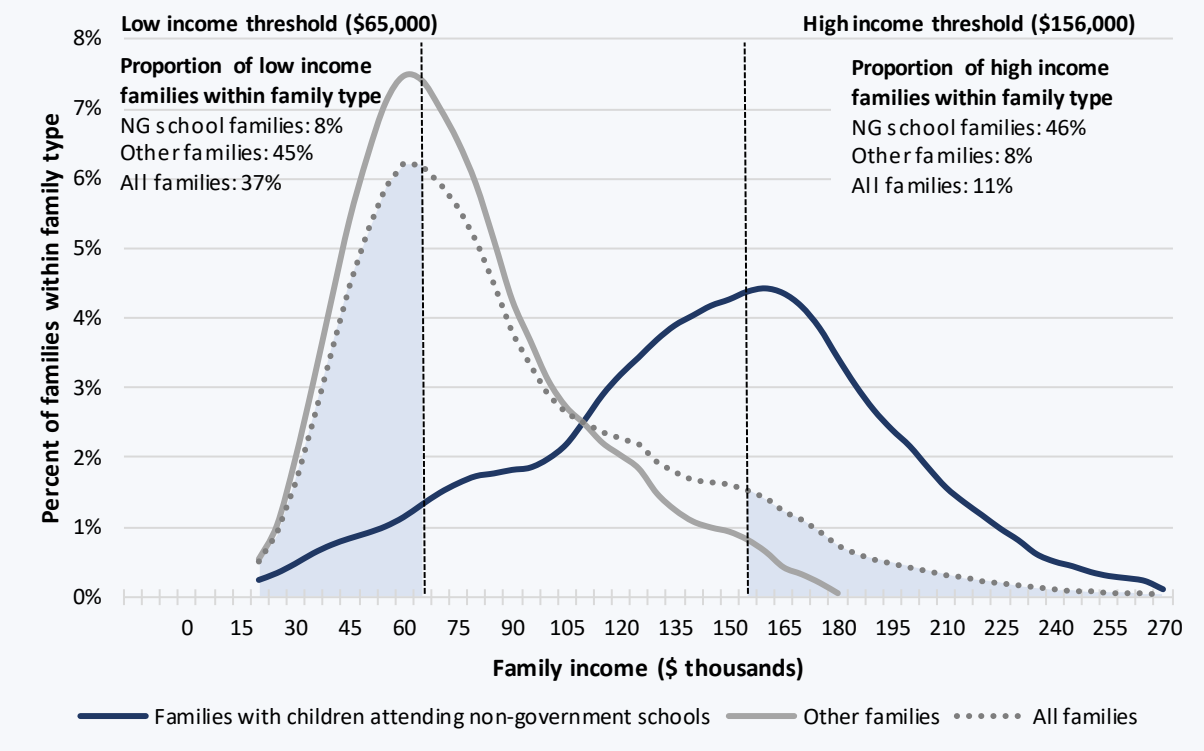
- the 'ecological fallacy'—concern that differences between the SES of the students attending a non-government school, and the area in which they live, may lead to a school's SES score not accurately reflecting the capacity to contribute of the school community
- measurement error—data reported in the Census used to estimate the SES score is incomplete or does not accurately measure what is intended
- the robustness of using Census data, compared to data collected directly from parents.

The ecological fallacy

The ecological fallacy is often confronted in social research where there are layers of data. A common example from the school education context is that there are students and schools. Data on the performance of a school, such as average NAPLAN scores, may conceal performance variation at a student level. Although a school may be doing well on average, it does not necessarily mean all its' student are doing well.

A conceptual example of this issue as it relates to the SES score is presented in Figure 4-8. Using the family income dimension, this conceptual example identifies the implications of the family characteristics of students attending a non-government school being materially different to that of other residents within the same SA1. In this example, 46 per cent of families with students attending non-government schools are identified as having a high income. This compares to only 8 per cent among all families.

Figure 4-8 Ecological fallacy: family income within an SA1 - conceptual example



Notes: NG = non-government. The shaded area details all families used within SES score calculation. Thresholds are those used in SES scores determined using the 2011 Census.

If the characteristics of families attending a non-government school are not representative of the SA1 where they live, the SES score estimated for a school may be inaccurate. This is a risk in this hypothetical example, as it is the 8 per cent among all families identified as high income that is used in the calculation of the family income dimension score and ultimately the school SES score.

Students attending non-government schools may not be representative of their SA1

Issues and concerns associated with the ecological fallacy are the most numerous amongst of all those on the SES score, comprising the following 'sides of the same coin':

- students from an SA1 attending non-government schools (or a specific non-government school) come from families that are not representative of their SA1
- if students attending a school are not from families representative of their SA1, the calculated school SES score will not accurately reflect the capacity of a school's parents to contribute financially towards a school.

An elaboration of this issue is whether students attending local non-government schools from an SA1 have similar characteristics, or whether student SES influences the specific non-government school they attend.

Several studies have examined this issue, with one using 2011 ABS Census data finding that families with children attending one non-government school sector have lower average incomes in 56 per cent of metropolitan SA1s than the other non-government school sector. Another study focussed on Penrith in NSW using 2001 ABS Census data found that students attending non-government schools were twice as likely to have a high family income as a low income, whereas students attending government schools were equally likely to have a low or high family income.

