

**Education Research Brief**

# **Resource Gaps Between Advantaged & Disadvantaged Schools Among the Largest in the World**

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## Overview

Disadvantaged students in Australia are being denied equal opportunities to learn because they have less access to qualified teachers and material resources than advantaged students. The gaps in access to education resources between advantaged and disadvantaged schools in Australia are among the largest in the world and the OECD.

Data from PISA 2015 published in a supplementary report by the OECD show that disadvantaged schools in Australia experience more teacher shortages, higher teacher-student ratios and more shortages or inadequacy of material educational resources than advantaged schools [OECD 2016a]. Advantaged schools are much better equipped to provide opportunities to learn.

The extent of the gaps is both startling and shocking:

- Australia has the largest gap in teacher shortages between disadvantaged and advantaged schools in the OECD and the 4<sup>th</sup> largest of the 70 countries/regions participating in PISA 2015; only Buenos Aires, Peru and the United Arab Emirates have a larger gap of all the countries participating in PISA;
- Inequity in the allocation of educational staff between disadvantaged and advantaged schools in Australia is the highest in the OECD according to the PISA measure of equity in the allocation of staff and the 3<sup>rd</sup> highest of the 70 countries/regions participating in PISA 2015. Inequity was greater in only Peru and Buenos Aires;
- Australian is one of only seven OECD countries where disadvantaged schools have a higher student-teacher ratio than advantaged schools and the gap in Australia is the equal 2<sup>nd</sup> largest. Australia's gap is the equal 12<sup>th</sup> highest of the 70 countries/regions participating in PISA 2015;
- Australia has the 4<sup>th</sup> largest gap in the shortage or inadequacy of educational material and physical infrastructure between disadvantaged and advantaged schools in the OECD, and is only exceeded in Mexico, Turkey and Spain. The Australian gap is the 18<sup>th</sup> largest out of the 70 countries/regions participating in PISA 2015;
- Inequity in the allocation of material resources in Australia is the 5<sup>th</sup> highest in the OECD according to the PISA measure of equity in resource allocation and the 15<sup>th</sup> highest of the 70 participating countries/regions.

Private schools are better equipped in terms of human and material resources than public schools. Public schools have greater shortages in teaching and material resources and higher student-teacher ratios than private schools.

Provincial and rural schools also have greater teaching shortages than city schools.

- Australia has the largest gap in teacher shortages between town and city schools in the OECD and one of the largest of all countries/regions participating in PISA;
- The gap in the shortage of teachers between rural and city schools in Australia is the 5<sup>th</sup> largest in the OECD.

A feature of the latest PISA results is continuing high inequity in education outcomes in Australia. High proportions of disadvantaged students don't achieve international minimum standards in reading, mathematics and science and they are three or more years of learning behind advantaged students. High proportions of students in provincial and remote area schools are also below minimum standards and are 2½-3 years behind advantaged students.<sup>1</sup>

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<sup>1</sup> The terminology used to classify schools by geographic location is different between the OECD report and the Australian national report on the PISA results. The OECD report classifies schools as being city, town or rural

These inequities are not new. They are a longstanding feature of Australia's PISA, and of other national and international test results. In fact, the percentage of disadvantaged students and students in provincial and remote area schools below international minimum standards has increased significantly in the last 10 years.

The OECD report shows that the distribution of human and material resources between disadvantaged and advantaged schools matters for student achievement in education systems. It found that: "In countries and economies where more resources are allocated to disadvantaged schools than advantaged schools, overall student performance in science is somewhat higher" [OECD 2016a: 189].

Australia must provide more resources for disadvantaged schools if the large achievement gaps are to be reduced. As the OECD report states:

Achieving equity in education means ensuring that students' socio-economic status has little to do with learning outcomes. Learning should not be hindered by whether a child comes from a poor family, has an immigrant background, is raised by a single parent or has limited resources at home, such as no computer or no quiet room for studying. Successful education systems understand this and have found ways to allocate resources so as to level the playing field for students who lack the material and human resources that students in advantaged families enjoy. When more students learn, the whole system benefits. This is an important message revealed by PISA results: in countries and economies where more resources are allocated to disadvantaged schools, overall student performance in science is somewhat higher. [OECD 2016a: 233]

A similar report on PISA 2012 results showed that the extent and quality of human and material resources in secondary schools influences student achievement. It found that: "High-performing countries tend to allocate resources more equitably across socio-economically advantaged and disadvantaged schools" [OECD 2013: 17].

Australia is clearly still failing in this. Many academic studies show that better targeting of teaching and material resources to disadvantaged schools would improve the results of disadvantaged students. Improving the results of low SES students to match the current Australian averages would lift Australia into the top 10 countries in the world in reading and science and substantially improve Australia's position in mathematics.

The Gonski funding model was designed to redress the inequity in resources between disadvantaged and advantaged schools. Its sabotage by the Federal Coalition will mean continuing disadvantage and social inequity in education in Australia. The forthcoming meeting of the national education ministers' council must ensure future funding arrangements that support increased resources for disadvantaged schools.

## **High inequity in student achievement**

The national PISA 2015 report shows that very high proportions of low socio-economic status (SES), Indigenous, provincial and remote area 15 year-old students are not achieving international minimum standards in reading, mathematics and science.

About one-third of low SES students are below the reading, mathematics and science standards [see Chart 1 below]. Almost half of all Indigenous students are below the mathematics standard while 40

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schools and the Australian report classifies schools as metropolitan, provincial and remote. The classifications seem to be similar.

per cent are below the reading standard and 42 per cent are below the science standard. About 30 per cent of remote area students and about 25 per cent of provincial students and students from a language background other than English (LBOTE) are below the standards. In contrast, only seven to nine per cent of high SES students are below the standards.

Mean scores in reading, mathematics and science results for low SES, Indigenous, remote area students lag those of high SES students by about three or more years [Chart 2]. The achievement gap between high and low SES students in reading, mathematics and science is equivalent to about three years of learning. The gap between high SES and Indigenous students is even larger, being equivalent to about four years of learning. The high SES/remote area student gap is about three years of learning, the high SES/provincial gap is 2½-3 years and that for high SES/LBOTE students is about 2-2½ years.

## Shortage of education staff

Shortage of qualified teachers restricts effective learning. One-fifth of Australian students attend schools whose principals reported in PISA 2015 that a shortage of teaching staff hinders learning to some extent or a lot [OECD 2016a: Table II.6.14]. However, advantaged schools in Australia face fewer staff shortages than many other schools in Australia. The gaps in the shortage of teachers between disadvantaged and advantaged schools, town and city schools and rural and city schools are the largest in the OECD and among the largest of all countries/cities participating in PISA 2015.<sup>2</sup>

Australia has the largest gap in the shortage of teachers between disadvantaged and advantaged schools in the OECD and one of the largest of all 70 countries/regions participating in PISA 2015. The gap is very large compared to the average across the OECD and is much larger than in high performing countries such as Singapore, Japan, Estonia, Taiwan, Finland, Vietnam and Korea [Chart 3]. Only Buenos Aires, Peru and the United Arab Emirates have a larger gap than Australia.

The OECD PISA 2015 report also constructed a measure of equity in the allocation of education staff amongst disadvantaged and advantaged schools based on principals' concerns about the lack or inadequacy of human resources at school. This shows that inequity in the allocation of education staff in Australia is the highest in the OECD and much higher than in other high performing countries [Chart 4]. Many high performing countries such as Estonia, Finland, Singapore, Japan and Canada have very little inequity in the allocation of education staff. Inequity in Australia is the 3<sup>rd</sup> highest of 70 countries/regions participating in PISA 2015. Inequity was greater in only Peru and Buenos Aires.

Australia also has the largest gap in the shortage of teachers between town and city schools in the OECD and one of the largest of all countries/regions participating in PISA.<sup>3</sup> The shortage gap is very large compared to the average for the OECD [Chart 5]. Several high performing countries such as Korea, Estonia, Germany and Slovenia have a higher shortage of teachers in city schools rather than schools in towns. Only China, Cyprus, Dominican Republic and Jordan have a larger shortage gap between town and city schools than Australia.

