
18. Understanding shadow education from the perspective of economics of education

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1 INTRODUCTION

Recent decades have brought dramatic global expansion of private tutoring as a supplement to schooling. This tutoring is widely called shadow education on the grounds that much of it mimics the content of regular schooling (Aurini et al., 2013; Bray, 2009; Dang and Rogers, 2008). It is not a new phenomenon in the sense that supplementary tutoring may have existed for as long as formal schooling has existed. However, in previous decades and centuries it was mostly confined to high-income families in prosperous countries. Contemporary forms of shadow education have penetrated all socio-economic groups and may be found in poor, middle-income and rich countries.

One common definition of private supplementary tutoring (see for example, Bray, 1999; Tan, 2009) has three components: privateness, that is, tutoring provided in exchange for a fee; supplementation, that is, tutoring in subjects taught in regular schooling but beyond the standard duties of the schools; and academic, that is, tutoring in examinable subjects taught by schools. This definition is employed in the present chapter.

2 DEMAND FOR PRIVATE TUTORING

Table 18.1 presents statistics on the scale of private tutoring in different parts of the world. The data were collected through different procedures, and as such may not easily bear direct comparison. Moreover, some statistics are more robust than others; but they show that shadow education has become a significant phenomenon in a wide range of countries.

In general, parents pay for tutoring because they consider it a good investment. They may not be informed about empirical evidence on human capital and screening (Becker, 1964; Groot and Hartog, 1995; Mincer, 1974), but they reach conclusions about the value of education through casual observation and everyday experiences. They commonly desire their children to stay in education systems as long as possible. Economic development and competition has enhanced parental awareness about educational investments, and has raised parents' aspirations for their children's education. Families demand more and better education, and may consider schooling by itself to be inadequate to meet their needs.

Cultural influences are also evident. For example, Confucian values of diligence and belief in merit are commonly mentioned in East Asia (Kim and Lee, 2010; Kwok, 2010; Zhang, 2014). Success in education is considered vital for success in social status,

Table 18.1 Cross-national indicators of shadow education

Location	Patterns
Argentina	Cámara and Gertel (2016, p.140) surveyed 360 students who had gained admission to the National University of Córdoba. The researchers chose different programmes to identify variations in the demand for tutoring to gain entrance. Rates were 17.5 per cent, 30.9 per cent, 39.2 per cent and 92.4 per cent respectively of admitted candidates in Law, Dentistry, Economics and Medicine.
Austria	AK-Wien (2010, p.6) reported on a telephone survey of 4,406 children from 2,760 households. It indicated that 20 per cent of parents paid for tutoring for their children.
Azerbaijan	Silova and Kazimzade (2006, p.119) surveyed 913 first year university students and found that 91.8 per cent had received private tutoring during the last year of secondary schooling.
Bangladesh	Household surveys showed that in 2008, 37.9 per cent of primary students and 68.4 per cent of secondary students received private tutoring (Nath, 2011).
Cambodia	A 2013/14 survey of 1,274 students in Siem Reap Province found that 74.7 per cent of Grade 9 students and 89.8 per cent of Grade 12 students received private tutoring (Bray et al., 2016, p.294).
Canada	Aurini and Davies (2013, p.157) reported that 33 per cent of parents had purchased supplementary education and that 21 per cent of nine-year-old children had received some kind of private tutoring. Eckler (2015) described tutoring as the 'new normal'.
China	The 2010 China Family Panel Studies (CFPS) baseline survey indicated that 22.5 per cent of primary students were receiving private tutoring, and the proportions among junior secondary and senior secondary students were 25.3 per cent and 26.9 per cent respectively (Liu and Bray, 2017, p.212).
Cyprus	Data analysed by Lamprianou and Lamprianou (2013, p.40) indicated that 80.5 per cent of households with school-aged children were paying for private tutoring.
England & Wales	A 2015 survey of 11–16 year olds asked whether they had ever received private or home tutoring. In London, 42 per cent of respondents replied affirmatively, and 25 per cent in the rest of the country did so. Nationally, the proportion of pupils receiving private or home tutoring rose from 18 per cent in 2005 to 25 per cent in 2015 (Kirby, 2016, p.16).
France	Melot (2007) estimated the participation rates in private tutoring among lower secondary and upper secondary students were 25 per cent and 33 per cent respectively. In large Parisian lycées the proportions were perhaps as much as 75 per cent.
Georgia	The Trends in International Mathematics and Science Survey (TIMSS) indicated that 33.4 per cent of Grade 4 students and 38.6 per cent of Grade 8 students received private tutoring (Kobakhidze, 2015, p.33).
Germany	A 2013 nationally representative survey of 4,500 households found that 6 per cent of primary and 18 per cent of secondary students were receiving private tutoring (Hille et al., 2016, p.63). Among 17-year-olds, 47 per cent had received tutoring at least once during their academic careers.
Hong Kong, China	A survey in 16 secondary schools (3 per cent of the total) found that 53.8 per cent of Grade 9 students and 71.8 per cent of Grade 12 students received private tutoring (Bray et al., 2014, p.29).