As the ABS Census provides data detailing the school sector attended by school students, it is straightforward to explore this issue at the SA1 level. What the ABS Census data does not allow is exploring this issue by comparing specific schools.

The ecological fallacy is exacerbated in schools serving regional students

Other analysis builds upon the above points to argue that non-government schools serving regional students—whether they be schools located in regional areas, or boarding schools—are advantaged by the ecological fallacy more than other non-government schools. The argument is that as regional students attending non-government schools, specifically independent schools, are likely to be highly unrepresentative of their SA1, the SES of the students' family is likely to be much higher than their SA1 average. As a consequence, it is argued, schools serving regional students obtain an SES score that is much higher than is warranted.

The extent that regional students attending non-government schools are representative of their SA1 can also be explored using ABS Census data.

There can be significant variation in the SES of households within SA1s

A range of non-school specific research has examined the extent of variation within SA1s, identifying the extent that area-based measures of SES may conceal considerable variation in SES within areas. This analysis has largely been undertaken by the ABS examining whether area-based Socio-Economic Indexes for Areas (SEIFA) estimates provide an accurate representation of the SES of individuals within areas.

Analysis undertaken by ABS researchers has focussed on developing Socio-Economic Indexes for Individuals (SEIFI), which are compared with the corresponding SEIFA estimates. Initial analysis using 2001 Census data:

> *…found that individual and family relative socio-economic disadvantage was quite diverse within areas. This means that there is a high risk of an ecological fallacy if we use the SEIFA indexes as a measure of individual level disadvantage, rather than a measure of area level disadvantage. (Baker & Adhikari, 2007)*

A similar finding was made in more recent research using 2006 Census data (Wise & Mathews, 2011), as well as ACT Government commissioned research (ACT Government, 2012 and Goldie, Kakuk, & Wood, 2014).

The interest of the ACT Government in the ecological fallacy stems from ABS analysis finding that the ACT had the greatest diversity among all Australian jurisdictions, with 7.9 per cent of ACT CDs identified as diverse (Wise & Mathews, 2011).[6] The least diverse jurisdiction was Queensland, with only 1.7 per cent of CDs. Subsequent analysis has found that between 65 and 95 per cent of the ACT's disadvantaged population live in areas identified as advantaged.

No analysis has been identified examining how diversity within SA1s may be influencing school SES scores. It may be that the variability identified by the ABS comparing *individuals* to *areas* may not be so pronounced when examining *groups* of families with children attending non-government schools. This is certainly an issue that can be explored using ABS Census data, with one possibility to generate household-level SES scores. The SES scores for households with children attending non-government schools (by sector) could then be compared to households with children not attending non-government schools.

Using mesh blocks in place of SA1s may overcome the ecological fallacy

As mentioned in Section 3 (p. 26), the SES score is currently estimated using SA1 level data. In the 2016 Census there were 57,523 SA1s, with each having between 200 and 800 people. SA1s are made up of several mesh blocks—in the 2016 Census there were just under 360,000 mesh blocks, with residential mesh blocks having an average population of 92 people.

[6] A diverse CD is one where at least 20 per cent of individuals were in the bottom quintile of all Australian individuals, and at least 30 per cent in the top 30 per cent of all Australian individuals.

As part of the Review of Funding for Schooling, the potential for using mesh blocks, instead of SA1s, for estimating SES scores was raised by a peak body. A submission to the Review indicated that mesh blocks provide:

> *an opportunity to improve the accuracy and reliability of socioeconomic calculations of families (Independent Schools Victoria, 2011, p. 37).*

This issue was mentioned in passing as an option in the Review's report, and was not subjected to close analysis. Rather, the Review report suggested that a more accurate measure of school SES could be obtained by using mesh blocks, thus potentially overcoming the ecological fallacy issue (Gonski, et al., 2011).

The implications of using mesh blocks will need careful consideration. For instance issues associated with small numbers of people in the variables used to generate SES scores may be accentuated, making the ecological fallacy problem even worse. As a consequence calculated SES scores at the mesh block level may be increasingly volatile.

Measurement error

The income dimensions within the SES score may not adequately capture affluence

In the latest calculation of the SES score using 2011 Census data, high income households are identified as having income greater than $143,000, and high income families with school age children as having income greater than $156,000.

Stakeholder concern has been raised that having only one high income threshold may conceal significant income variation among high income households and families. Analysis has been undertaken identifying that the proportion of families of children at a non-government with very high incomes, is consistently higher for one non-government school sector over another.

The existing analysis does not examine the extent to which this issue is present within individual SA1s. While the finding that one school sector have a greater proportion of very high income families than the other, this may not necessarily bias the SES score estimates.

The income dimensions may not adequately measure affluence

The SES score calculation process currently treats families and households reporting nil or negative income as having a low income. The affected families/households thus influence the SES score calculated for an SA1. Concern has been raised that this approach may bias the SES score results, with ABS research cited finding that

> *people living in households with nil or negative income tended to have more similar characteristics to those living in higher income households (Pink, 2013, p. 21).*

The impact of this issue upon SA1 and school SES scores is unclear—this depends on what the 'true' income and affluence of the affected households is. Related to the above issue regarding household wealth, households with nil or negative income may nevertheless be affluent.