The gap in the shortage of teachers between rural and city schools in Australia is also one of the largest in the OECD [Chart 6]. Only the Slovak Republic, Chile, Canada and New Zealand have a larger gap. The Australian gap is the 12<sup>th</sup> largest of all countries/regions participating in PISA 2015.

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<sup>2</sup> The OECD constructed an index of shortages in education staff from principals' responses to the PISA 2015 questionnaire. Differences in index scores reflect differences in the shortage of staff in schools.

<sup>3</sup> A town is defined as having a population of 3,000 to 100,000 and a city is defined as having a population of over 100,000.

Public schools also have a greater shortage of teachers than private schools and the gap is larger than the average in OECD countries [Chart 7]. The gap is larger than in most high performing countries.

## Student-teacher ratios

Australia is one of only seven of 35 OECD countries where disadvantaged schools have a higher student-teacher ratio than advantaged schools and the gap in favour of advantaged schools in Australia is the equal 2<sup>nd</sup> largest in the OECD [Chart 8]. In Australia, the average student-teacher ratio in disadvantaged secondary schools is 13.1 compared to 12.4 in advantaged schools [OECD 2016, Table II.6.29]. In contrast, the average student-teacher ratio in disadvantaged secondary schools across the OECD is 12.1 compared to 13.5 for advantaged schools. Australia is one of only 18 countries/regions out of 70 participating in PISA 2015 where disadvantaged schools have a higher student-teacher ratio than advantaged schools and it is the equal 12<sup>th</sup> highest.

In high performing countries, student-teacher ratios in disadvantaged schools are generally lower than in advantaged schools. Canada, Estonia, Finland, Japan and Korea all have lower student-teacher ratios in disadvantaged schools than in advantaged schools. For example, in Estonia the average ratio for disadvantaged schools is 8.8 and 13.6 in advantaged schools. In Japan, the respective ratios are 10.0 and 12.5 while in Finland they are 9.6 and 10.7.

Student-teacher ratios in town and city schools are also higher than in advantaged schools. The ratio for town schools is 13.0 and 13.2 in city schools [Chart 9]. The ratio for rural schools is 12.1 which is similar to that in advantaged schools [Chart 10]. The student-teacher ratio in public schools is also higher than in private schools – 13.5 compared to 12.5 [Chart 11]. These ratios are similar to the OECD averages for public and private schools.

The PISA 2015 study found only a weak relationship between student-teacher ratios and student achievement across OECD countries and in Australia. In Australia, this may be due to the fact that the variation in student-teacher ratios between schools is relatively small. Studies show that lower student-teacher ratios increase student achievement in disadvantaged schools [for example, Jackson et.al. 2016, Mathis 2016, Schanzenbach 2014]. Lower student-teacher ratios in disadvantaged schools allow for lower class sizes or allow teachers more time to prepare for lessons and take on other responsibilities such as mentoring students.

## Shortage of educational material resources

The OECD report found that students score lower in schools whose principals reported that the capacity to provide learning opportunities is hindered to a greater extent by a shortage or inadequacy of physical infrastructure and educational material resources, such as textbooks, science laboratories, information technology and libraries [OECD 2016a: 187].<sup>4</sup>

In Australia, only about 10 per cent of students are in schools where principals reported that a lack or inadequacy of educational materials hinders learning to some extent or a lot [OECD 2016: Table II.6.1]. However, 25 per cent of students are in schools where principals reported that inadequacy of physical infrastructure, such as school buildings, heating and cooling systems and teaching space hinder learning to some extent or a lot.

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<sup>4</sup> The OECD constructed an index of shortage in educational material resources from principals' responses to the PISA 2015 questionnaire about the extent to which shortage or inadequacy in physical infrastructure and educational materials hinder learning. Differences in index scores reflect differences in the shortage of material resources in schools.

Australia is one of many countries where student learning in socio-economically disadvantaged schools is hindered by a lack or inadequacy of educational material and physical infrastructure to a greater extent than in advantaged schools. However, the gap in Australia is the 4<sup>th</sup> largest in the OECD, only exceeded in Mexico, Turkey and Spain [Chart 12]. It is much larger than in high performing countries such as Singapore, Canada, Estonia, Finland and Korea. The Australian gap is the 18<sup>th</sup> largest out of the 70 countries/regions participating in PISA 2015

The OECD PISA 2015 report also constructed a measure of equity in the allocation of education resources amongst disadvantaged and advantaged schools based on principals' concerns about the lack or inadequacy of educational resources at school. This shows that inequity in the allocation of educational resources in Australia is the 5<sup>th</sup> highest in the OECD and much higher than in other high performing countries [Chart 13]. It is the 15<sup>th</sup> highest of the 70 participating countries/regions. Public schools also face much greater shortages or inadequacy in physical infrastructure and educational materials than private schools and the gap is similar to that between disadvantaged and advantaged schools [Chart 14]. The gap is much greater than in many other high performing countries such as Canada, Estonia, Japan, Korea and Singapore.

Rural and town schools also face greater shortages or inadequacy of educational resources than city schools, but the gaps are less than between disadvantaged and advantaged schools [Charts 15 & 16]. However, the gaps between rural and town schools and city schools are larger than the OECD averages.

## Conclusion

Achievement gaps are inextricably linked to gaps in the opportunity to learn. The opportunity to learn is affected by factors outside and within schools. Disadvantage is constantly reproduced in society through poverty, low incomes, unemployment, lack of affordable housing, poor health and other factors. Schools are in a constant battle against the reproduction of inequality and poverty in society. Their efforts must be supported by economic and social policies to reduce growing inequality and increasing poverty. But, it is critical that they are also provided with adequate human and material resources to ensure that disadvantaged students achieve at the levels of advantaged students.

The allocation of teaching and educational material resources between advantaged and disadvantaged schools matters. The OECD analysis of the PISA 2015 science results found that 31 per cent of the variation in science performance is explained by the degree of equity in the allocation of educational resources between advantaged and disadvantaged schools [OECD 2016a: 189]. Evidence from another OECD report last year indicated that low-performing students appear to benefit the most when more resources are allocated to disadvantaged schools than advantaged schools (OECD 2016b). As the eminent US educationalist Linda Darling-Hammond concluded in a review of inequality and school resources:

Clearly, money well spent does make a difference. Equalizing access to resources creates the possibility that all students will receive what is their birthright: a genuine opportunity to learn. [Darling-Hammond 2013: 97]