Table 18.1 (continued)

Location	Patterns
India	A nationwide rural survey reported that 24.1 per cent of students aged 6–14 received private tutoring in 2013 (ASER Centre, 2014, p.73).
Ireland	Data on 1,496 upper secondary graduates in a 2004 School Leavers' Survey indicated that 45 per cent had received paid private tutoring during their last year of schooling (Smyth, 2009, p.9).
Japan	A 2007 survey found that 15.9 per cent of Grade 1 and 65.2 per cent of Grade 9 students were attending <i>juku</i> tutorial centres (Japan, 2008, p.13).
Kazakhstan	Kalikova and Rakhimzhanova (2009) surveyed 1,004 university students, and found that 59.9 per cent had received private tutoring in the last year of secondary schooling.
Malaysia	A 2004/5 Malaysian Household Expenditure Survey indicated that 20.1 per cent of families employed private tutoring for their children (Kenayathulla, 2013, p.632).
Nepal	Jayachandran (2014, p.196) examined data of 16,400 students from 450 schools in 28 districts and reported that in 2004, 43 per cent of government school students and 34 per cent of private school counterparts received private tutoring.
Pakistan	A 2014 household survey reported that 12.2 per cent of rural children and 34.8 per cent of urban children received private tutoring (ASER-Pakistan, 2015, pp.75, 85).
Sri Lanka	The 2006/7 household survey reported that 64.0 per cent of families invested in private tutoring for children aged 6 to 21 (Pallegedara, 2012, p.380).
Slovakia	Kubánová (2006, p.285) reported that roughly 56.0 per cent of students received private tutoring in the last year of secondary schooling based on the data from 926 first year university students.
South Korea	Official statistics showed that 80.7 per cent of primary school pupils were receiving private tutoring in 2015. The proportions in middle school and general high school were 69.4 per cent and 56.8 per cent respectively (KOSIS, 2016).
Tajikistan	Kodirov and Amonov (2009) reported that 64.8 per cent of students received private tutoring in the last year of secondary schooling based on the data from 999 first year university students.
Vietnam	The 2006 Vietnam Household Living Standards Survey reported that 32.0 per cent of primary students were receiving tutoring. The respective proportions among junior and senior secondary students were 46.0 per cent and 62.9 per cent (Dang, 2013, p.30).

employment and standard of living. Parents attach great importance to the education of their children, holding high aspirations and pushing children hard in their learning.

The education sector itself may shape demand for shadow education. Competition in education systems, especially at transition points at the end of primary and secondary schooling, may be a major factor. In education systems that do not provide universal lower or upper secondary schooling, students have to compete to retain places; and in systems that do have universal schooling, systems are stratified by the quality of institutions for which students must compete. Competition even exists in such countries as Japan where higher education is available for virtually all secondary graduates. With expansion

of higher education, the question for families changes from whether a university place can be secured to which programme in which institution can be entered. In order to gain access to better universities, students need excellent examination scores from secondary education; and in turn they have to compete for places in good secondary schools through examinations in primary school. Indeed in some societies, shadow education to support examination success begins for children in kindergarten.

Current academic achievement is an important factor for parents to consider when making decisions about whether or not to seek private tutoring. Low-performing students may take tutoring for remedial purposes, and high-performing ones may take it for enrichment. Thus in the marketplace private tutoring is received by students across the achievement spectrum. For example, Xue (2015, p.54) reported on achievements levels of Grades 1–9 children in China who were receiving mathematics private tutoring. According to this national survey, 33.1 per cent of the students were perceived by parents to have excellent performance, 26.9 per cent as good, 17.7 per cent as fair and 16.5 per cent as poor (p.54). Through a logistic regression, the researcher found a positive influence of perceived academic achievement on the demand for tutoring (p.56). However, other studies have found different relationships. For example, Bray et al. (2014, p.34) found that among Grade 9 and Grade 12 students in Hong Kong self-reported lower achievers were more likely to receive private tutoring than higher achievers.