A short-term option for addressing this issue could include examining the impact of excluding nil/negative income households/families from the SES calculation, or treating them as mid income. Furthermore, the accuracy of SA1 level data on nil/negative income households/families may be able to be assessed using ATO income data.

The SES score calculation does not reflect that parents may live in separate households

The SES score calculation process only considers one student address, and does not take into account whether parents are living in separate households. Concern has been raised that this situation may bias SES score estimates. It is argued that both households likely contribute towards the cost of their child's education, such that the capacity to contribute is under-estimated.

The potential bias that may result from the current approach has not been identified—the impact upon SES scores for individual schools depends upon the distribution of affected students across SA1s and schools.

The extent of this issue could be explored in the first instance using ABS Census data to identify the numbers of families with children attending non-government schools where parents may live in separate households. Furthermore, it may be appropriate to assess the feasibility of collecting data from schools on the addresses of parents living in separate households—this data may already be collected by many schools.

Family size is not considered in the SES score calculation

At present the SES score calculation does not take family size into account. Concern has been raised that family size is likely to affect the capacity of families to contribute to their child's education. Furthermore, at a national level ABS Census data indicates that the average number of dependent children in a family declines as family income increases.

The implication of the current situation is that if two SA1s are identical in every way except for average family size, they will nevertheless receive the same SES score.

Family size has also been identified as a particular issue in schools associated with certain religious denominations that have large families. Indeed, as noted in Section 2, family size has been successfully used in appeals to the Australian Government for school's SES score to be reduced (see p. 16)

At the time of the initial SES score calculation, the ABS did not report income in a way that adjusted for family size or composition. Since the 2006 Census the ABS has been estimating and reporting what is known as equivalised household income. Equivalised household income adjusts household income to reflect size and composition.

The extent to which the use of equivalised household income in future SES score calculation may address this issue needs examination. It may not make a material difference to school SES scores if affected families represent a small proportion of the SA1s where they live.

Data robustness

Census data is more robust than data collected from parents

There has been little consideration of alternatives to Census data in discussion of issues and concerns with the SES score approach. As part of its submission to the Review of Funding for Schooling, one non-government schooling sector considered the robustness of data collected by the ABS Census, compared to data collected by schools from parents at the time of enrolment.

At that time, the submission considered that Census data is robust, by virtue of being collected under controlled and consistent conditions. In contrast, it was argued, data collected by schools from parents is not robust.

To explore this issue it may be appropriate to first seek advice from ACARA and the ABS on the results of analysis undertaken examining the robustness of data collected from the Census and the My School collection.

Timeliness of the SES score

Stakeholder concern has been raised that SES scores generated for SA1s and schools can soon become out of date due to economic structural change. The example has been provided of the Western Australian economy. It is argued that at the time of the 2011 ABS Census, Western Australia has strong economic growth, which flowed through to the SES scores of Western Australian SA1s and schools. However, the Western Australian economy has subsequently contracted, implying that SES scores for Western Australian schools are now potentially too high.

The additional example is provided of more localised economic structural change, such as in the car manufacturing and dairy industries. Many communities will not be fully impacted by the closure of the car manufacturing industry until late 2017—one year after the 2016 Census. As a result, SES scores calculated for these communities may be inaccurate as soon as they are released. Although not raised in any public documents, the timeliness of the SES score may also be an issue for new communities, such as residential housing developments.

The implications of this issue could be examined by first examining changes in SA1 SES scores over time, with this analysis focussed on SA1s that have been affected by economic structural change.

5. Potential directions for measuring the capacity to contribute

Despite the application of the SES score changing in 2013—from determining the percentage of the AGSRC allocated to non-government schools, to determining the discount made to a school's base SRS allocation—the objective of what the SES score is intended to measure, and its calculation method, have not. Neither has the SES score been subjected to focused review and analysis since it was first developed in the late 1990s and then implemented in 2001.

Moving forward it is considered there is a need to re-affirm the 1999 validation activities to identify whether the SES score is fit for purpose.[7] The nature of the issues and concerns documented in Section 4 mean a deeper and broader validation process is likely required. For instance, the original validation activities did not seek to identify whether the SES score was accurate for each of the non-government school sectors—instead it considered non-government schools as a whole.

The premise of many of the stakeholder concerns and issues documented in Section 4 is the contention that the SES score, as currently calculated and applied to non-government schools, systematically provides too high an SES score for one non-government school sector, and too low an SES score for the other. And that this alleged bias is a result of the SES of families with children attending non-government schools being systematically different on the basis of school sector attended. Furthermore, it is argued by stakeholders that this bias is both a result of issues with the Census data used to estimate the SES score, and the SES score calculation method itself.

To address these points a range of policy and analytical activities are identified below. These comprise clarifying the purpose and objective of the capacity to contribute measure, followed by analysis that seeks to validate the SES score as a capacity to contribute, and to improve upon the current SES score design.

Suggested analytical activities reflect the context of 2017—datasets are available today that were not in the late 1990s. At a minimum, these datasets may be able to assist in validating the SES score, and some may have a role in the ongoing estimation of a capacity to contribute measure.

Clarifying the purpose and objective of the capacity to contribute measure

A preliminary activity is confirming the appropriateness of the SES score's objective, and to elaborate upon this objective. At present the SES score's objective is to measure the capacity to contribute of individual schools, reflecting that:

[7] These previous validation activities are described in Section 2, pp. 12-13.

some parents and school communities are more able than others to contribute financially to their school's operating costs (Australian Government, 2017).