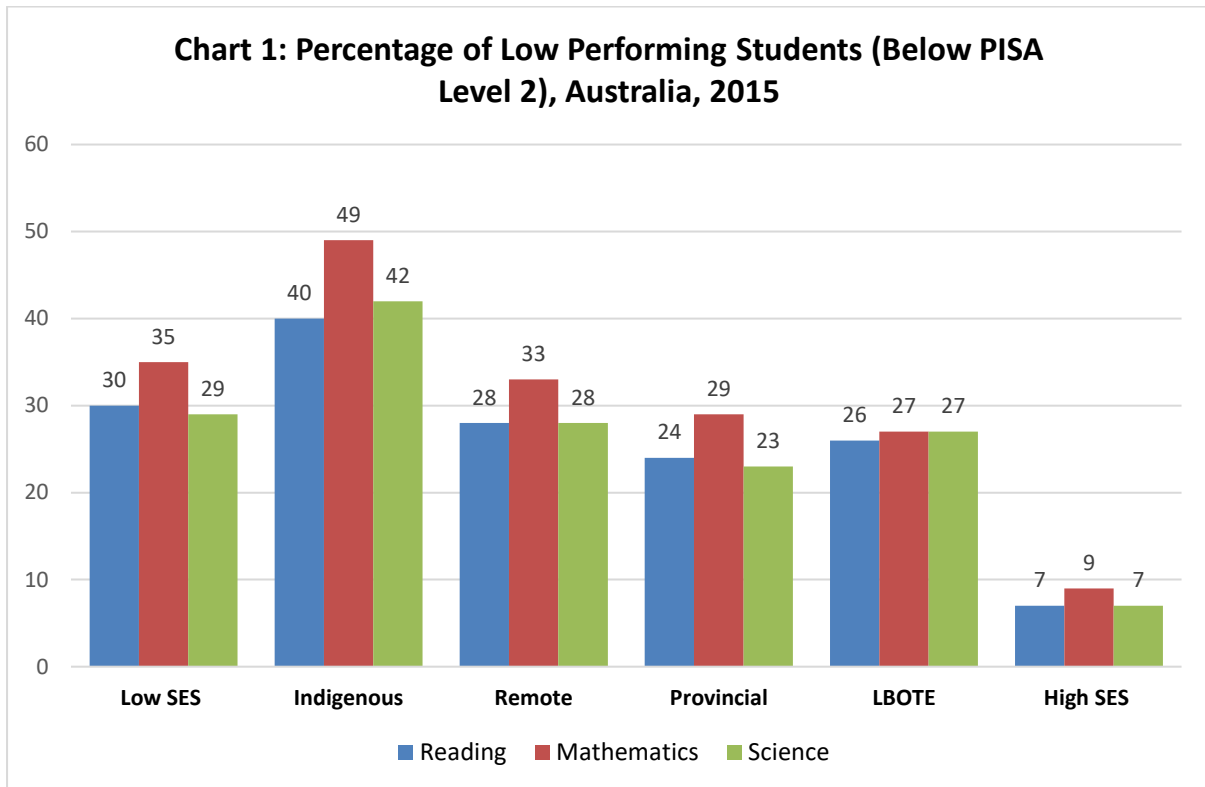
Improving the results of disadvantaged students would not only increase their life chances, but would significantly lift Australia's overall education performance. If the average results for students in the lowest SES quartile were lifted to the current national average scores recorded in PISA 2015, Australia would move into the top 10 countries in reading and science and significantly improve its position in mathematics.

In 2015, low SES students were well over one year of learning behind the Australian average in reading, mathematics and science (41 points behind in reading, 39 points behind in mathematics and 42 points behind in science). If the results of low SES students were lifted to the current Australian average, Australia would move from 16<sup>th</sup> to 9<sup>th</sup> in reading out of 70 countries and be statistically equivalent with Estonia, Japan and Korea. In science, Australia would move from 14<sup>th</sup> to 9<sup>th</sup> and be statistically similar to Canada, Hong Kong and Vietnam. In mathematics, Australia would move from 25<sup>th</sup> to about 15<sup>th</sup> and be statistically similar to Finland, Germany and Denmark.

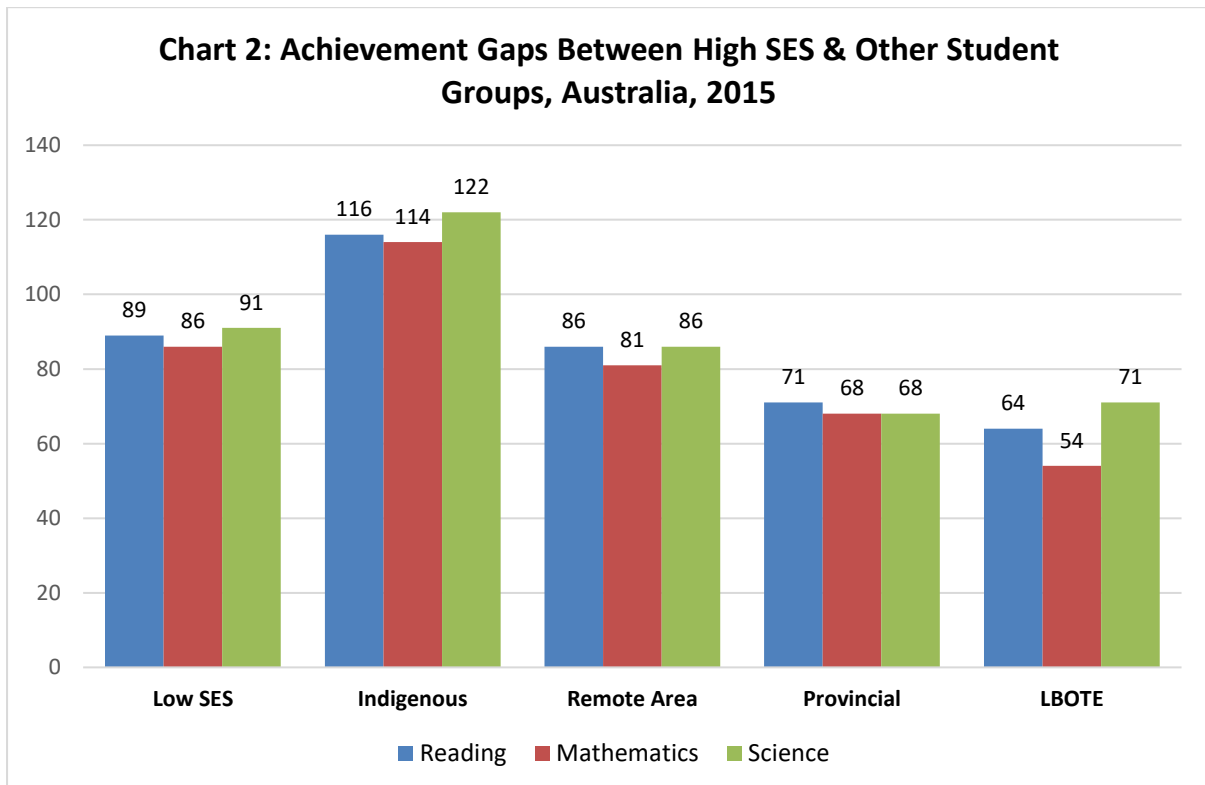
Lifting the results of low SES and other disadvantaged students requires better targeting of teaching and material resources to disadvantaged schools as many studies show. However, Governments in Australia and the federal and state/territory level have all failed to provide disadvantaged schools with the human and material resources necessary to reduce the large achievement gaps.

The Gonski funding model was designed to redress the inequity in resources between disadvantaged and advantaged schools. Its sabotage by the Federal Coalition will mean continuing disadvantage and social inequity in education in Australia. It will also mean lower productivity and economic growth, and higher government expenditure on health, welfare and crime. The forthcoming meeting of the national education ministers' council must ensure future funding arrangements that support increased resources for disadvantaged schools.

