Education Choices and Labour Supply During the Mining Boom

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Abstract

The mining boom led to large increases in wages for many lower-skilled jobs in mining regions. This raised the opportunity cost of remaining in school, TAFE or university for many students, particularly those in mining areas. I show that this led fewer people in those areas to pursue tertiary study. These educational responses were an important source of labour market adjustment during the boom. It accommodated most of the strong rise in the labour force participation rate of 15–24 year olds in the resource-rich states, and 5–10 per cent of the total additional labour supply needed in those states.

Introduction

The world price of Australia's mining exports more than tripled over the 10 years to 2012, while investment spending by the mining sector increased from 2 per cent of GDP to 9 per cent. This 'mining boom' led to a substantial increase in the demand for labour in the resource-rich states of Western Australia and Queensland. This resulted in strong wages growth and very low rates of unemployment in these states relative to the rest of the country (Graph 1). This was true both for highly skilled labour, such as engineers, and for less skilled labour, such as machinery operators and labourers.

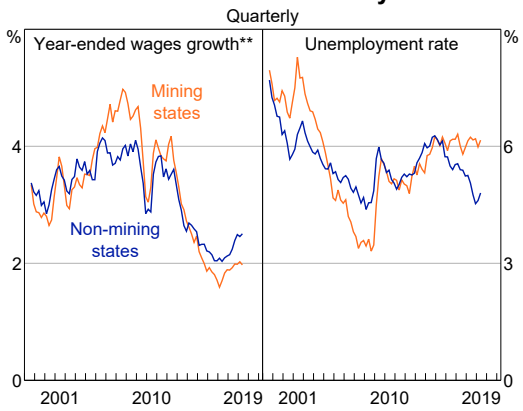
The high wages paid for low-skilled jobs increased the opportunity cost of remaining in school, TAFE or university for many students. This was particularly true in the resource-rich states, given the geographically concentrated nature of the mining boom.[1] The higher opportunity cost of studying led some students to undertake less education than they would have had the boom not occurred. In particular, many younger people responded to the boom by abandoning or deferring their plans to attend TAFE or university, choosing instead to pursue the high-paying employment on offer.

These education responses shed light on an important source of labour market adjustment to economic shocks. Previous work suggests that when economic conditions improve, more people enter the labour force, and particularly younger people (Benati 2001; Evans, Moore and Rees 2018). The mining boom episode highlights that decisions about whether to remain in study or not play a key part in this.[2] Indeed, changes in the study plans of younger people accommodated most of the strong rise in the labour force participation rate of 15–24 year olds in the resource-rich states and, on some simple estimates, 5–10 per cent of the total additional labour supply needed in those states. The importance of this adjustment mechanism has often been under-appreciated in previous analysis and discussion of the Australian mining boom. However, similar findings have been made for other countries (see, for example, Black, McKinnish and Sanders 2005; Emery, Ferrer and Green 2012; Cascio and Narayan 2015).

To the extent that the boom permanently altered the education decisions of younger people, the reduction in human capital accumulation during this period could also have longer-run consequences for the productive capacity of the economy. This is another potential negative side effect of the mining boom aside from 'Dutch Disease', where a higher exchange rate leaves the manufacturing sector uncompetitive and industrial capacity is hollowed out (Gregory 1976; Corden and Neary 1982).[3] However, some of those whose study decisions were influenced by the mining boom may still pursue further study later in their lives.

Graph 1

Labour Market Outcomes by State*



* 'Mining states' are Western Australia and Queensland; 'Non-mining states' are all other states and territories
** Wage Price Index excluding bonuses and commissions
Sources: ABS; RBA

Approach

The goal of this article is to estimate the counterfactual; that is, what would education attendance rates have done in the absence of the mining boom? My approach is to examine the change in education attendance in the 'mining states' during the boom relative to their pre-boom levels. I compare these changes to those of a control group – a set of regions whose students' decisions were not affected (or less affected) by the mining boom. While it is impossible to find a perfect control group, the 'non-mining states' are likely to provide a reasonable control. I define the mining states to be the resource-rich states of Western Australia and Queensland and the non-mining states to be the other states and territories of Australia. If the boom also had an influence on students' education decisions in the non-mining states, this approach would lead me to underestimate the effect of the boom on education decisions.