There are several elements to this objective requiring clarification before further validation activities can commence. These include confirming:

- Which parents are in scope? Is it only the parent(s) where a student lives, or all parents?
- What is meant by school communities?
    - To the extent possible should the future estimation of the capacity to contribute only use data for families and households where at least one child is attending a non-government school?
    - Should the financial resources of individual schools not provided by current families be considered, such as funds provided to schools by alumni?
    - Where feasible, should data used to measure the capacity to contribute be sourced directly from schools for the families of children attending non-government schools?
- What is the scope of 'financial resources' in the capacity to contribute?
    - Is it only family/household income, or should it also encompass, to the extent possible, assets?
    - And which assets should it encompass—should it comprise both financial and fixed assets (e.g. housing), or other data that provides an approximation of these assets?

Validating and improving the SES score as a capacity to contribute measure

Data availability

Answers to the above questions on the capacity to contribute objective will provide focus to analysis seeking to validate the SES score, and identify potential improvements or alternatives.

The sequence should first be on data availability, and then analysis. For instance, it may not be possible to collect data on family assets that could ultimately be used to construct a school-level measure of capacity to contribute. But, it may be possible to analyse certain datasets to identify whether family assets are an important measure, and whether other data that is collected in the Census could be used as a proxy (e.g. housing tenure type).

Data analysis

Following identification of data availability, a suite of analysis is suggested for validating the SES score, and exploring improvement opportunities. A range of potential datasets and analysis approaches are summarised in Table C-1 (see p. 49), which seek to address each of the stakeholder issues and concerns identified in Section 4.

This analysis could be underpinned by a set of principles, potentially building upon those used when the SES score was first developed—transparency, based on reliable data, simplicity,

nationally consistent and avoid duplication. Given stakeholder concerns centre largely on accuracy, this could be another guiding consideration.

The suggested analysis seeks to use predominantly accessible data sets, such as Census data published by the ABS, and data used by DET to generate SA1 and school SES scores. However, specialised datasets are identified—with custom data requests from the ABS and Australian Taxation Office (ATO) required.

The overarching intent of the suggested analysis is to identify whether the SES score, as currently calculated, provides an accurate measure of the relative capacity to contribute of individual schools. Related to this intent is identifying whether the SES score is biased in favour of schools with certain characteristics.

The range of analysis outlined in Table C-1 is extensive. It will be necessary to select the analysis fundamental to validation and improvement. Initial analysis is proposed that seeks to clarify the objective of the capacity to contribute, including the relationship between school base SRS funding and school fees, alongside school wealth and assets.

The outlined analysis also proposes to make use of datasets not available at the time of the original SES score calculation, in particular the Household, Income and Labour Dynamics in Australia (HILDA) survey. The HILDA survey contains data on the education, occupation, income and wealth of individuals and households, as well as the school sector attended by children.[8]

There is scope to use HILDA to examine the relationship between education, occupation and income, and whether the omission of assets information has a material impact on the calculated SES score. This can be achieved by developing a household level SES score, based upon the methodology used by Wise & Mathews (2011). Comparative analysis can then identify whether an SES score developed using asset information provides a materially different result to not using asset information. Further, if asset information is important, HILDA can be used to identify whether variables also collected in the Census, such as housing tenure type, provide a close alternative. Differences in SES on the basis of school sector attended can also be examined.

Subject to data availability, there may also be potential to improve the accuracy of the SES score using administrative data collected by the Australian Government. For example, it may be feasible to request the ATO to provide data on the household income composition of SA1s—this may be more accurate than that reported in the ABS Census. A more complex and challenging approach could be to request non-government schools to collect the Tax File Numbers (TFNs) of parents/guardians. These TFNs could then be provided to the ATO to generate school level summary information on family income composition. The feasibility of

[8] A question about the school sector attended by children was last asked as part of the HILDA survey in 2012. See https://www.online.fbe.unimelb.edu.au/HILDAodd/KWCrossWaveCategoryDetails.aspx?varnt=cety01.

both approaches—from an administrative as well as a privacy perspective—requires close examination.

Similarly, the findings of analysis examining the robustness of Census data compared to data collected from parents, may suggest that the education and occupation dimensions used in the SES score are better sourced from the My School collection. This potential approach first depends upon whether it is decided the education and occupation dimensions are maintained in the SES score calculation.

A measure of the capacity to contribute is required

Ultimately, there is a need for the Australian Government to use a measure of the capacity to contribute when allocating funds among schools. It is unlikely that an approach can be developed that is 'perfect', as such the challenge moving forward is to identify an approach that best meets the needs of the Australian Government, schools and families.