## Charts on Disadvantage & Educational Resources



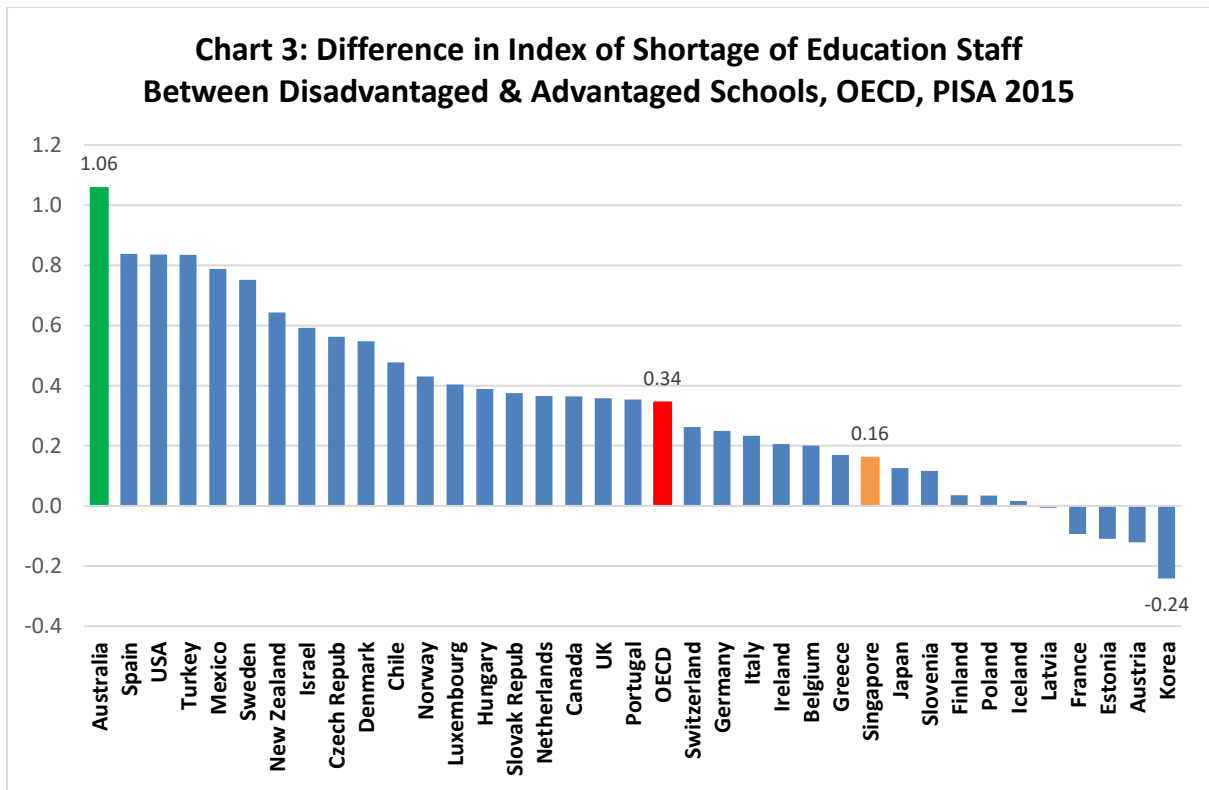
Source: Thomson et.al. 2016, Figures 5.2, 5.4 & 5.6.



Source: Derived from Thomson et.al. 2016, Figures 9.2, 10.2, 11.2 & 13.2.

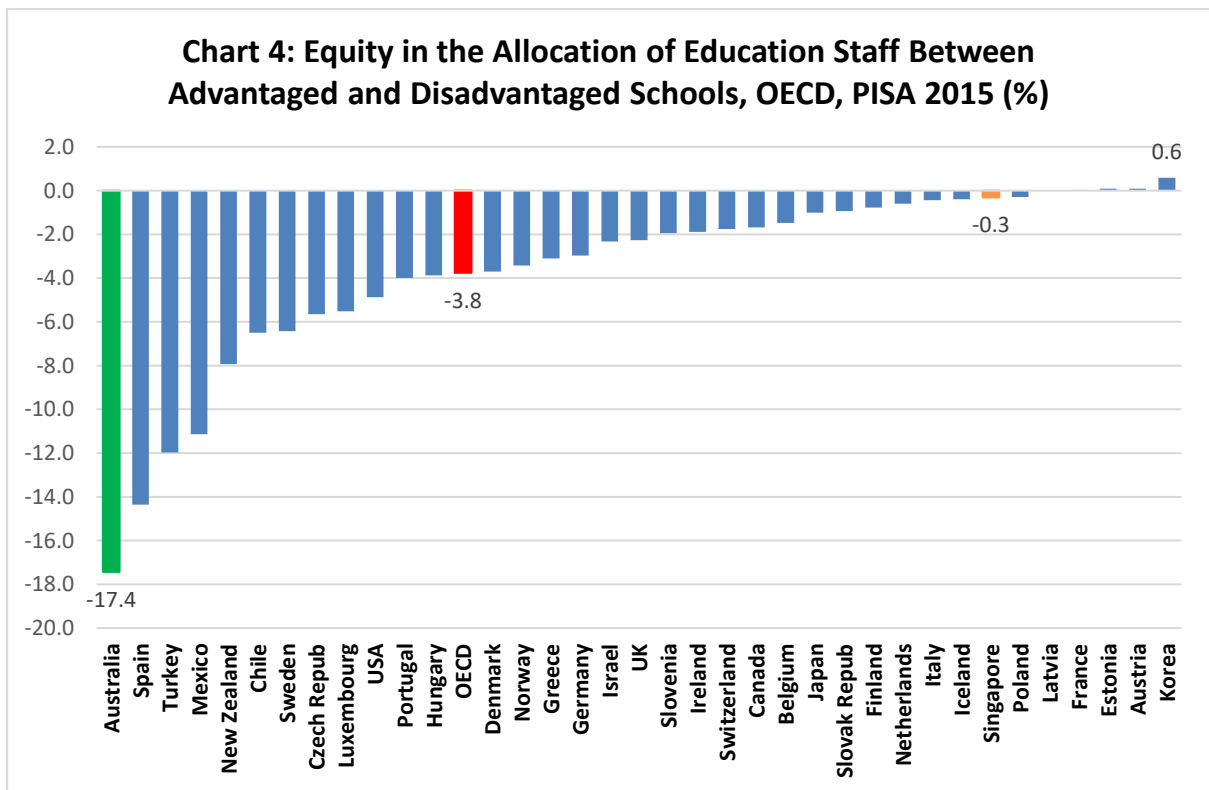
Note: One year of learning is equivalent to about 30 points on the PISA scale.





Source: OECD 2016a, Table II.6.15.

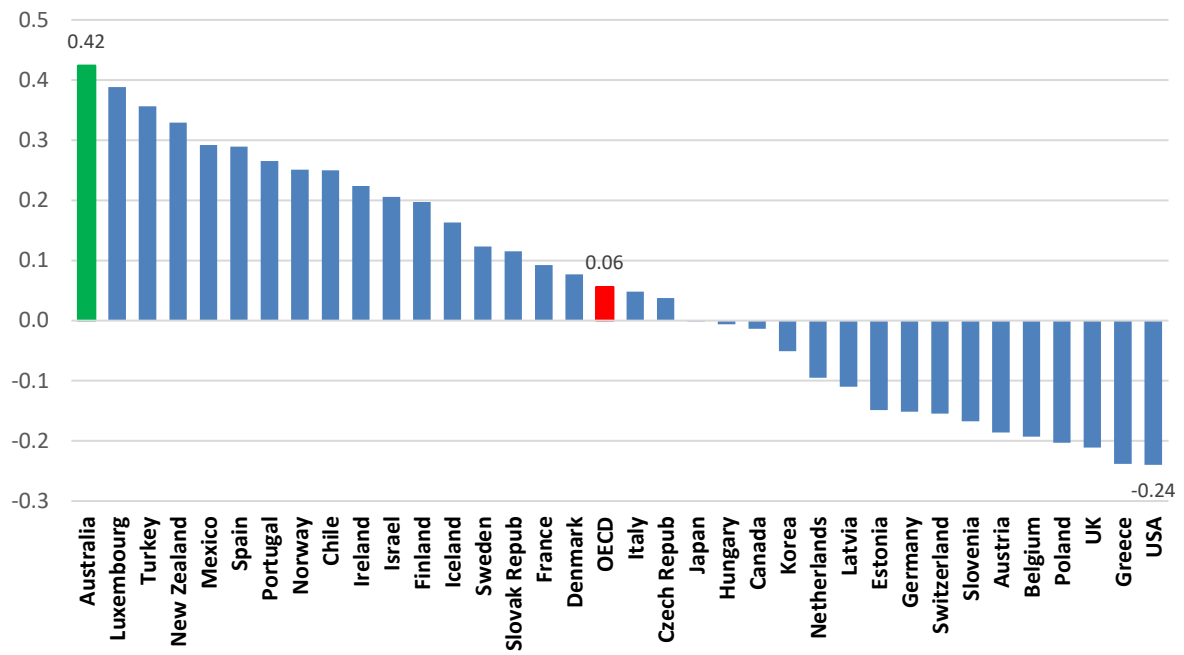
Note: Singapore is highlighted in this and the following charts because it is the top performing country in PISA 2015.