3 SUPPLY OF PRIVATE TUTORING

3.1 Types of Private Tutoring

Like other products and services, private tutoring may be offered in diverse forms. In scale, at one end of the spectrum is one-to-one tutoring in which a single tutor teaches a single student. One-to-one tutoring permits tailoring of the curriculum to students' needs and greater interaction between tutors and students. It is typically the most expensive type of tutoring.

At the other end of the scale is lecture-type tutoring delivered in large classes perhaps with overflow rooms served by video screens, as exemplified by the operations of 'star tutors' in Hong Kong (Koh, 2014). This type of tutoring is mainly offered by companies, and usually helps students to prepare for examinations by providing revision notes and mock examinations (Zhan et al., 2013). Since all the students in large classes share the cost, for individuals it is usually much cheaper than one-to-one tutoring.

In between is tutoring in small groups or medium-sized classes. In China, for example, small-group tutoring is often delivered to two to five students, and medium-sized classes usually have six to 25 students (Zhang and Liu, 2016). These classes usually cost more than lecture-type tutoring but less than one-to-one tutoring.

In addition, technological advance makes possible Internet tutoring such as that offered by the US company InteractiveMathTutor.com. One major attraction is the low cost. In South Korea, the cost of Internet tutoring is about one fifth of the cost of tutoring in person (Ventura and Jang, 2010, p.65). Other advantages for consumers include the convenience of receiving tutoring through the Internet without travel time. For the suppliers, Internet tutoring can cross national borders – allowing, for example, a child in the USA

to be coached by a tutor in India. This arrangement provides a greater pool of qualified tutors, and allows the companies to utilise personnel in certain countries at relatively low salaries.

3.2 Providers of Private Tutoring

Much informal provision of tutoring is delivered by mainstream schoolteachers, university students, secondary students or other self-employed persons working full- or part-time. More formally, tutoring may be delivered through registered companies, some of which operate internationally in a franchise mode. The types of tutors may have different implications for pedagogy, costs, and the ways that tutors attract clients.

Mainstream teachers

Mainstream teachers may be well qualified for tutoring since they generally have professional qualifications and familiarity with syllabuses, textbooks and assessment requirements. However, in some jurisdictions teachers are prohibited from providing private supplementary tutoring because of the potential for conflict of interest (Bray and Kwo, 2014, p.44). Education authorities perceive that teachers might put more effort into supplementary tutoring than into their regular duties, and that if permitted to tutor their existing students they might deliberately restrict efforts during regular lessons in order to promote demand for private lessons. However, provision of paid supplementary lessons by teachers is common in some countries. In Cambodia, for example, many teachers provide private tutoring for their own students on school premises, sometimes even in the same classrooms, after the close of the official school day (Bray et al., 2016). Usually this pattern is closely related to teachers' low salaries. This has been observed not only in Cambodia (Dawson, 2010, p.20) but also for example in Egypt (Ille, 2015, p.1), Kazakhstan (Kalikova and Rakhimzhanova, 2009, p.112), Lao (Benveniste et al., 2007, p.52), and Tajikistan (Kodirov and Amonov, 2009, p.159). Governments permit the arrangements, overtly or tacitly, in order to retain teachers in the profession. The low salaries also make parents more sympathetic to the practice than they might otherwise be.

Students and other self-employed persons

In some settings, university students and even secondary students who want to earn extra pocket money may provide private tutoring. Self-employed persons working full- or part-time may also provide tutoring. For example, in Eastern Europe much tutoring for upper secondary students is provided by university lecturers and professors (Jokić, 2013).

Tutoring companies

Increasing volumes of private tutoring are provided by companies on an international, national or local basis. Kumon, for example, is headquartered in Japan but operates by franchise in 49 countries and serves 4.26 million students (Kumon, 2016). TAL Education Group, which began its business of mathematics tutoring in Beijing in 2003, has become a leading company in China. It operates tutorial centres in 19 cities, providing tutoring in all academic subjects for students from pre-primary to senior secondary levels (TAL, 2016). By contrast, numerous tutoring companies operate on a local basis, commonly with just one shopfront.

