EFFECTS OF ABILITY COMPOSITION ON SHADOW EDUCATION IN SOUTH KOREA

A Thesis in
Educational Theory and Policy

by

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ABSTRACT

Shadow education or private outside-of-school activities for supplementing academic achievement in formal education, has developed and expanded on a global scale in recent years. Since shadow education is linked to students’ academic achievement in many countries, unequal opportunities for shadow education has become a significant problem. Using data from the 2012 Program for International Student Assessment (PISA), this study analyzes whether ability composition of schools attended affects students’ use of shadow education in Korea. The results show that students’ academic achievement is positively correlated with their use of shadow education. In addition, students in higher-achieving schools are more likely to use shadow education. However, the relationship between ability composition of schools and the use of shadow education is not significant when controlling for the socioeconomic composition of schools. Findings suggest that socioeconomic status not only at the individual level but also at the school level matters to shadow education.
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Chapter 1

Introduction

Shadow education has recently attracted increasing interest as one of the educational resources affecting academic achievement (Baker, Akiba, LeTendre, & Wiseman, 2001; Bray, 1999; Stevenson & Baker, 1992). Shadow education is defined as structured, out-of-school activities for improving academic achievement in formal education (Baker et al., 2001). Participation in shadow education is positively linked to academic achievement in many countries, such as Japan, Korea, and Singapore (Baker et al., 2001; Bray & Kwok, 2003; Stevenson & Stigler, 1992). However, when considering the positive role of shadow education as an academic resource, one must also deliberate on issues related to the allocation process. Since shadow education is a service that is exchanged in the marketplace, it is frequently unequally distributed based on students’ socioeconomic status. Given the relationship between academic achievement and shadow education, inequality in the use of shadow education matters because, through shadow education, differences in socioeconomic status can produce differences in academic achievement. Although the influence of shadow education is significant, research on shadow education, especially with respect to inequality, is still needed.

To address the issue of inequality in shadow education, this study draws on the idea of peer effects. Peer effects suggest that students’ academic abilities are influenced by the academic abilities of their peers. Research has shown that students’ characteristics are influenced by the characteristics of their peers, including their peers’ academic achievement, socioeconomic status, and race (Coleman, 1966). This line of research also suggests that segregation produces inequality in education especially for disadvantaged students (Summers & Wolfe, 1977). In other
words, when schools are highly segregated by academic ability, especially low achieving students are disadvantaged.

If students’ academic achievement is influenced by the abilities of their peers, is the use of shadow education also influenced by their peers’ use of shadow education? Though it is well established that students’ academic composition influences their academic achievement, whether academic composition at the school level affects students’ use of shadow education has not yet been examined. If students’ use of shadow education is affected by their school environment, then attending schools with differing ability composition may make a difference in students’ demands for shadow education. Though many factors relate to the use of shadow education, shadow education in general certainly illustrates the important influence of peers’ abilities in this case. Given the different ability mix of students, therefore, the hypothesis states that difference in the use of shadow education may be interpreted as increased or decreased pressure for academic achievement influenced by their peers, which implies that shadow education is used for increasing academic achievement extensively. This study analyzed shadow education in the context of South Korea (hereafter, Korea), one of the top performing countries in the world. The country has used shadow education extensively over the past few decades (Lee & Shouse, 2011), including competitive preparation for college entrance, extensive use of standardized examinations, high parental expectations for higher education, and more. Furthermore, literature suggests a strong relationship between peers’ academic achievement and students’ performance in Korea. In other words, higher achieving peers improve students’ academic achievement in Korea (Kang, 2007). Therefore, it is important to examine the influence of other students’ achievement on the use of shadow education in Korea.