Source: OECD 2016a, Table II.6.16

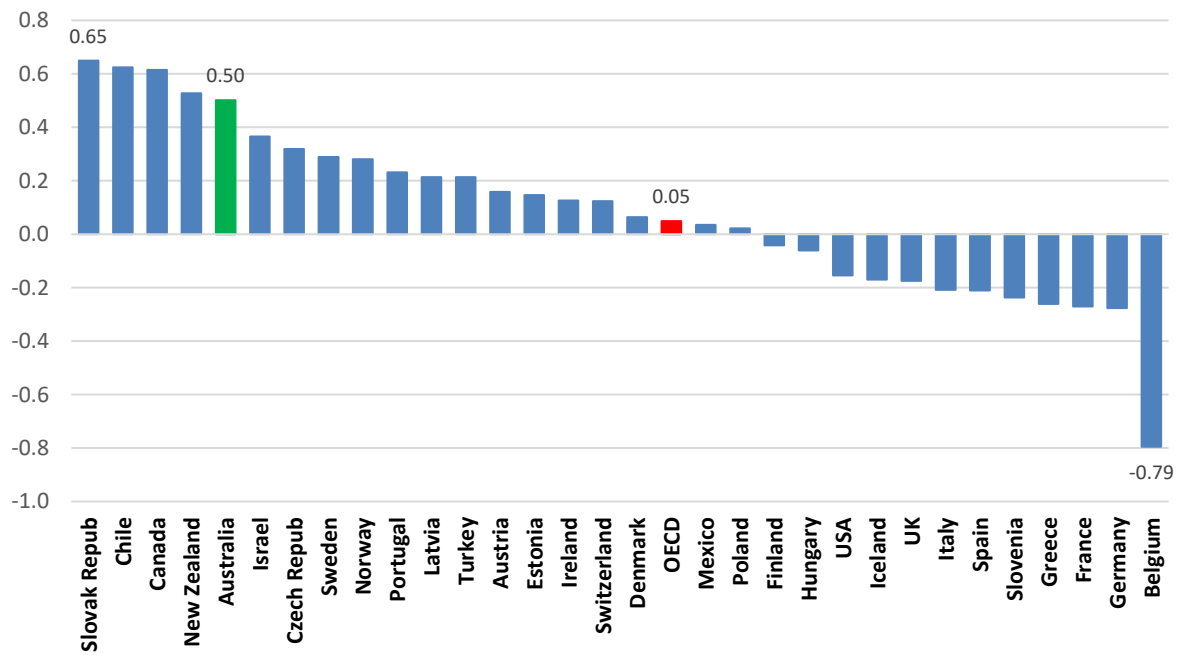
Note: The index of equity in the allocation of education staff is the percentage of the variation in the index of shortage of educational staff explained by the school PISA index of economic, social and cultural status of the school multiplied by a negative or positive sign, depending on the sign of the relationship.