The market share occupied by tutoring companies varies in different societies. In Cambodia, schoolteachers dominate supply of private tutoring. Tutoring companies have become visible in Phnom Penh, the capital city, but are rare in other places. A survey of Grade 9 and Grade 12 students in Siem Reap Province found that 81.9 per cent were receiving private tutoring but none from a tutoring company (Bray et al., 2016, p.294). By contrast, in Japan and Hong Kong companies dominate the market. In Japan, nine private tutoring companies were already listed on the Japanese stock exchange in the 1990s (Russell, 1997, p.166). In Hong Kong, tutoring companies were reported in 2011 to have capacity for 45,700 students of which 54 per cent was provided by large companies operating in chains and the remainder was through individual tutoring centres (Synovate, 2011). Companies are more likely to operate in urban than rural areas because they seek density of population for markets of sufficient size. In Thailand, for example, 1,964 private tutoring companies were officially registered in 2011, among which 77.6 per cent were located in Bangkok (Thailand Ministry of Education, 2013). The development of online tutoring may change this phenomenon, but most households still prefer tutoring in person.

3.3 Dynamic Between Supply and Demand

Compared with regular schooling, customers in the shadow education marketplace have considerable choice over the hiring of specific tutors for specific subjects and durations. The shadow sector is more client-oriented, and the supply side has to respond to the demand. Tutors usually make special efforts to find out what students and families want, and how they can help. Mathematics and language are commonly the top two popular subjects for tutoring, which reflects the fact that they are required subjects in their own right in most education systems and also underpin other subjects. Tutors may offer special classes to cater for the demand of specific groups of students. For example, companies in Beijing organise special classes for Grade 6 students who have been admitted to elite junior secondary schools, teaching them the content for Grade 7 one year in advance.

Advertising is a common way to attract customers, and companies may advertise in residential areas, in newspapers, on buses and on billboards. In Hong Kong, some companies use strategies resembling the promotional machines of pop and movie stars (Koh, 2014). Approaches elsewhere may be less brash, but companies nevertheless use advertising along similar lines to other services.

In some settings, the supply side may create demand for private tutoring. This is especially obvious when regular teachers offer tutoring to their own students. For example, in Cambodia, schoolteachers commonly offer additional classes to the students for whom those teachers are already responsible in regular classes. Teachers may intentionally slow down and cover only part of the curriculum in school classes and then require students to come to the private classes for the remainder of the curriculum (Dawson, 2009). Teachers deliberately teach content in the private class ahead of the school class, and then the tutored students perform better than their peers. Similar patterns have been noted in Egypt (Ille, 2015, p.1).

4 COSTS AND AFFORDABILITY

The costs of shadow education naturally vary by types, locations and reputations of the tutors. As an example, Acadomia, the market leader in France, indicated in 2016 that private tutoring for a Grade 10 student in a large city would cost €31.5 (US\$35) per hour or €252 (US\$282) per month (Acadomia, 2016). In England, costs were commonly in the range of £24–32 (US\$32–42) per hour (Kirby, 2016, p.29). Within the less formal market of tutoring provided by teachers, university personnel commonly charge more than secondary and primary teachers (see for example, Kubánová, 2006, p.290).

Private tutoring consumes considerable household financial resources. Korean government statistics showed that families on average spent 151,643 won (US\$121) per month on private tutoring in 2015, accounting for 57.7 per cent of household educational expenditure (KOSIS, 2016). Egyptian data from the nationwide Household Income, Expenditure and Consumption Surveys in 2010/11 indicated that one more child at secondary level raised total household expenditure on education by 25 per cent (Rizk and Abou-Ali, 2016, p.9). The higher cost of secondary education was largely due to reliance on private tutoring for secondary examination, which was a prerequisite for entry to college.

Affordability is of course related to family incomes. Bray et al. (2014, p.31), investigating the tutoring received by Grade 9 and Grade 12 students in Hong Kong, found that for families in the highest-income band the monthly expenditures on tutoring formed less than 3 per cent of the estimated household incomes, but that the proportion exceeded 32 per cent for the lowest-income band. In poor countries the cost of tutoring is generally low but the burden may be heavy. The Cambodian survey mentioned earlier found that the common rate for private tutoring was only 500 riels (US\$0.13) per lesson or 10,000 riels (US\$2.50) per month per subject, but 84.2 per cent of sampled students felt or strongly felt that the costs were a financial burden for their families (Bray et al., 2016, p.294).

Some studies have examined the aggregate costs of private tutoring at the country level as illustrated by Table 18.2. The statistics may not be directly comparable because the percentages use different bases and the levels of education covered are not completely consistent, but the table does provide some information across countries. On the basis of these data plus data from a further nine countries, Aurini et al. (2013, p.xvi) suggested that for the total of 17 countries the supplementary education industry generated US\$41 billion per year. Aurini et al. then added estimates from other parts of the world to reach a round number of US\$80 billion. To place this in context, they compared the figure with the 2012 sales of General Motors (US\$4.7 billion), Starbucks (US\$3.8 billion) and Nike (US\$19.2 billion), each of which, as they remarked (p.xvi) are ‘well known to most of the planet’s population’. These companies, the authors added, are also of great interest to governments; yet the supplementary industry, by contrast, ‘has quietly developed, sometimes with little acknowledgment of its existence’ with the consequence that ‘most government responses . . . have been reactive, rather than proactive’.