Until recently, the Labour Force Survey (LFS) collected data only on education attendance for *15–24 year olds studying full time*. It did not collect similar data for older age groups or for students in part-time study. As such, I begin by examining the full-time study decisions of 15–24 year olds. This group accounts for 80 per cent of all working-age people in full-time study. In a later section I examine the study decisions of older age groups and part-time students using some alternative data sources.

The Boom Had a Large Impact on Full-time Study

In the decades leading up to the mining boom, the share of young people in full-time study followed remarkably similar trends in mining and non-mining states; both tended to rise over time in line with the expansion of the higher education system (Graph 2). However, after the onset of the boom in the early 2000s, the full-time study rate continued to rise in the non-mining states but stopped rising

in the mining states. The gap between the mining and non-mining states' full-time study rates widened by 6 percentage points between 2001 and 2012. This divergence is statistically significant and large; taken at face value, it suggests that 6 per cent of all 15–24 year olds in the mining states did not pursue full-time study (or postponed their study) as a result of the boom. However, part of this gap – around 1¾ percentage points – reflects the high rates of migration into mining states from overseas and interstate (see Appendix A for details).

This response of full-time education mainly reflected lower participation in tertiary study (e.g. TAFE and university), rather than a change in the high school dropout rate (Graph 3). We can get further insight into this effect on tertiary study using data from the Census, which provides more detailed (but less frequent) data than the LFS on the types of education institutions students attend. A comparison of the 2001 and 2011 Census data suggests that the response of full-time tertiary study to the boom was driven by a decline in university attendance, rather than TAFE. That is, fewer people enrolled in full-time university than would have been the case had the boom not occurred.[4] The number of younger people studying at TAFE also declined due to the boom, but this had a smaller effect on the aggregate share in tertiary study (right-hand panel of Graph 3) given that TAFE students account for less than 20 per cent of all students in full-time tertiary study.[5]

The effects of the mining boom on full-time study rates were similar for males and females (Graph 4). This is surprising given that mining and its associated activities (e.g. engineering and construction) tend to be male dominated. The surge in labour demand during the boom may have meant that firms hired more females than usual; indeed, the share of females in mining employment rose from 12 per cent in the early 2000s to more than 16 per cent in 2012. The response in the full-time study rate of females may also reflect that it was not only mining-related wages that increased, as other firms in resource-rich areas also had to pay higher wages to compete with mining for labour. The minimum wage in Western Australia was also increased at a faster rate than other states during the mining boom, in part reflecting strong economic conditions.

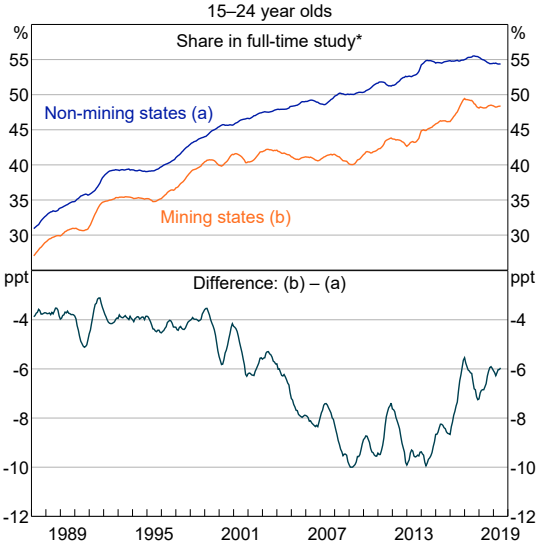
Some Students Downgraded to Part-time Study

Until recently, the regular LFS did not provide data on part-time study attendance. However, we can gain some insights on part-time study from the ABS Survey of Education and Work, which is included as a supplement to the LFS every May. These data suggest that part-time study rates declined in both mining and non-mining states during the boom, though the falls were relatively larger in the latter