**Chart 5: Difference in Index of Shortage of Education Staff  
Between Town & City Schools, OECD, PISA 2015**



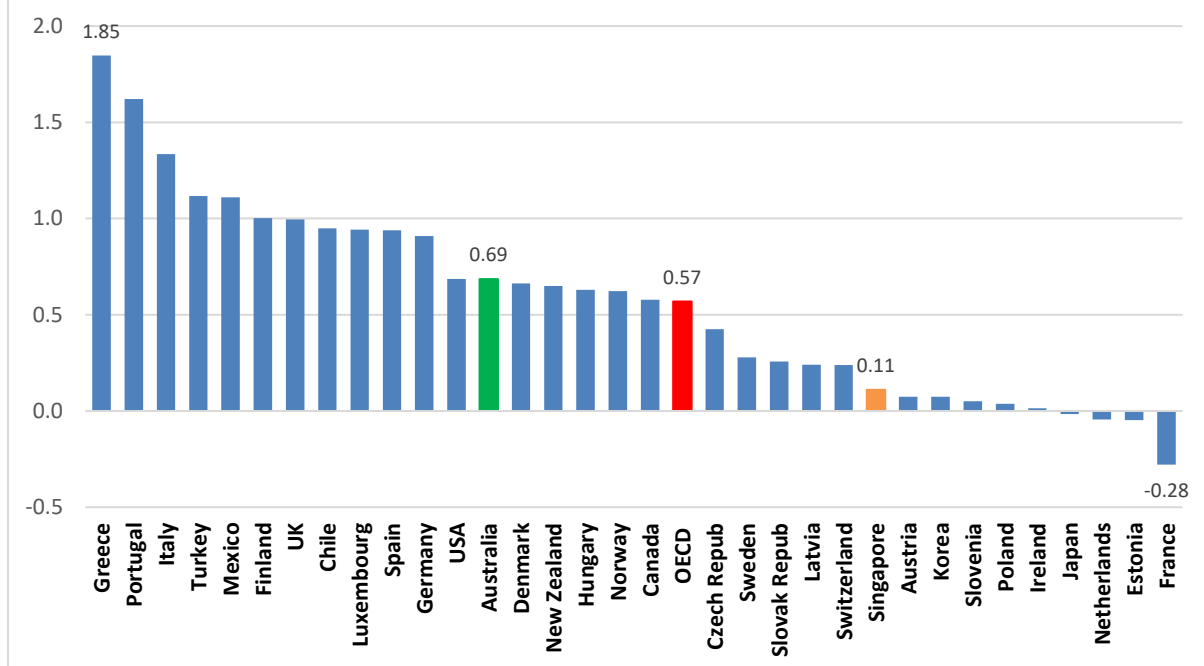
Source: OECD 2016a, Table II.6.15

**Chart 6: Difference in Index of Shortage of Education Staff  
Between Rural & City Schools, OECD, PISA 2015**



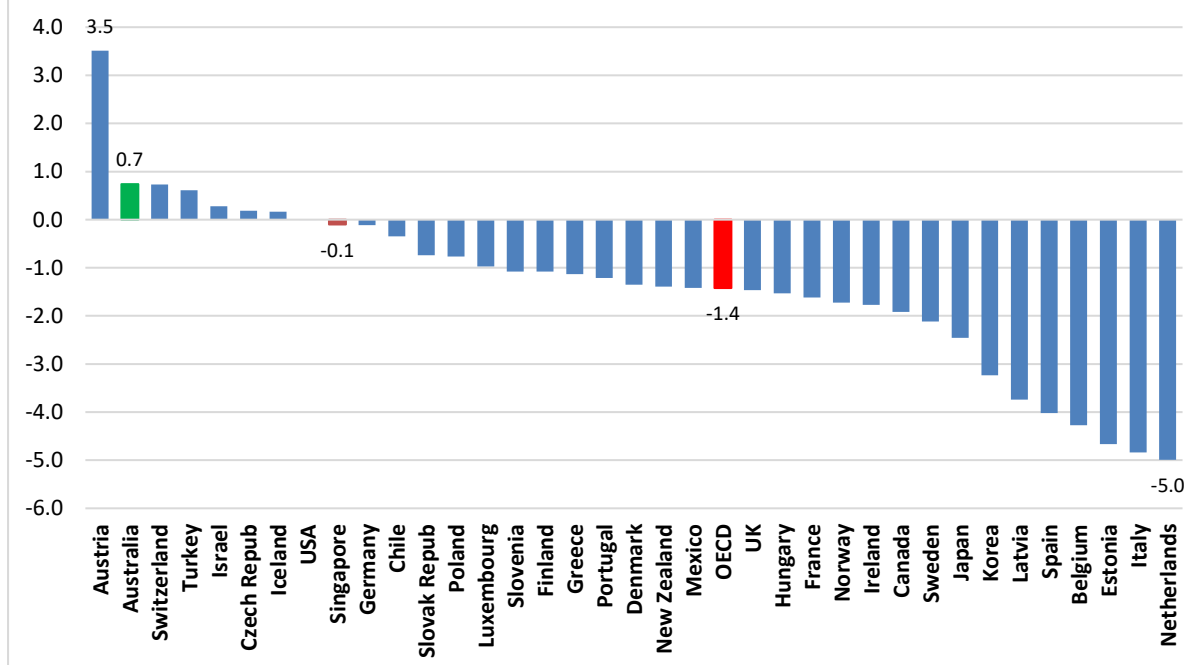
Source: OECD 2016a, Table II.6.15

**Chart 7: Difference in Index of Shortage of Education Staff Between Public & Private Schools, OECD, PISA 2015**



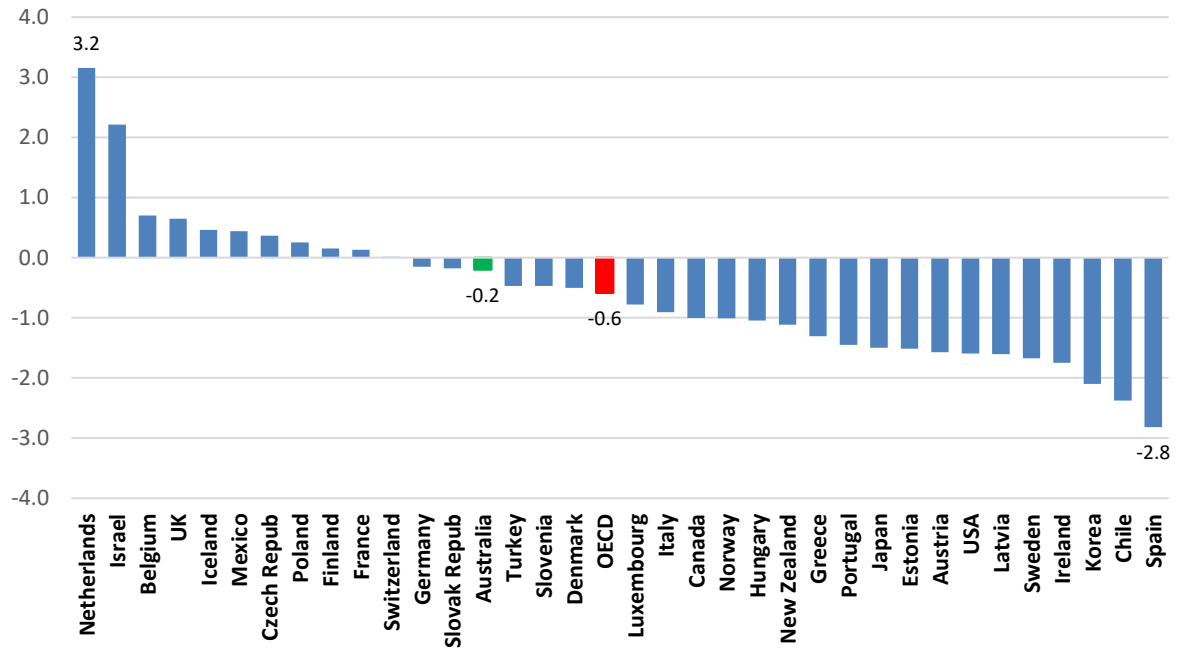
Source: OECD 2016a, Table II.6.15

**Chart 8: Difference in Student-Teacher Ratios Between Disadvantaged & Advantaged Schools, OECD, PISA 2015**



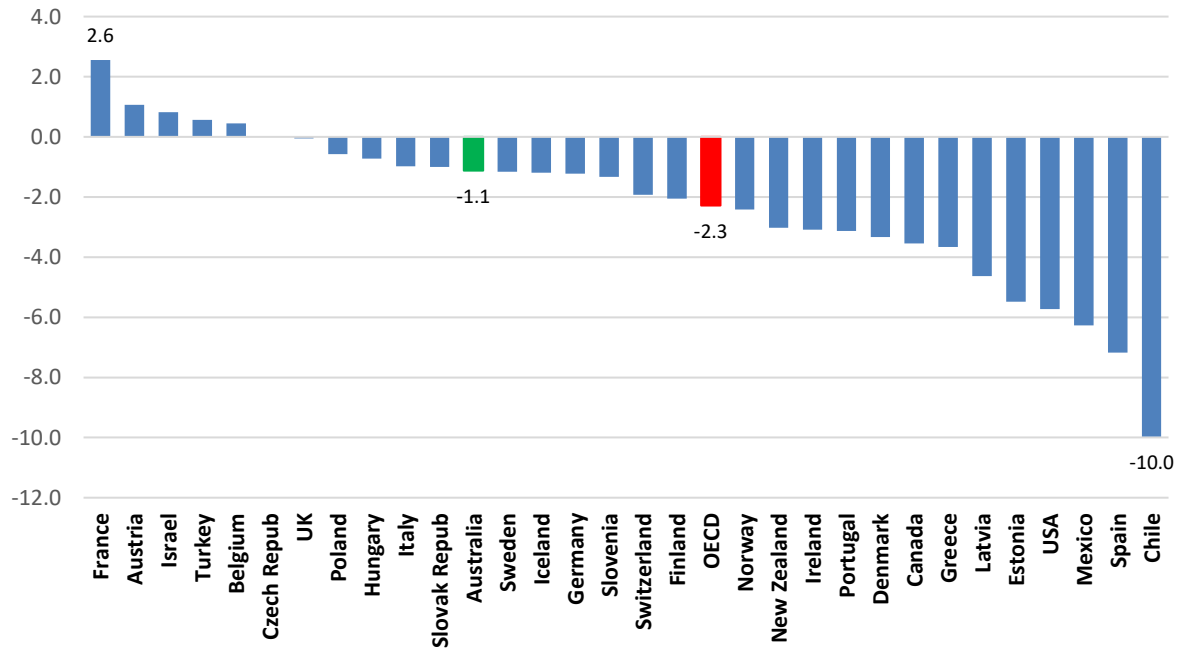
Source: OECD 2016a, Table II.6.29

**Chart 9: Difference in Student-Teacher Ratios Between Town & City Schools, OECD, PISA 2015**

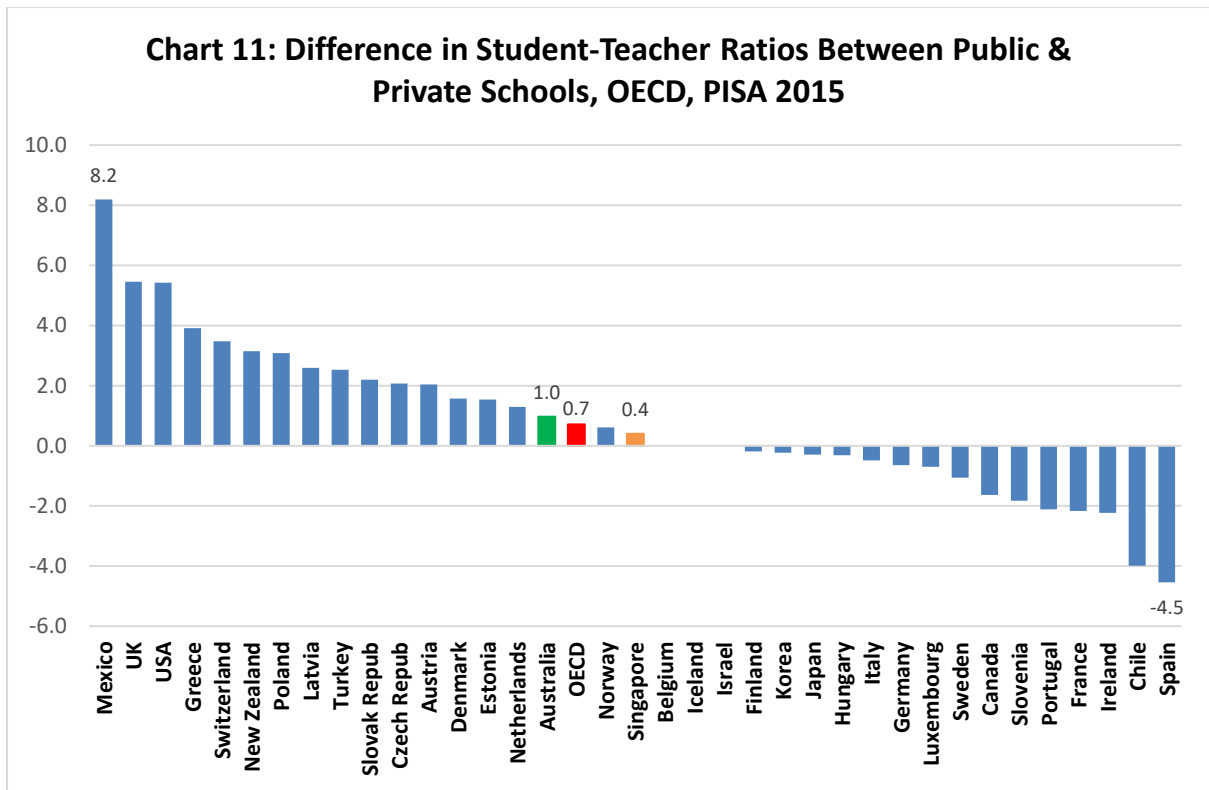


Source: OECD 2016a, Table II.6.29.