In the following, the current study reviews the extant literature in this research area. Then, I test the research question using data from the 2012 Program for International Student Assessment (PISA). I use a logistic regression to examine the relationship between ability
composition of schools and students’ use of shadow education in Korea. Finally, I discuss results and offer policy implications.
Chapter 2

Literature Review

2.1 Definition of Shadow Education

Bray (1999) described three characteristics of shadow education: supplementary, private, and academic subject-oriented. First, shadow education supplements formal education. In other words, shadow education is not a substitute for or synonymous with the formal schooling provided in school (Bray, 1999). Thus, even though the purpose of shadow education is to increase academic achievement in formal education, shadow education cannot exist without formal education because its nature is supplementary. Second, shadow education is private. Since students are taught by private entrepreneurs and individuals who seek profit, their educational achievement is traded in an education market; thus, shadow education is distinct from Head Start or other programs and from volunteer help from friends or family members (Bray, 1999). Finally, shadow education is academic subject-oriented, focusing on academic subjects taught in mainstream schools, particularly languages, mathematics, and other examinable subjects (Bray, 1999).

Literature suggests that shadow education has been popular and its use is becoming more common worldwide (Mori & Baker, 2010). Bray (1999) investigated the status of the phenomenon on a global scale. He documented that many countries (e.g., Brazil, Cambodia, Egypt, Guinea, Hong Kong, Japan, South Korea, Malaysia, Malta, Mauritius, Morocco, Myanmar, Singapore, Sri Lanka, Taiwan, Tanzania, and Zimbabwe) have out-of-school education for commercial purposes with 20% to 70% of students in these countries attending private out-of-school education. It is evident that shadow education is now a trend across geographical and
cultural background. Bray (2006) reported that shadow education is seen from low income countries such as Cambodia and Bangladesh to high income societies such as Western European countries. In Eastern Europe, tutoring has been emerging with the collapse of socialism and the advent of the market economy (Bray, 2006). Recent studies have also reported that shadow education is expanding in North America on a large scale (Buchmann, Condron, & Roscigno, 2010; Davies, 2004). Students in Canada are using shadow education more and more frequently, especially in major cities (Davies, 2004). In the United States (U.S.), business for Scholastic Achievement Test (SAT) preparation has been growing with the increase of the importance of standardized exams for college admission (Buchmann et al., 2010). As Byun and Baker (2015, p. 1) noted, “This new form of education has expanded worldwide and become a multi-billion dollar global service industry offering many different and costly tutoring services from after-school classes to a host of online options.” Even though the degree of prevalence varies across countries, shadow education has been expanded its influence on education in a global scale.

The question of why students need shadow education other than formal education has emerged. There are two reasons for taking shadow education: the first is remedial, and the other is for enrichment. Remedial refers to keeping up with the academic requirements of school, mostly needed by low achieving students to keep up with their peers. Other students use shadow education for enrichment (Baker & LeTendre, 2005; Byun & Park, 2012), which indicates that some students take shadow education as an academic resource to excel other peers. These purposes appear differently across societies. For example, enrichment purposes are more evident in East Asia compared to other countries (Baker & LeTendre, 2005). Purposes are also different depending on race/ethnicity. For example, Byun and Park (2012) illustrated that East Asian American students were more likely to use shadow education for enrichment purposes than other ethnic/race groups in the United States.
Macro perspectives focus on the role of institutional factors. For example, Baker and LeTendre (2005) note that education is becoming similar; it has common forms across different cultures and societies. This suggests that shadow education is not caused by a certain cultural context, but is created by similar institutional factors around the world (Mori & Baker, 2010). High-stakes exams have long been in the spotlight as one of the factors. Standardized testing is considered a big factor in the growth of shadow education. Standardized testing led to students want to seek out programs that help with preparing for the test, which increases the demand for shadow education, as it makes it easier for private entrepreneurs to provide customers with education services that fit well (Buchmann et al., 2010). When standardized exams, controlled by a government, are prevalent, the society lays the foundation for the development of shadow education (Stevenson & Baker, 1992).

There are other institutional factors that influence the growth of shadow education. For example, homogeneous educational curriculum supports the need for shadow education (Stevenson & Baker, 1992). The equalized curriculum in many Asian countries (such as Japan and Korea) drives students to need additional academic resources that compensate for the drawbacks of formal schooling (Kim, 2004; Stevenson & Baker, 1992). In other respects, shadow education occurs because of dissatisfaction with school quality. Many scholars have discussed school quality as a cause of shadow education. For example, Bray (1999) mentioned that the demand for quality schooling creates the prevalence of shadow education in Malaysia. Other empirical evidence also bolsters this idea with proof that parents who use shadow education are more likely to be dissatisfied with the quality of formal schooling (Davies, 2004). Shadow education is also highly related to other institutional factors, like limited access to national-funded education system for disadvantaged students. Baker et al. (2001) asserted that lack of national educational system to support underachieved students, rather than high-stakes testing and national achievement incentives, drive the use of shadow education. In particular, they found that
increasing mass schooling increases the use of supplementary shadow education. “Although private educational activities predate the creation of modern public schooling, mass public schooling ironically produces reasons and demands for mass shadow education in many countries” (Baker et al., 2001, p. 14).