Graph 2

Full-time Study and the Mining Boom

15–24 year olds



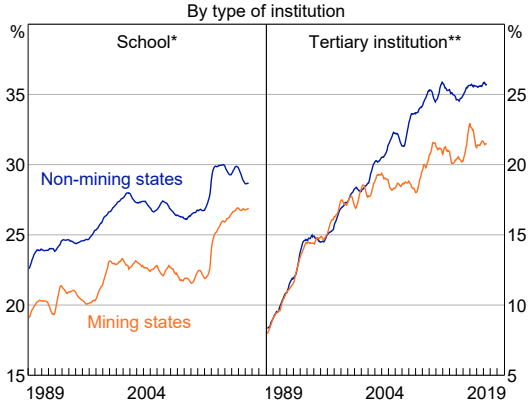
* Attending school or tertiary institution; smoothed using 12-month-trailing average

Sources: ABS; RBA

Graph 3

Share of 15–24 Year Olds in Full-time Study

By type of institution



* 15–19 year olds only

** Includes TAFE, university or other higher educational institution

Sources: ABS; RBA

(Graph 5). Since we are using the non-mining states as a control group (i.e. a guide to what would have occurred in mining states in the absence of the boom), this suggests that the boom contributed to a *rise* in the share of young people undertaking part-time study in the mining states. This was largely driven by a rise in the likelihood of undertaking part-time study at TAFE, although part-time university attendance also rose. One interpretation of this finding is that some of the students that abandoned (or deferred) full-time study went into part-time study instead. For example, in response to high wages for low-skilled jobs, some full-time students may have dropped their study load to part time and increased their hours of work. Nonetheless, the rise in part-time study did not completely offset the decline in full-time study, at least at university. The effect of the mining boom on the share of young people in study was both statistically and economically significant.

There Was Also an Effect on Older Students

The Survey of Education and Work also lets us examine the education choices of persons over the age of 25 years. I find that the boom lowered the education attendance rate of 25–34 year olds in mining states, relative to non-mining states (Graph 6). The peak impact on attendance rates for this age group occurs in 2012, and is quite large (around 2 percentage points) considering that only around 15 per cent of people in this age group are usually engaged in study. DEEWR (2008) has also linked the decline in university applications from mature age students in Western Australia during the mining boom to strong labour market conditions. I find no discernible effect on 35–64 year olds, which is unsurprising given that only 6 per cent of people in this age range are usually engaged in any kind of study.

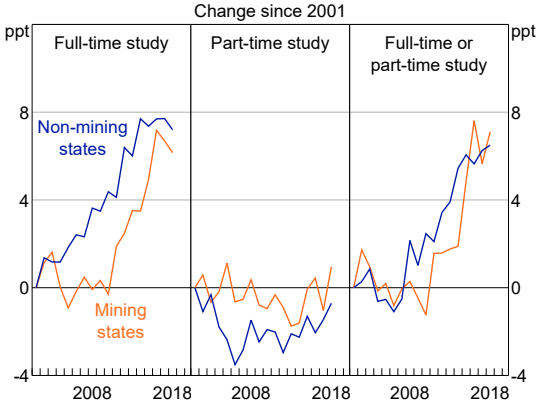
What Role Did Education Attendance Play in Labour Market Adjustment?

Interstate and overseas migration clearly played a key role in the labour markets' adjustment to the mining boom. But previous Bank analysis also highlights the important role played by the increase in labour supply from *within* the mining states, through a combination of higher participation rates and lower unemployment rates. These within-state factors accounted for more than a third of the