5 BENEFITS OF PRIVATE TUTORING

Since private tutoring consumes considerable financial resources, obvious questions may be raised about the benefits that can be gained from this investment and is it effective in

Table 18.2 National data on the financial scale of the shadow education industry

Country	Cost of tutoring
Austria	Private tutoring was calculated to consume €126 (US\$141) million in 2010 (AK-Wien, 2010, p.6).
Cyprus	Private tutoring consumed €111.2 (US\$124.4) million in 2008, equivalent to approximately 17 per cent of government expenditures on primary and secondary education. Within this amount, €30.5 (US\$34.1) million was for students in primary education, €33.7 (US\$37.7) million was for students in gymnasiums, €2.6 (US\$2.9) million was for students in technical schools, and the remainder was for students in lyceums (Cyprus, 2010).
Georgia	Household expenditures on private tutoring at the secondary level were 120 million lari (US\$48 million) in 2011, equivalent to 34.2 per cent of public expenditure on secondary education (EPPM, 2011, p.29).
Germany	Private tutoring was estimated to consume between €942 (US\$1,053) and €1,468 (US\$1,641) million in 2010, of which €143 (US\$160) million was for primary students and the remainder was for secondary students (Klemm and Klemm, 2010, p.7).
Great Britain	Kirby (2016, p.17) estimated the market value of tutoring for 5–18 year olds in England, Scotland and Wales at between £1–2 billion (US\$1.3–2.6 billion).
Greece	Private tutoring was estimated to consume €952.6 (US\$1,065.1) million in 2008, accounting for 18.6 per cent of all household educational expenditures, and was equivalent to 20.1 per cent of the government expenditures on primary and secondary education (Centre for the Development of Education Policy, 2011).
Japan	Japanese households were reported in 2010 to be spending about 924 billion yen (US\$12 billion) on tutoring (Dawson, 2010, p.16).
South Korea	The Korean National Statistics Office estimated expenditure on private tutoring at 3 per cent of GDP in 2009 (Lee, 2013, p.52).

achieving particular educational goals. These questions are linked to cost-benefit analysis and cost-effectiveness analysis.

As noted by Levin (1995a, p.360), cost-benefit analysis ‘compares the costs and outcomes of alternatives when the outcomes can be assessed in monetary terms’. Such analysis can be used to estimate the rates of return to investment in education, particularly for programmes that have labour market outcomes. Proponents of private tutoring may claim that it can improve students’ academic performance and help students to stay longer in education systems, thereby enhancing their opportunities and earnings in the labour market. However, this impact is indirect: it takes effect only when students proceed to higher levels of education because their academic performance has been improved by private tutoring. Thus, it is difficult to separate the market private benefit from that of formal schooling. Furthermore, cost-benefit analysis needs detailed information from data collected over a long time period. No studies of this kind have yet been undertaken for private tutoring.

Nevertheless, two studies that have discussed the impact of private tutoring on the labour market performance deserve mention. Kim (2010) asked whether participation in private tutoring would influence the hourly wage in the labour market in South Korea but

found no significant effect after controlling many other personal factors. Also in South Korea, Park (2015) drew on the retrospective survey data of individuals aged 15 to 35 in 2006 from the Korean Labour and Income Panel Study Wave 9 to discuss the impact on the duration of first job search after finishing school education. Park found that receiving private tutoring had significant impact on access to top-end employment and this effect was particularly strong for poor academic performers in school, though did not find an impact on salary after controlling the personal and family characteristics.

The non-market private benefits for students who receive private tutoring have also been discussed in some studies. Greater attention for individual needs and support suited to the personal temperaments and skill sets are commonly mentioned benefits of tutoring compared to school classes (for example, Soldo and Jokić, 2013). Zhan et al. (2013, p.503) solicited opinions from Hong Kong students about the effects of different types of private tutoring. Students reported that one-to-one tutoring effectively improved their examination grades and learning strategies, and that lecture-type tutoring improved their confidence in examinations, revision skills and learning strategies.