Appendix A. SES score calculation variables

Table A-1 Variables and national average used in SES score calculation: 2006 and 2011

2006		2011	
Variable	Per cent	Variable	Per cent
Occupation Dimension			
Male & Female Labourers	11.4	Male & Female Labourers	10.3
Male & Female Unemployed	5.6	Male & Female Unemployed	6.0
Female Managers	9.7	Female Managers	9.6
Female Sales	13.6	Female Sales	12.8
Female Machine Operator/Drivers	1.7	Female Machine Operator/Drivers	1.6
Female Professional	22.1	Female Professional	24.0
Female Technicians and Trades	4.7	Female Technicians and Trades	4.6
Female Community Service Workers	13.7	Female Community Service Workers	15.0
Male Managers	15.8	Male Managers	15.4
Male Clerical/Admin	6.5	Male Clerical/Admin	6.6
Male Machine Operator/Drivers	11.6	Male Machine Operator/Drivers	11.7
Male Professional	17.1	Male Professional	18.2
Male Technicians and Trades	23.4	Male Technicians and Trades	23.2
Education Dimension			
Diploma, degree+	23.1	Diploma, degree+	26.6
Left school year 9	14.2	Left school year 9	13.4
Never attended school	0.9	Never attended school	0.9
Tertiary students 15-24	22.0	Tertiary students 15-24	24.9
Trade certificate	17.6	Trade certificate	18.2
No qualifications	59.3	No qualifications	55.2
Household Income Dimension			
Household Income < $52,000 pa	47.0	Household Income < $65,000 pa	49.2
Household Income >$117,000 pa	15.5	Household Income > $143,000 pa	16.1
Family Income Dimension			
Family Income < $52,000 pa	35.4	Family Income < $65,000 pa	38.1
Family Income > $130,000 pa	15.9	Family Income > $156,000 pa	15.1

Note: Percentages are national averages from across all CDs in 2006, and SA1s in 2011. Averages are weighted by the population of each CD or SA1.
Source: Farish (2013), p. 9.

Table A-1 Dimension variable loadings calculated using ABS Census data: 1996 to 2011

	Census year[a]			
	1996 (1998)	2001 (2003)	2006 (2008)	2011 (2013)
Occupation				
Eigenvalue[b]	4.120 (29%)	4.363 (31%)	4.34 (33%)	4.44 (34%)
Male & Female Labourers	-0.3518	-0.3305	-0.4562	-0.3527
Male & Female Unemployed	-0.2643	-0.2662	-0.2487	-0.2225
Female Managers/Administrators	0.1251	0.1869		
Female Managers			0.2277	0.2409
Female Elementary Clerical/Sales/Service	-0.1438	-0.2498		
Female Sales			-0.1883	-0.1918
Female Production/Process Workers	-0.2895	-0.2553		
Female service, sport, recreation workers	0.1372	0.1229		
Female Machine Operator/Drivers			-0.1785	-0.1906
Female Professional	0.3838	0.3809	0.3864	0.3880
Female Trades	-0.1310	-0.1175	-0.1042	-0.1140
Female Community Service Workers			-0.2340	-0.2554
Male Managers/Administrators	0.1962	0.2415		
Male Managers			0.2853	0.2835
Male Clerical Workers	0.1491	0.1177		
Male Clerical/Admin			0.1021	0.1135
Male Production/Process Workers	-0.4027	-0.3882		
Male Elementary Clerical/Sales/Service				
Male Operator/Drivers			-0.3692	-0.3642
Male Professional	0.4091	0.3888	0.3899	0.3892
Male Sales	0.1267	0.0988		
Male Trades	-0.3109	-0.3156	-0.3114	-0.2979
Education				
Eigenvalue[b]	2.457 (49%)	2.708 (54%)	3.14 (52%)	3.24 (54%)
Diploma, degree+	0.5521	0.5714	0.5436	0.5373
Left school at age 15	-0.5272			
Left school after year 9		-0.5286	-0.4567	-0.4522
Never attend school	-0.2965	-0.2164	-0.1106	-0.1073
Tertiary students 15-24			0.4029	0.4020
Trade certificate	0.0708	-0.0883	-0.2730	-0.3002
No qualifications	-0.5695	-0.5827	-0.4968	-0.4935
Household Income				
Eigenvalue[b]	1.795 (90%)	1.882 (94%)	1.81 (91 %)	1.84 (92%)
Household Income < $36,000 pa	0.7071			
Household Income >$78,000 pa	-0.7071			
Household Income < $41,600 pa		0.7071		
Household Income >$90,000 pa		-0.7071		
Household Income < $52,000 pa			0.7071	
Household Income >$117,000 pa			-0.7071	
Household Income < $65,000 pa				0.7071
Household Income > $143,000 pa				-0.7071

	Census year[a]			
	1996 (1998)	2001 (2003)	2006 (2008)	2011 (2013)
Income of families with children				
Eigenvalue[b]	1.588 (79%)	1.724 (86%)	1.68 (84%)	1.72 (86%)
Family Income < $26,000 pa	0.7071			
Family Income >$78,000 pa	-0.7071			
Family Income < $41,600 pa		0.7071		
Family Income >$90,000 pa		-0.7071		
Family Income < $52,000 pa			0.7071	
Family Income > $130,000 pa			-0.7071	
Family Income < $65,000 pa				0.7071
Family Income > $156,000 pa				-0.7071

Note: [a] Years in brackets indicate when the SES score calculation occurred. [b] Percentage value in brackets comprises the per cent of variation in all dimension variables explained by the first principal component.
Sources: Department of Education, Training and Youth Affairs (1998); Farish (2004); Farish (2008) and Farish (2013).