2.2 Determinants of Shadow Education

Prior research has identified various factors associated with shadow education. Such factors can be categorized into three different levels of scale: individual, school, and nation. For the individual level, gender is one of the determinants of shadow education. Japanese male students are more likely to participate in shadow education than their female counterparts (Stevenson & Baker, 1992). Japanese society has different expectations depending on gender, and male students are expected to get better, successful jobs that earn enough to support their families (Brinton, 1988). This naturally leads families to invest more in shadow education for their academic success, which is closely related to their career success (Stevenson & Baker, 1992). By contrast, female students have a significantly higher likelihood of using shadow education than male students in the United States (Buchmann et al., 2010).

Southgate (2009) found that parental socioeconomic status has a positive impact on shadow education. Families with higher socioeconomic status are more likely to participate in the various forms of extracurricular activities across different societies. This indicates that children who attend shadow education get more attention from their parents and are from a relatively affluent environment. Linking with parents’ attention, parents with higher educational degrees are more likely to let their children use shadow education in Canada (Davies, 2004). These parents are also more likely to send their children to private schools, showing relatively high educational expectations of their children.
Although family structure does not have a great impact on shadow education compared to the parents’ socioeconomic status, children from two parent families purchase shadow education more (Southgate, 2009). While the number of siblings turns out to be insignificant after controlling the income level in the United States (Buchmann et al., 2010), an increasing number of siblings has a negative association with parents spending on shadow education in Korea, indicating the parents’ financial burden (Byun, 2010).

Prior studies have shown a contradictory relationship between shadow education and students’ academic achievement. One of the most popular ideas about shadow education is that it is positively connected with academic achievement, which conveys the issue of inequality at the same time (Buchmann, 2002). However, some scholars are still skeptical about the role of shadow education as an academic resource. They found that shadow education is not strongly related to academic achievement or even had a negative influence (Sung & Kim, 2010). Byun (2014) noted that such inconstancy of study results about this relationship is derived from selection issues. Since students from high socioeconomic status are more likely to use shadow education, the effect of shadow education is misleading. That is, shadow education may appear to have a positive effect on academic performance because of their high socioeconomic backgrounds (Byun, 2014). Whether students are living in an urban or rural area is also related to shadow education. Students who reside in urban areas participate highly in shadow education in Japan (Stevenson & Baker, 1992). This pattern was also found in Turkey and Korea (Kim & Park, 2010; Tansel & Bircan, 2006).

Students’ grade level and age are also closely related to shadow education. Since high-stakes tests are generally used more at the grade level transition, such as between primary and secondary, researchers found that the use of shadow education increases especially during these periods (Southgate, 2009). However, the relationship between grade levels and shadow education is not universal; it does not appear in some countries, such as Kenya (Buchmann, 2002). Even
other factors, such as the correlation between academic achievement and shadow education, differ depending on the grade level (Dang, 2007).

At the school level, teacher quality is a determinant of shadow education. In Vietnam, spending on private tutoring fell significantly when the qualifications of the teachers increased (Dang, 2007). Whether there is a difference in the use of shadow education between private vs. public school is confusing, because the status of private school is different in many countries. For example, private schools attract affluent students with high socioeconomic status in the American education system, which produces differences in academic achievement (Condron & Roscigno, 2003). Therefore, the differences in terms of shadow education between private and public schools would be explained by the parents’ socioeconomic status in this case. However, there are no differences in the two types of schools in some countries, such as Turkey, because both private and public sectors are financially funded by the government (Southgate, 2009).