Sending children to tutoring can also benefit parents and other family members. This is among the so-called intra-family effects identified by Wolfe and Haveman (2002). Tutors provide children forms of support, which parents may not have enough time or knowledge to offer. Parents thus take private tutoring as a means to perform the parental role in helping children's learning (Gauci and Wetz, 2009). In addition, for parents with older children, especially adolescents, tutoring may be a way to overcome problems in parent-child communication and to purchase peace within the home. By hiring private tutoring to help children with the schoolwork, the tensions between parents and children can be reduced (Kazimzade and Jokić, 2013, p.221; Oller and Glasman, 2013, p.85).

In addition to the benefits received by individuals, private tutoring may have external benefits, which spill over to other members of the community (Psacharopoulos and Patrinos, 2004). The shadow education sector can generate considerable opportunities to employ people, who in turn gain incomes and through their consumption generate employment for others. Due to the huge demand and its low barriers to entry, the shadow education industry is a major provider of employment in some societies. In South Korea, for example, the sector was the largest employer of college graduates in 2009 (Kim and Park, 2012, p.273).

Private tutoring can also release parents to take up employment elsewhere and contribute their human capital to the economy. Parents frequently mention lack of time to help children with schoolwork or to support their learning systematically to explain why they send children for private tutoring (for example, Kazimzade and Jokić, 2013). Viewing this dimension from a different angle, helping children's learning is a task calling for considerable parental time and energy, and private tutoring services with child-minding functions can release parents for other work.

6 EFFECTIVENESS OF PRIVATE TUTORING

Cost-benefit analysis is a helpful decision-oriented tool to ascertain which educational investments have greater benefits relative to costs. However, some educational alternatives are designed for outcomes that cannot be easily converted into monetary terms and

are therefore more suited to cost-effectiveness analysis than cost-benefit analysis (Levin, 1995b, p. 382). For parents and their children, the major objective for receiving private tutoring is improved academic achievement. Thus, studies on the effectiveness of private tutoring analyse whether the inputs of private tutoring can generate output, that is, improved academic achievement, usually measured by test scores.

In the USA, the Coleman Report (Coleman et al., 1966) used an education production function – a statistical relationship showing the maximum education outputs that could be produced with given educational resources (Cohn and Geske, 1990). A general formulation is as follows (Hanushek, 1986, pp.1155–9):

$$A_{ij} = f(F_{ij}, T_{ij}, OS_{ij})$$

Where A_{ij} represents the student achievement, F_{ij} represents the family inputs, T_{ij} represents the teacher inputs, and OS_{ij} represents other school inputs.

When investigating private tutoring, the function is usually adapted as follows (for example, Ryu and Kang, 2013; Xue, 2015; Zhang, 2013):

$$A_{ij} = f(PT_{ij}, F_{ij}, T_{ij}, OS_{ij})$$

Where PT_{ij} represents private tutoring inputs, such as the participation in tutoring, the time spent on tutoring, or the expenditure of tutoring. Table 18.3 summarises some empirical studies that have estimated the impact of private tutoring on academic achievement. The table does not show consistent patterns (see also Byun, 2014; Park et al., 2016), in part because of challenges in data availability. Researchers usually draw upon survey data with international or national orientations. The former category includes the Programme for International Student Assessment (PISA) (Hof, 2014; Hu et al., 2015; Ünal et al., 2010) and the Trends in International Mathematics and Science Study (TIMSS) (Baker et al., 2001), while national surveys have been conducted in China (Xue, 2015), India (Dongre and Tewary, 2014), Sri Lanka (Aturupane et al., 2013; Cole, 2016); South Korea (Byun, 2014; Kang, 2007; Lee, 2013; Ryu and Kang, 2013), and Vietnam (Dang, 2007). Different social contexts and definitions of private tutoring may lead to the inconsistent findings regarding the effectiveness of tutoring, and challenges are compounded by the difficulties of securing accurate data with imperfect instruments (Bray, 2014; Zhang and Liu, 2016).

Inconsistencies may also be partly due to the research methods adopted by different researchers. Ordinary Least Squares (OLS) regression is commonly used (for example, Byun, 2014; Lee, 2013), but the OLS estimation may be biased by endogeneity. For example, students' participation in private tutoring may be affected by variables that also impact their academic performance such as the teaching quality in class. If some variables influence both academic achievement and private tutoring participation but are not included in the model, the variable PT will be correlated with the random error term. This violates the basic assumption of OLS (Zhang, 2015, p.63).