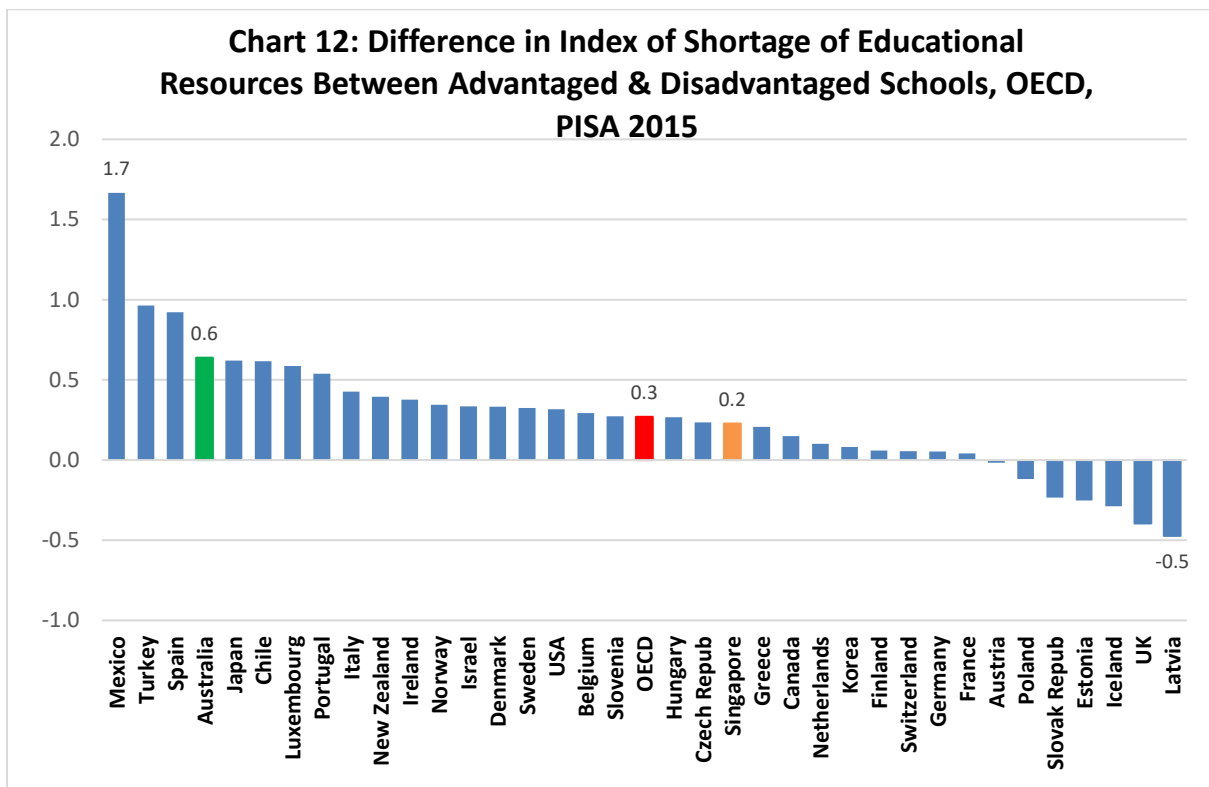
**Chart 10: Difference in Student-Teacher Ratios Between Rural & City Schools, OECD, PISA 2015**



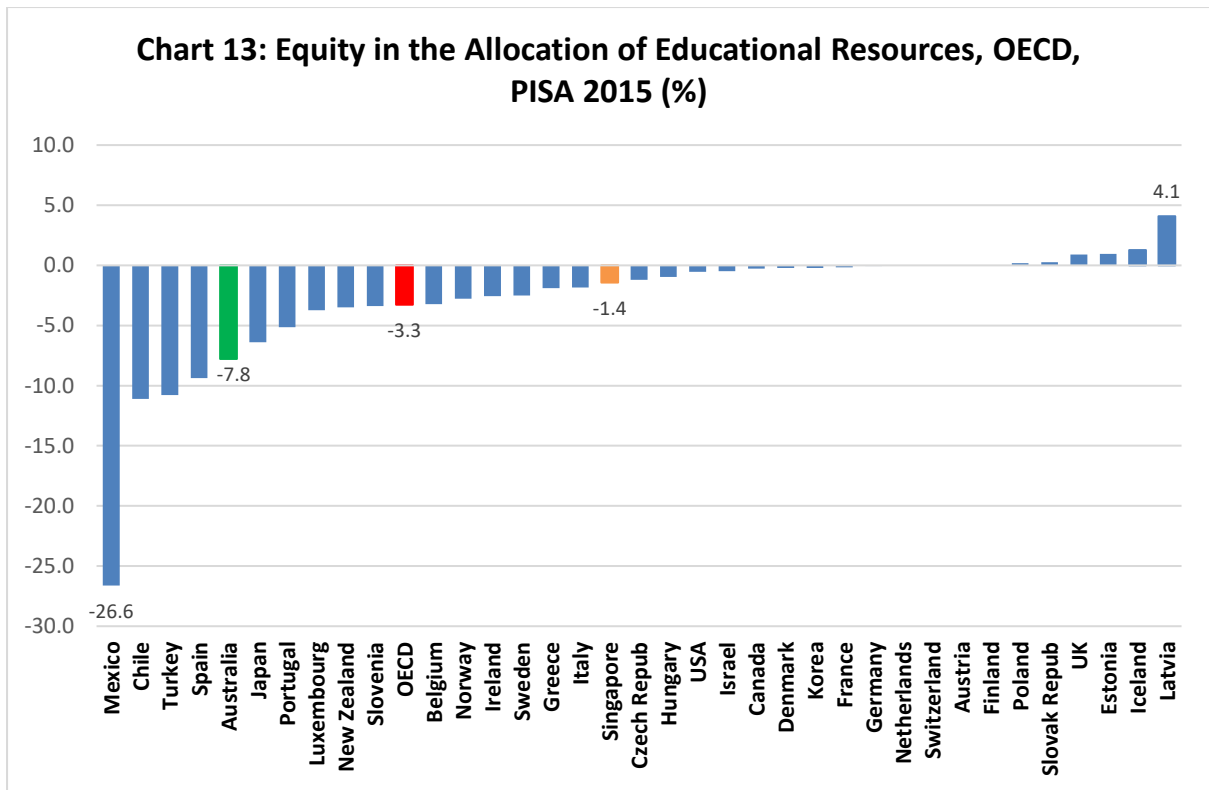
Source: OECD 2016a, Table II.6.29.