Appendix B. Stakeholder issues and concerns with the SES score

Table B-1 Stakeholder issues and concerns with the SES score

Summary of raised issue or concern	Source	Presented evidence
Purpose and objective of the SES score		
An SES-based measure of capacity to contribute is too narrow • Assessing the capacity to contribute by looking at characteristics of students' families is too narrow in scope • Endowments or donations, should be taken into account.	***Researcher*** Watson (2004), p. 233.	• 'Established schools' receiving income from endowments • A regional Queensland school received income from local businesses, and was in the lowest ERI funding category • In contrast, this school had a below average SES score (93).
Schools that set low fees to facilitate access are penalised • The SES score penalises schools that set low fees to facilitate access • Base funding provided to schools should take into account both school SES, and school recurrent private income.	***Peak body*** National Catholic Education Commission (2011), pp. 22-24.	• The conceptual example is used of schools with similar Australian Government funding levels (due to similar SES scores), but different levels of private resources • It is argued that this situation is at odds with the objective of certain schools/sectors to promote access to its schools.
Low fee schools should have a reasonable resource base • In 2011 low fee independent schools with the low revenues were experiencing rapid enrolment growth • The then SES funding model didn't accurately reflect the ability of low fee schools to raise income.	***Peak body*** Independent Schools Council of Australia (2011), pp. 7-8.	• Analysis is used showing that independent schools with an SES score of between 86 and 100 had significantly lower per student revenues than other independent schools • These low fee schools also have the bulk of independent school enrolments, and the fastest enrolment growth.
The SES score makes no adjustment for school wealth • The SES funding model does not consider resources previously accumulated by schools • As a result school wealth is not taken into account.	***Researcher*** Maddox (2014), p. 74.	• The SES funding model led to large percentage funding increases to the 'wealthiest, high-fee-charging schools' • In contrast, modest funding increases were by received 'poorer private schools'.
Design of the SES score		
Unclear relevance of the education and occupation dimensions • The relevance of education and occupation to a family's capacity to contribute is questionable • School SES scores can differ when measured using family and household income versus education and occupation.	***Peak body*** Catholic Education Commission of Victoria (2017), pp. 12-14.	• Analysis is presented comparing SES scores derived from the two income dimensions, to one generated from the education and occupation dimensions • This analysis finds significant variation for all Australian SA1s and for Victorian Catholic schools.

Summary of raised issue or concern	Source	Presented evidence
The weighting given to the SES score dimensions are arbitrary • The four dimensions used to calculate school SES scores are weighted—Occupation (⅓), Education (⅓), Household income (⅙) and Income of families with children (⅙) • It is argued that these weights are *'more or less arbitrary'.*	***Peak body*** Catholic Education Commission of Victoria (2017), p. 8.	• No evidence is presented on the implications of the current weighting • Neither is an alternative weighting proposed • Rather, the paper goes onto question the inclusion of the education and occupation dimensions at all (see below).
Education, occupation and income are weakly correlated • An argument supporting education and occupation being included in the SES score was their correlation with income • However, the correlation between education and occupation with income is low at the individual level.	***Peak body*** Catholic Education Commission of Victoria (2017), pp. 12-14.	• Evidence of low correlation between education and income, and occupation and income, is drawn from Marks (2016), p. 196 • This article analysed the LSAC.
Education and occupation are used twice in the SRS • Education and occupation are used twice in the SRS—in the SES score and the low-SES loading • The low SES loading uses occupation and education data collected by ACARA for use in developing ICSEA • Education and occupation play a great role in determining school funding, with income having a lesser role.	***Peak body*** Catholic Education Commission of Victoria (2017), pp. 15-16. ***Researcher*** Farish (2017), p. 2.	• Catholic Education Commission of Victoria (2017) compare the education and occupation data elements used to generate the SES score and ICSEA • A high degree of commonality is identified in the specific education and occupation data elements used in both the SES score and ICSEA.
Family/household wealth is not used in the SES score • Family/household wealth is relevant to estimating family capacity to contribute financially to their children's education, yet it is missing from the SES score calculation • *'A 'fit for purpose' measure of capacity to contribute would take into account all of the financial means available to student families to contribute to school costs.*	***Peak body*** Catholic Education Commission of Victoria (2017), pp. 15-16. ***Researcher*** Farish (2017), p. 8.	• Catholic Education Commission of Victoria (2017) compare the SES score to means testing for income support payments, where income and assets tests are used • ABS data shows younger families are more likely to have less wealth than older families, but similar income levels • Wealth and income are not in line—high income households have 48.5% of income and 62.1% of wealth.
Accuracy of the SES score		
The ecological fallacy		
Non-government school students are unrepresentative of SA1s • The distribution of students from a given SA1 across different schools is not socioeconomically neutral • More affluent families from an SA1 tend to attend different schools to less affluent families	***Peak body*** Catholic Education Commission of Victoria (2017), pp. 24-25.	• Catholic Education Commission of Victoria (2017) compare average family income by school sector attended • The analysis found one sector has lower average incomes in 56 per cent of metropolitan SA1s than the other sector