At the country level, the geographic distribution of shadow education reveals its irrelevance with countries’ gross domestic product (GDP), presenting the economic developmental level of a country. As stated earlier, shadow education has been growing globally. Even some countries with a high prevalence of shadow education, such as Japan, Korea, and Malaysia, do not show an economic relationship with the use of shadow education. Prior studies have focused on the geographic characteristic. It has been thought of as part of a unique culture in East Asia (Cummings, 1997), therefore, studies examined the cultural characteristics of East Asia (Manzon & Areepattamannil, 2014; Watkins & Biggs, 1996). Some scholars have highlighted the influence of Confucian culture on shadow education (Bray, 2010; Watkins & Biggs, 1996). Competition and a high value placed on learning and efforts make shadow education more prevalent in East Asian countries such as China, Hong Kong, Korea, and Japan (Bray, 2010). However, this explanation fails to explain the expansion of shadow education in other societies, such as Eastern European countries and Southeast Asia (Bray, 2010). Since the growing influence
of shadow education in East Europe and some countries in Southeast Asia (e.g., Cambodia) is more closely derived from dissatisfaction with educational quality, rather than common cultural factors, explaining the prevalence of shadow education is limited in a few societies in these regions. In sum, the determinants of shadow education differ depending on the specific contexts of individuals and countries. However, all factors illustrated above are directly or indirectly related to shadow education and a careful approach to the relationships among factors is required for an adequate analysis of shadow education.

2.3 Concept of Peer Effects

The relationship between ability composition and shadow education begins with the concept of peer effects. The term “peer effects” conveys the influence of peers’ characteristics, commonly referred to as the ability mix of classmates, on the achievement of an individual student in school (Zimmer & Toma, 2000). Although a great deal of research has found empirical evidence that illustrates the impact of peers, studies have struggled with both conceptual and data problems (Brock & Durlauf, 2001; Manski, 1993; Moffitt, 2001). Since there are many other characteristics that affect students’ academic achievement, it is hard to distinguish the pure impact of peers’ characteristics from other confounding factors, such as school characteristics or family background. Despite the application of sophisticated econometric techniques, it is challenging to remove all other variables except for peer effects. In this paper, the term “peer effects” is used as “ability composition.” Characteristics of peers that influence students’ academic achievement will be limited to academic composition, therefore, the term “peer effects” refers to the influence of the academic abilities of peers on an individual’s academic achievement.

The increased influence of peer groups brings attention to peer effects, especially as children grow; they become more independent from the impact of their families (Jessor & Jessor,
Due to this increasing influence on the development of children, peer effects become the key determinants that can help children from low socioeconomic backgrounds by affecting these students with positive peer effects. This logic brings forth the policy issue of integration in schools. A mixed setting of students from different backgrounds provides an opportunity for other individuals, especially for underprivileged students, to be positively influenced by other students’ characteristics.

2.4 Peer Effects and Academic Achievement

Since peer effects illustrate the need for integration in education, peer effects are naturally related to the issue of segregation. Since Coleman’s 1966 report, peer effects in education have been known to have significant positive effects that justify the need for integrated education; however, it remains unclear who benefits from integrated education. Are integrated schools good for all students, or is integration a system that only benefits disadvantaged students, thus limiting other students’ potential for development? Prior research has proven that peer ability significantly benefits disadvantaged students and that it is not dramatically helpful for high achieving students. According to Summers and Wolfe (1977):

Students who test at grade level or lower are distinctly helped by being in a school with more high-achieving students. The students who are performing above their grade level are not particularly affected. … What all this seems to say is that high achievers are relatively unaffected by variations in the percentage of top achievers. But, for the low achievers, the intellectual composition associated with other characteristics of the student body has a direct impact on learning. (p. 647)

Zimmer and Toma (2000) also found that peer effects are significant determinants of educational achievement and that the effect appears to be greater for low-ability students than for high-ability students across countries; however, their findings were not robust across school types. Although other evidence shows that peer achievement has a positive effect on overall
achievement, these findings follow the logic that students throughout a school have test score distributions that appear to benefit from higher achieving schoolmates (Henderson, Mieszkowski & Sauvageau, 1978). These previous findings illustrate the negative effects of segregation, especially for disadvantaged students; however, though integration is socially desirable in terms of reducing inequality, it can produce negative effects for high achieving students, who might feel that their abilities are being used to exploit academic resources.