Graph 5

Share of 15–24 Year Olds in Study

Change since 2001

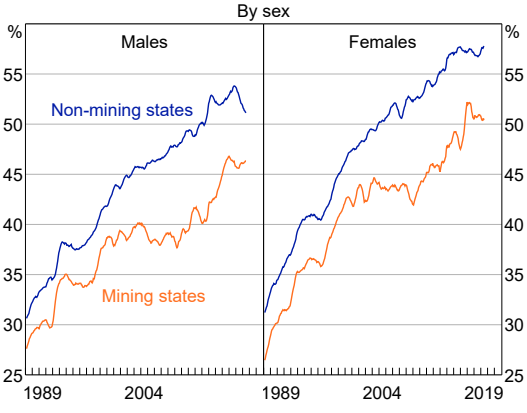


Sources: ABS Survey of Education and Work; RBA

Graph 4

Share of 15–24 Year Olds in Full-time Study

By sex

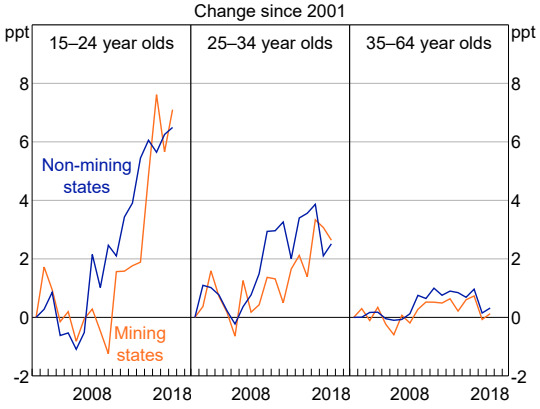


Sources: ABS; RBA

Graph 6

Share of Population in Full-time or Part-time Study

Change since 2001



Sources: ABS Survey of Education and Work; RBA

overall increase in labour supply in the mining states (Graph 7, reproduced from D'Arcy *et al* (2012)). The cyclical adjustment of the participation rate accounted for around 40 per cent of the total within-state adjustment, in line with standard rules of thumb (Evans, Moore and Rees 2018).

What is less well understood is that the vast majority of the participation rate adjustment within the mining states came from a surge in participation amongst 15–24 year olds (Graph 8). This was made possible by fewer young people undertaking full-time study. Indeed, the response of full-time study attendance accounted for more than half of the overall increase in labour force participation of younger people in mining states relative to non-mining states during the mining boom.[6] A further rough calculation suggests that this response of full-time study to the mining boom helped meet around 5–10 per cent of the overall increase in labour demand in mining states. The positive participation rate response of 25–34 year olds can also largely be accounted for by the decline in study rates.

Longer-run Consequences

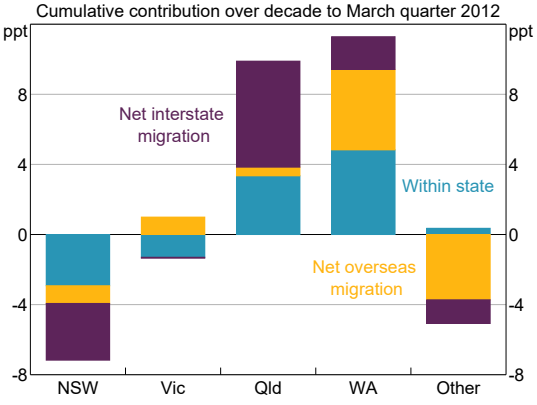
In theory, even a temporary mining boom could have a permanent effect on long-run growth. During the mining boom some commentators were concerned that the economy would suffer from 'Dutch Disease'. The RBA has previously argued that the Dutch Disease effects of this episode appear to have been small (Downes, Hanslow and Tulip 2014; Ellis 2017). Education choices are another mechanism through which mining booms could have permanent effects. This ultimately depends on whether the impact on study rates was large enough to put a dent in the economy's stock of human capital, which, in turn, depends on the number of people whose decisions were affected, and whether they abandoned study or simply deferred it.[7]

Although it is difficult to be precise, a rough estimate suggests that the number of individuals with a Bachelor's degree in Australia would currently be around ½ per cent higher had the boom not occurred. On the other hand, the effect of the mining boom on the number of individuals with a TAFE qualification was trivial. It is worth noting that those students who made the decision to defer or abandon their studies as a result of the mining boom may be those who would have benefited the least from university anyway. If so, the private and social returns to those 'marginal' students obtaining a degree would be lower than those students who did not leave their studies as a result of the mining boom. Relatedly, people who worked rather than studied may not have attained a formal post-school education, but still benefited from on-the-job training while working. At a minimum, those choosing work and earning income through that period would have been likely to start the post-mining boom period in a stronger financial position than those studying throughout the period and incurring study expenses.