Summary of raised issue or concern	Source	Presented evidence
• This situation biases SES scores--non-government schools attracting more affluent families from an SA1 receive a lower SES score than is representative of their students.	***Researcher*** Preston (2010).	• Preston (2010) undertook CD-level analysis of the 2001 Census on families with secondary students in Penrith • Government school secondary students were equally likely to have a low or high family income • Non-government school students were more than twice as likely to have a high income as a low income.
The SES score favours schools serving regional students • The social geography and density of populations across metropolitan and regional areas tends to advantage regional schools and schools serving high proportions of students from regional areas (e.g. boarding schools) • These schools tend draw students from regional areas with more diverse SES within SA1s than in metropolitan areas.	***Researcher*** Watson (2004), pp. 233-234.	• Evidence is presented examining the SES scores for several independent schools located in regional areas, or serving students from regional areas • These schools were identified as having relatively high fees, but SES scores that were significantly lower than metropolitan-based schools with similar fee levels.
There can be significant variation in household SES* within *SA1s • Household resources within SA1s can vary greatly • ABS research compares individual and area-level SES • SES scores calculated using area-level data may not accurately reflect the family characteristics of students attending non-government schools.	**Statistics agency** Wise & Mathews (2011).	• Wise & Mathews (2011) examine individual level diversity within areas, compared to area-level analysis • Equivalent individual indexes of IRSAD and IRSD were developed, using ABS 2006 Census data • The analysis identified significant diversity within CDs, varying between states and territories.
Mesh blocks may overcome the ecological fallacy • The Review of Funding for Schooling suggested SES scores be generated using mesh blocks in place of CDs • Mesh blocks are smaller than SA1s, providing an opportunity to improve SES score 'accuracy and reliability'.	***Government review*** Gonski, et al. (2011), p. 177. ***Peak body*** Independent Schools Victoria (2011), p. 37.	• This option was not closely examined in the Review of Funding for Schooling report or the Independent Schools Victoria submission • Rather, it was flagged as a possibility only.
Measurement error		
The income dimensions may not adequately measure affluence	***Peak body*** Catholic Education Commission of	• 2011 Census data shows diversity in families with incomes above the high-income threshold ($156,000 per annum)

Summary of raised issue or concern	Source	Presented evidence
• The thresholds determining the 'income' profile of SA1s within the SES score are an imprecise way of assessing capacity to contribute • Rather there can be significant variation in resources—families below the lower threshold and above the upper threshold do not have equal resources.	Victoria (2017), pp. 29-32.	• Many SA1s have similar proportions of families with incomes above $156,000 per annum, but variable proportions of families with incomes above $260,000 • The proportion of families with very high incomes are consistently higher in one non-government school sector.
Families with a nil/negative income may still be affluent • Households/families with a nil/negative income are included in the 'low income' category • It is contended that many of these households/families may actually have higher incomes or be affluent, meaning the income dimensions included in the SES score may be inaccurate.	***Peak body*** Catholic Education Commission of Victoria (2017), p. 18.	• '[P]eople living in households with nil or negative income tended to have more similar characteristics to those living in higher income households' (Pink, 2013, p. 21) • Few families are affected—1.2 per cent of usable observations. In almost 10 per cent of SA1s, more than 5 per cent of observations have a nil or negative income.
Parents may live in a different location to their child • Capacity to contribute cannot be deduced directly from the resources available to the family a student lives with • Many parents live in separate households to the student, yet can contribute to their children's education.	***Peak body*** Catholic Education Commission of Victoria (2017), p. 34.	• The 2011 ABS Census indicates that 14.5 per cent of households comprise one-parent families. This implies that in many cases a parent is living in a different location • It is noted that only the SA1 where a student resides is considered in the SES score calculation.
Family size is not considered in SES score calculation • The diversity in family/household size is not accounted for in the SES score calculation • As a consequence the number of children whose families are expected to contribute towards their education is not taken into account when generating SES scores.	***Peak bodies*** Catholic Education Commission of Victoria (2017), p. 19. Independent Schools Victoria, (2011), p. 37. Australian Council of Jewish Schools (2017), p. 6. ***Researcher*** Farish (2017), p. 2.	• Catholic Education Commission of Victoria (2017) present 2011 ABS Census data showing the average number of dependent children in a family declines as income increases • A number of schools have successfully appealed their SES score on the basis that their school communities have significantly larger families than the average.

Summary of raised issue or concern	Source	Presented evidence
Data robustness		
Census data is more robust than data collected from parents • Census data used to calculate the SES score is collected under controlled and consistent conditions • Accordingly, Census data is a reliable source of SES data on which to base a funding model • Data collected by schools from parents is not robust.	***Peak body*** Independent Schools Council of Australia (2011), p. 3 and Independent Schools Victoria, (2011), p. 37.	• No evidence is provided supporting this view that Census data is more robust than data collected from parents.
Timeliness of the SES score		
The five years between Censuses makes the data soon outdated • The five yearly Census means information on communities, and thus capacity to contribute, is soon out of date. • Specific issues impacting SES score timeliness include urban fringe residential development, structural change and population movement.	***Peak body*** Catholic Education Commission of Victoria (2017), pp. 32-34.	• The example of the impact of the 2010-11 'mining investment boom' in Western Australia is used • It is argued the boom led to the average household and family income dimension scores for Western Australian SA1s being 104, compared to 99 in the rest of Australia • The subsequent contraction in the Western Australian economy is not reflected in the SES score calculation.