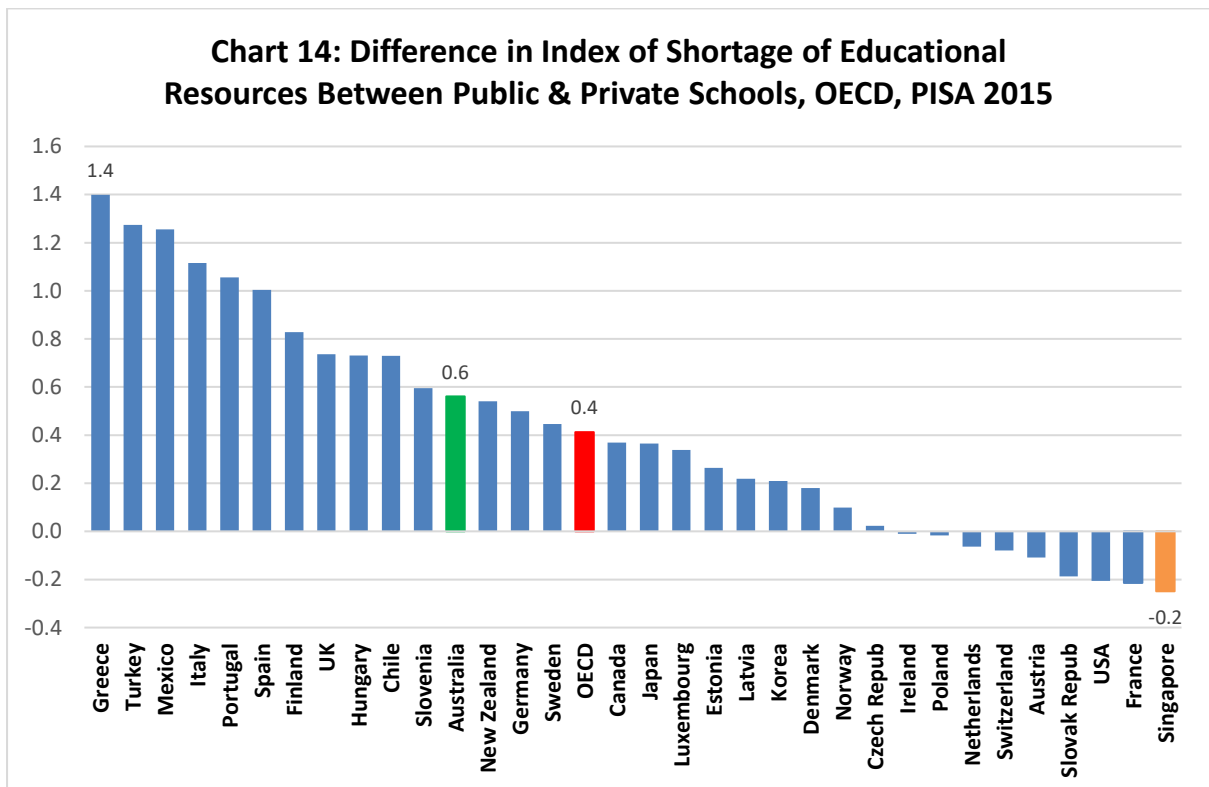
Source: OECD 2016a, Table II.6.29.



Source: OECD 2016a, Table II.6.2.

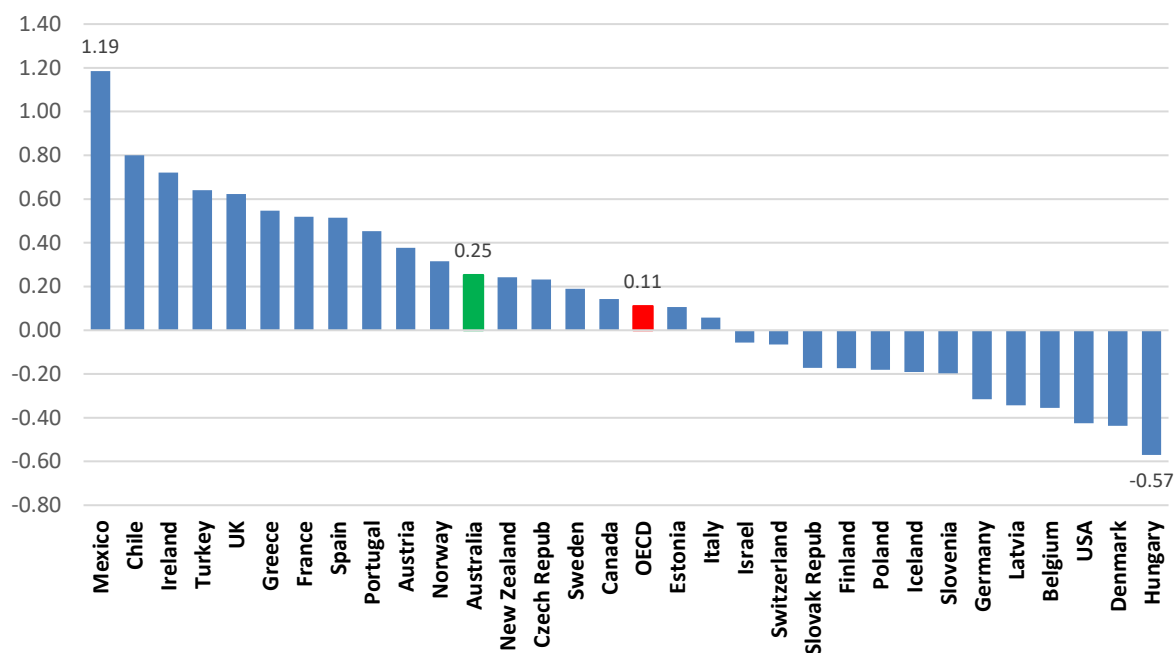


Source: OECD 2016a, Table II.6.3.



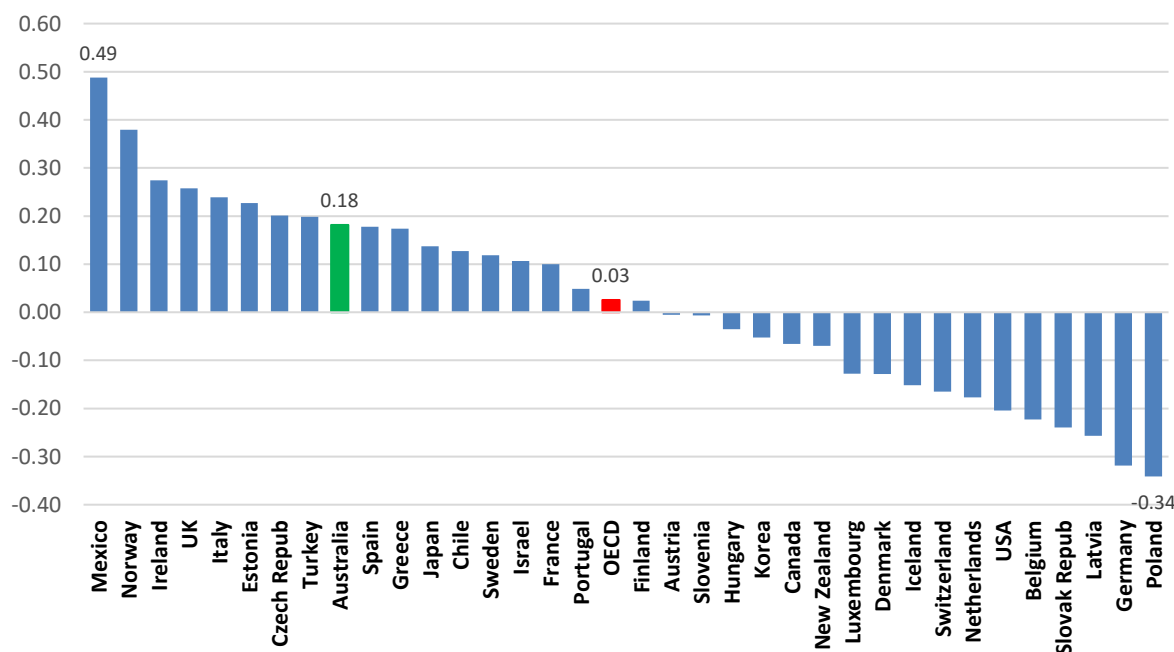
Source: OECD 2016a, Table II.6.2.

**Chart 15: Difference in Index of Shortage of Educational Resources Between Rural & City Schools, OECD, PISA 2015**



Source: OECD 2016a, Table II.6.2.

**Chart 16: Difference in Index of Shortage of Educational Resources Between Town & City Schools, OECD, PISA 2015**



Source: OECD 2016a, Table II.6.2.

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