Graph 7

Sources of Relative Employment Growth*

Cumulative contribution over decade to March quarter 2012



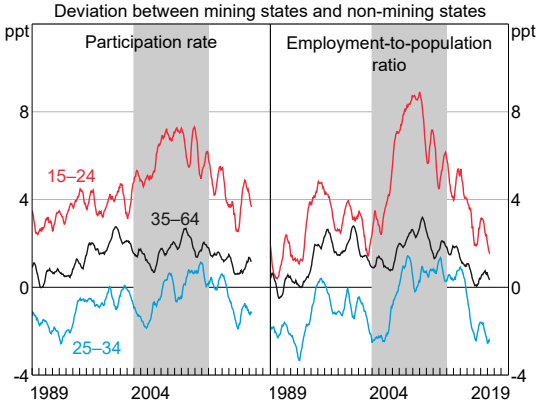
* Excludes a small residual

Sources: ABS; RBA

Graph 8

Participation and Employment by Age*

Deviation between mining states and non-mining states



* Mining boom period shaded, 2002 to 2012

Sources: ABS; RBA

Table A1: Share of 15–24 Year Olds in Full-time Study[(a)]

By migration status, 2011

Change in location since five years ago	Mining state %	Non-mining state %
Same location	45	52
Moved from interstate[(b)]	36	39
Moved from overseas	56	66

(a) Data are a 1 per cent sample of individuals from the 2011 Census; individuals' location five years ago is based on recollection; excludes overseas visitors intending to stay for less than one year.

(b) Interstate moves only include movements between mining and non-mining states and vice versa

Sources: ABS; RBA

Conclusion

The high wages paid to low-skilled labour during the mining boom led to a decline in full-time study rates in the resource-rich states relative to the other states and territories. This played a key role in the adjustment of the labour market to the boom, as it allowed for a sharp rise in labour force participation of young people in the booming areas.

Appendix A: Overseas and Interstate Migration

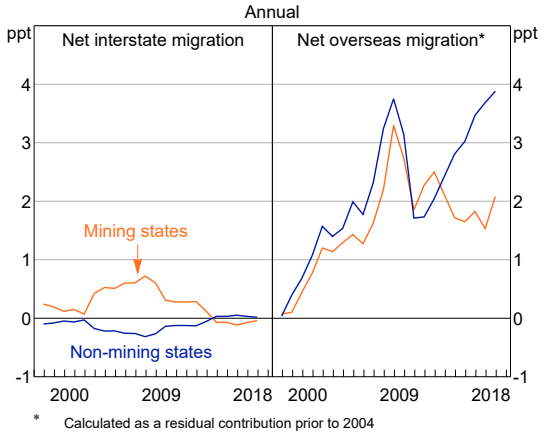
During the mining boom, the populations of younger people in the mining states were boosted by migration from other states and overseas (Graph A1). Some of these people were relocating in search of job opportunities rather than to study. As such, we may be concerned that the apparent decline in the education attendance rates in the mining states relative to non-mining states reflects migration, rather than an impact of the boom on education decisions per se.

Considering the impact of interstate migration first, Table A1 confirms that younger people who migrated from a non-mining state to a mining state during the boom did indeed have a lower propensity to study full time than those who did not migrate. All else being equal, this means that interstate migration reduced the full-time study share in the mining states relative to the non-mining states via a composition effect. Overall however, these migration flows only explain part of the decrease in full-time study rates in the mining states during the boom. Over the decade to 2012, net interstate migration boosted the population of 15–24 year olds in the mining states by less than 20,000 people (less than 2 per cent of the total number of 15–24 year olds living in those states in 2012). Given the difference in study rates of interstate migrants relative to existing residents in the mining states (Table A1), these flows can account for less than ¼ percentage point of the overall decline in the share of 15–24 year olds in full-time study in the mining states.[8],[9]

Net overseas migration made a strong contribution to growth in the number of 15–24 year olds in both the mining and non-mining states during the mining boom (Graph A1). Higher immigration in this age group reflected strong growth in foreign student numbers (particularly from China and India) and increasing use of foreign labour to meet skills shortages. To some extent, the composition of these migrants differed depending on where they settled; a larger share of younger migrants who settled in the non-mining states studied full time compared to those who settled in the mining states

Graph A1

Contribution to Growth in 15–24 Year Olds



* Calculated as a residual contribution prior to 2004

Sources: ABS; RBA

(Table A1). Notwithstanding this, more than half of all younger people who migrated to mining states from overseas did so to study, rather than to work. A simple calculation suggests that differences in the amount and type of migration between mining and non-mining states can explain around 1½ percentage points of the overall increase in full-time study rates of younger people in mining states vis-à-vis the non-mining states.[10],[11]

Taken together, interstate and overseas migration contributed less than 1¾ percentage points of the roughly 6 percentage point decrease in the share of young people in full-time study in mining states relative to non-mining states during the boom. This gives us confidence that the results in this article are not being driven by migration and that the mining boom had a genuine effect on the educational decisions of young people who grew up in mining states.