Appendix C. Validation and analysis of SES score: suggested activities

Table C-1 Validation and analysis of the SES score: suggested activities

Raised issue or concern	Validation	Improvement	Data source	Analysis approach
Purpose and objective of the SES score				
1. An SES-based measure of capacity to contribute is too narrow	✓	✓	Financial Questionnaire (FQ), enrolment and student characteristics data collected via My School.	Analysis will be guided by the clarification of the capacity to contribute measure objective. Analysis could involve analysing: • the relationship between school base SRS funding and school fees, and also school wealth and assets • SES scores and base SRS funding received by schools with similar student characteristics using My School data.
2. Schools that set low fees to facilitate access are penalised	✓	✓		
3. Low fee schools should have a reasonable resource base	✓	✓		
4. The SES score makes no adjustment for school wealth	✓	✓		
Design of the SES score				
5. Unclear relevance of the education and occupation dimensions	✓	✓	SA1 dimension scores	Analysis focussed on validating rationale for including occupation and education in the SES score (see p. 12), examining whether if only using income dimensions: • school SES scores would differ markedly from status quo • school SES scores would vary more over time.
6. The weights given to the SES score dimensions are arbitrary	✓	✓	SA1 dimension scores	Use simulation methods to examine distribution of school SES scores when using alternative weights.
			Advice from ABS on SEIFA estimation of the IRSAD	Identify whether implied weights for the education, occupation and income dimensions within the ABS IRSAD are similar to that used in the SES score calculation. This will require re-analysis, potentially by the ABS, of the data used to estimate the IRSAD.
7. Education, occupation and income are weakly correlated	✓		HILDA survey	Use HILDA survey to examine correlation between education, occupation and income, and whether this correlation varies on basis of school sector attended by children.

Raised issue or concern	Validation	Improvement	Data source	Analysis approach
8. Education and occupation are used twice in the SRS		✓	SRS funding model, and advice from ACARA on ICSEA estimation	Identify the relative importance of parental education and occupation in the estimation of SEA quartiles. The need for this analysis will depend upon the item 5 analysis findings.
9. Family/household wealth is not used in the SES score	✓		HILDA survey	Based upon (Wise & Mathews, 2011), use HILDA to generate household level SES scores. Also identify whether the inclusion of household wealth generates a markedly different SES score. This analysis should compare calculated SES scores by school sector attended. Finally, if wealth is identified as significant, the analysis can test whether proxy wealth measures collected in ABS Census, such as housing tenure type or number of bedrooms per resident, provide a close approximation.
Accuracy of the SES score				
The ecological fallacy				
10. Non-government school students are unrepresentative of SA1s	✓		ABS Census, customised data request	Generate school SES scores using SA1-level data for households where students attend non-government schools, and compare to status quo SES scores. SA2 level data may be required to ensure adequate quantity of data.
11. The SES score favours schools serving regional students	✓		ABS Census, customised data request	Identify home SA1s of students attending boarding schools, and compare SES of households where students attend non-government schools, to other households. Re-calculate SA1 and school SES scores to estimate impact of differences, if identified.
12. There can be significant variation in household SES within SA1s	✓		Census of Population and Housing, 5% Census Sample File, 2011	Generate household level SES scores and compare calculated SES scores of households where students attended non-government schools, to all households. Analysis will need to use groupings of SA3s, unless ABS is able to undertake analysis using full population data file.
13. Mesh blocks may overcome the ecological fallacy		✓	Advice from the ABS	Seek ABS advice on the feasibility of using mesh block level data.

Raised issue or concern	Validation	Improvement	Data source	Analysis approach
Measurement error				
14. The current SES score income dimensions may not adequately measure affluence	✓	✓	ABS Census and HILDA	Undertake analysis of ABS Census and HILDA to identify whether there are differences between non-government school sectors *within* the SES score income dimensions. If appropriate, re-calculate SA1 and school SES scores with alternative dimensions.
			ATO and ABS Census	Analyse SA1 family income distribution using ATO income taxation data, and compare to the ABS Census. Subject to these findings, re-calculate SA1 and school SES scores using income tax data. The ATO may need to undertake some of this analysis.
15. Families with a nil/negative income may have higher incomes	✓	✓	Advice from ATO and non-government school representatives	Identify the feasibility of collecting the Tax File Number (TFN) of non-government school parents, which are then used by the ATO to collate taxable income data for use in the SES score.
16. Parents may live in a different location to their child	✓	✓	Census of Population and Housing, 5% Census Sample File, 2011	Building upon the approach used for item 12, identify whether SES score results are materially different for single parent households where a child attends a non-government school.
			Advice from non-government school representatives	Identify feasibility of collecting additional address information from schools, for where parents live in a different location to student address. Related to item 15.
17. Family size is not considered in SES score calculation	✓	✓	Census of Population and Housing, 2011: Tablebuilder Pro	Re-calculate 2011 SA1 and school SES scores using equivalised household income data, and compare to status quo calculates.
Data robustness				

Raised issue or concern	Validation	Improvement	Data source	Analysis approach
18.Census data is more robust than data collected from parents	✓		Advice from ABS and ACARA	Undertake comparative assessment of data robustness in the ABS Census, and the ACARA ICSEA score.
Timeliness of the SES score				
19.The five years between Censuses makes the data soon outdated	✓	✓	SA1 and school SES scores. Advice from ABS and ATO	Undertake analysis of the change in SA1 and school SES scores over time. Identify whether there is scope to use other data (e.g. ABS labour force, ATO income tax data to adjust SES scores.

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