Experimental approaches might be considered an ideal way to control for endogeneity. Mischo and Haag (2002) tried a quasi-experimental method in which one group ($N=122$) of pupils in Grades 5–11 in Germany received private tutoring over a period of nine months and were compared to a control group ($N=122$) with approximately the same combination of subject matter and performance. The researchers found that receipt of

Table 18.3 *Studies of the effects of private tutoring*

Authors	Data	Methods	Effects of private tutoring
Aturupane et al. (2013)	2,639 Grade 5 students in 140 Sri Lankan schools from three sources: 2003 NEREC survey, 2003 Inter Sectoral Study on Health and Education and 2000 Sri Lanka Integrated Survey	OLS	Large positive effect on students' test scores.
Byun (2014)	Korean Educational Longitudinal Survey (an annual study that began in 2005 with 6,908 Grade 7 students)	OLS, PSM	Estimated the effects of cram schooling, individual or group tutoring, mail-based correspondence courses, Internet tutoring and the government's Educational Broadcasting System (EBS). Only cram schooling had a positive effect on achievement.
Byun and Park (2012)	9,760 US students who had taken or would take the SAT (Scholastic Assessment Test) in Grade 12, derived from the Education Longitudinal Study 2002–2006	OLS	Focused on the effectiveness of two forms of SAT tutoring, that is, commercial test preparation courses and private one-to-one tutoring, among children of East Asian immigrants to the USA. Commercial SAT test preparation course had positive effects on the SAT performance, but one-to-one tutoring was less likely to do so.
Cole (2016)	2,639 Grade 5 students in 140 Sri Lankan schools: 2003 Inter Sectoral Study on Health and Education	PSM	On average, five months of private tutoring had no effect on students' examination scores. Socially advantaged groups enjoyed higher impact of private tutoring than disadvantaged groups.
Dang (2007)	1997–98 Vietnam Living Standards Survey (nationally representative household survey)	joint Tobit and ordered probit model	Private tutoring had significant effects on academic performance at lower secondary level.
Dongre and Tewary (2014)	Household survey data of 439,168 rural children aged 6–14 from the 2011 round of Annual Status of Education Report	OLS	Positive effect of private tutoring in reading and mathematics. Effect stronger for children in government schools than their counterparts in private schools, for economically disadvantaged children, and for children of less-educated parents.
Guill and Bos (2014)	11,735 students aged 12–15 from the German longitudinal study Kompetenzen und Einstellungen von Schülerunnen und Schülern	HLM, PSM	Although most parents and students stated that private tutoring had improved the achievement in mathematics, the empirical findings from HLM and PSM models did not support this statement.

Table 18.3 (continued)

Authors	Data	Methods	Effects of private tutoring
Hamid et al. (2009)	Questionnaire to 228 Grade 10 students from eight schools in Nadiranga, Bangladesh, plus interviews of 14 of these students	mixed-methods	Positive effect of English private tutoring on English achievement found in the quantitative analysis, and supported and elaborated in the qualitative analysis.
Han and Lee (2016)	Data of 2,120 first year middle-school students from the Korean Children and Youth Panel Survey (KCYPs) in 2010	quantile regression	Generally, private education expenditure was positively associated with academic performance. The size of this positive relationship was heterogeneous: the magnitude was greatest around the median of the academic performance distribution.
Kang (2007)	1,752 general high school students in the Korean Education and Employment Panel study	2SLS	No significant effect of private tutoring in improving test score.
Kuan (2011)	2001 and 2003 data gathered by the Taiwan Education Panel Study (TEPS), covering 10,013 secondary students	PSM	Estimated the effects of mathematics cramming undertaken in the first semester of Grade 9. Average effect was positive but small.
Lee (2013)	Korean Educational Longitudinal Survey (an annual study that began in 2005 with 6,908 Grade 7 students)	OLS, 2SLS, PSM	On average, private tutoring in middle school had positive short-term effects (1–3 years after the participation) but minimal long-term effects (4–6 years after the participation) on the university entrance examination scores. English and mathematics tutoring were effective whereas Korean tutoring was not.
Liu (2012)	13,978 students in Grade 7 from the 2001 Taiwan Education Panel Study	OLS	Found that cram schooling had positive effects on students' performance. Impact decreased when tutoring hours were lengthened.
Mischo and Haag (2002)	244 German students in Grades 5–11 (122 students receiving tutoring and 122 students not receiving tutoring). Baseline data collected one month after term had commenced, and comparison data collected nine months later.	quasi-experimental with pre-post control group	Receipt of tutoring led to improved school performance and motivational variables.
Ryu and Kang (2013)	Panel data of 4,949 students from the Korean Educational Longitudinal Survey	OLS, 2SLS, PSM	Effect of private tutoring on academic achievement was modest at best.