Footnotes

[*] The author is from Economic Research Department

[1] Almost all iron ore mining in Australia occurs in Western Australia (mostly in the Pilbara region in the north-west of the state). Two-thirds of coal mining is in Queensland. In the case of natural gas, the bulk of production is from Western Australia and Queensland.

[2] Other studies for Australia have found evidence of a negative correlation between demand for university places and job opportunities during downturns. For example, DEEWR (2011) found that the share of individuals applying to university rose sharply during the early 1990s recession, although in part this reflected structural changes to the university education system.

[3] Any longer-run impact on the economy's productive capacity would of course depend on the role of higher education in driving productivity growth. It is generally accepted that university study confers a private benefit to individuals in terms of higher wages. However, the social returns may be higher than the private returns if there are positive spillovers of an education on other workers, or lower if a university education is merely a signal of underlying ability.

[4] Prior to 2010 the number of university places funded by the Australian Government was capped; each university received an allocation of funding, determined largely according to history. If these funding allocations had not kept pace with population growth in the mining states, any resulting shortage in university places could have contributed to the decline in their education attendance rates relative to the other states. However, there is no evidence that 'unmet demand' for university places (i.e. the share of applicants who were not offered a place at university) rose in the mining states relative to the non-mining states during the boom (see DEEWR (2011), section 6). Moreover, when the funding caps were removed after 2010, there was little evidence of a rise in enrolments in the mining states relative to the rest of Australia, suggesting little pent-up demand.

[5] The Census data suggest that the response of university attendance rates accounts for around three-quarters of the overall effect of the boom on full-time tertiary study, while attendance at TAFE and other institutions accounts for the remainder.

[6] Many of the people who would have undertaken full-time study had the boom not occurred would have participated in the labour force anyway. For example, they may have otherwise decided to study full time and work part time, or vice versa. I assume that half of all students who did not pursue full-time study as a result of the boom would have participated in the labour force regardless. This is based on the labour force participation rate of 15–24 year olds that studied full time in 2011. I also adjust for compositional effects stemming from higher rates of migration into mining states from overseas and interstate (see Appendix A). These compositional effects can account for less than half of the increase in participation rates of 15–24 year olds in mining states relative to non-mining states during the mining boom, although it is difficult to be precise.

[7] In their study of the 1973–81 oil boom in Alberta, Emery *et al* (2012), find that many of those students who dropped out of school during the boom re-enrolled later in their lives.

[8] This calculation assumes that younger people who migrated out of the non-mining states had a similar propensity to study to those who remained in those states. If the likelihood of studying was lower amongst those who migrated, this compositional effect would have increased the share of younger people in full-time study in the non-mining states. However, this assumption makes little difference to our overall conclusions about the effect of the mining boom on education decisions.

[9] In the Census, a person's 'usual residence' is the dwelling they live in most of the time. As such, some 'fly-in-fly-out' (FIFO) workers are included in the usual resident population of their FIFO community, while others are included in the population of their home town. In the LFS, a usual residence is the dwelling the person perceives to be their 'home', irrespective of how much time they spend there. To the extent that FIFO workers are more likely to be classified as a resident of their FIFO community in the

Census than in the LFS means that, if anything, our calculations overstate the contribution of net interstate migration on study rates during the boom.

[10] Overseas migrants (including foreign students) are in scope of the LFS provided they have been (or expect to be) residing in Australia for 12 months or more in a 16-month period.

[11] Net overseas migration of 15–24 year olds in the decade to 2012 contributed 10.9 per cent and 11.5 per cent of the 2012 populations of 15–24 year olds in the mining and non-mining states, respectively. This accounts for the fact that many of those who migrated as 15–24 year olds in the mid to late 2000s had moved into a higher age bracket by 2012. Combined with the data in Table A1, this suggests overseas migration made a mechanical contribution of 1.5 percentage points to the overall 6 percentage point increase in the share of young people in full-time study in mining states relative to non-mining states during the boom.

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