Table 18.3 (continued)

Authors	Data	Methods	Effects of private tutoring
Xue (2015)	4,265 students in Grades 1–9 derived from the China Family Panel Study	PSM	Private tutoring had positive effect on the performance in mathematics, but no impact in Chinese.
Zhang (2013)	5,766 Grade 12 students in Jinan, China, 2010	OLS, 2SLS, HLM and control function model	In terms of improving students' performance in the National College Entrance Examination, the average effect was not significant. However, it may vary according to the student's performance and registered residence status. Urban students with lower achievement may receive positive effect from tutoring, while rural students may have negative effect. This negative effect becomes larger for low achievers.
Zhang and Liu (2016)	5,766 Grade 12 students in Jinan, China, 2010	OLS	In general, private tutoring for mathematics, Chinese and English in various kinds of class-size (one-to-one, small class, middle-sized, large) had no significant effect on students' scores. Only large class tutoring in mathematics had positive effect for the whole sample (not for sub-samples of urban or rural students).

* OLS: Ordinary Least Square regression
 2SLS: Two-Stage Least Square (2SLS) regression with instrumental variables
 PSM: Propensity Score Matching
 HLM: Hierarchy Linear Modelling

tutoring led to a large improvement in school performance. However, this type of study is uncommon because of the ethical issues that arise when some students receive inputs that are deliberately withheld from other children (Bray, 2014, p.387).

Several statistical approaches have been adopted to address problem of endogeneity, such as propensity score matching (PSM) (for example, Byun, 2014; Cole, 2016; Hu et al., 2015; Xue, 2015) and the instrumental variable (IV) method (for example, Kang, 2007; Ryu and Kang, 2013; Zhang, 2013). When the measurement of private tutoring participation is a binary variable, the endogeneity can be understood as a self-selection problem, meaning that students select themselves into the treatment (that is, private tutoring participation) or not according to their own characteristics, which may also influence the academic achievement. PSM is adopted to enhance the validity of causal inferences about the effects of private tutoring. Some researchers have tried to find instrumental variables and use Two-Stage Least Square (2SLS) regression to address endogeneity, but the validity of instrumental variables is easily challenged and so is the robustness of findings.

A more sophisticated question concerns the effectiveness of different types of tutoring, since each type has specific features that may influence its effect on academic perform-

ance. In the USA, Byun and Park (2012) compared one-to-one tutoring and commercial test preparation courses in large classes. They found a positive effect of the large class preparation course on the performance in the Scholastic Assessment Test (SAT), but no effect of one-to-one tutoring. Turning to South Korea, Byun (2014) examined the effects of cram schooling, individual or group tutoring, mail-based correspondence courses, Internet tutoring and the government's Educational Broadcasting System courses, and found that only cram schooling had positive effects on achievement. In China, Zhang and Liu (2016) assessed the effects on students' NCEE scores in China of private tutoring in different class size, that is, one-to-one, small class (less than five students), middle-size class (six to 25 students), and large class (over 25 students). They found a positive effect only in large class tutoring in mathematics. However, these three studies are far from enough to arrive at a conclusion, and more investigation is needed.

In addition to the average effect of private tutoring, some studies have further investigated the effects for different groups of students (for example, Hof, 2014). Han and Lee (2016) found varying effects according to student's academic performance. Zhang (2013) demonstrated heterogeneous effects according to the student's performance and registered residence status. The existence of heterogeneous effects makes analysis of the effectiveness of private tutoring complicated, and future research should pay more attention to this issue.

7 CONCLUSIONS

Shadow education has deep roots, but has only developed significantly during recent decades. During the last quarter of the twentieth century it was mainly associated with Japan, South Korea and other parts of East Asia; but since the turn of the century it has greatly expanded in all world regions. The expansion has been greatly facilitated by increased acceptability that education may be a marketised service. Substantial household incomes may be spent on shadow education, and the sector employs considerable numbers of people.

Despite these features, research on economic dimensions of shadow education has yet to secure insights of the types that are available in the school sector. Rigorous cost-benefit analysis may be out of reach for methodological reasons, but sophisticated cost-effectiveness analyses should be easier to achieve. Such studies would consider the range of types of tutoring as well as diversity in the qualifications and skills of tutors in different subjects, the motivations of students across the grades, and other variables. The research would still be methodologically challenging, in part because of the difficulties of measuring effectiveness and of separating out the impact of shadow education from regular schooling and other inputs. Nevertheless, given the scale of the sector and its role in economic and social development, further research seems highly desirable.

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