On the other hand, many studies have shown that integrated education is good for all students (Rumberger & Palardy, 2005). Although integrated school involves a redistributive element, such that weak students gain and strong students lose, in general, integration allows students of various abilities and achievement levels to gain from classes in which the mean achievement is higher (Henderson et al., 1978). Since all students benefit from an increase in overall achievement, “if the objective of society is to maximize students’ overall achievement levels, a uniform mix of students according to achievement is optimal” (Henderson et al., 1978, p. 105). This idea corresponds to the utilitarian view that one might benefit by maximizing the overall good of society, a perspective that suggests integrated education is a tide that lifts all boats. Rumberger and Palardy (2005) found that the average socioeconomic level of a school had as much impact on students’ achievement as the students’ own socioeconomic status. They also proved that school socioeconomic status had an equal impact on advantaged and disadvantaged students and a nearly equal impact on white and black students (with black students benefiting slightly more) (Rumberger & Palardy, 2005). Their findings indicate that all students, whether advantaged or disadvantaged, gain from integration policies. Furthermore, their results show that schools serving mostly lower-income students tend to be organized and operated differently than those serving more affluent students; this supports the idea that integration in education halts the reproduction of inequality (Rumberger & Palardy, 2005).
Despite this controversial debate, the common findings show that students’ academic achievement is influenced by other students’ backgrounds, not just by their own backgrounds. Therefore, integrated schooling is important, especially with respect to the upward mobility of disadvantaged students. Then, how does this issue of equality relate to shadow education? Next, this paper briefly discusses the concept of shadow education and current status of shadow education in the context of Korea.

2.5 Korean Context

Korean students use shadow education extensively. One study found that approximately 70% of K–12 students used shadow education in 2011 (Korea National Statistics Office, 2011). Since Korea is one of the top achieving countries in international assessments, its prevalent use of shadow education has been considered a secret weapon for improving students’ academic achievement (Stevenson & Stigler, 1992). Although the causal relationship between shadow education and academic achievement is still controversial (Lee, 2007), it is clear that academic achievement and the use of shadow education are positively correlated in middle school (Park, Sang, & Kang, 2008).

Furthermore, since shadow education is considered capital exchanged on the open market, its extensive use increases the economic burden on parents, producing issues of inequality related to students’ socioeconomic status. To address this issue, the government attempted to reduce the use of shadow education in a variety of ways, including eliminating competitive high-stakes examinations and supporting supplementary school programs (Lee, Lee, & Jang, 2008).

To understand factors promoting shadow education, some scholars explored the ways in which school environments push the use of shadow education. For example, school quality is one
of the school environmental influences on the use of shadow education (Kim, 2004). Lower school quality significantly stimulates the demand for private tutoring (Kim, 2004), since students and parents are dissatisfied with the quality of the schools. Thus, some argue that the less variation there is in the curriculum, the more the educational quality of schools led by the Korean government’s rigid and uniform education policy will support the growth of shadow education (Kim & Lee, 2010; Lee, 2007).

As in many countries, peer effects have been shown to be strongly related to students’ academic achievement in Korea. Kang (2007) revealed that the mean achievement of a student’s peers is positively correlated with that student’s performance. Furthermore, social composition, such as school quality and the average socioeconomic status of schools, is also related to students’ academic achievement (Yang & Kim, 2003).

Despite attempts to determine the influence of school factors on the use of shadow education, few studies have empirically examined how peers affect individuals’ use of shadow education. Accordingly, more research focusing on the relationship between school-level factors and shadow education is needed. In particular, studying the effects of peers’ academic achievement on shadow education, among school-level factors, may offer new insights into shadow education in Korean society.
Chapter 3

Data and Methods

3.1 Data

This study drew on 2012 data from the PISA survey (Organisation for Economic Cooperation and Development [OECD], 2012), which takes place every 3 years and collects information about 15-year-old students in participating countries. The 2012 data were chosen because they were the most recent data that included a questionnaire with information about shadow education of all subjects. The PISA survey collects information about the math, science, and reading test scores of 510,000 students across 65 countries and economies, including all 34 OECD and other non-OECD countries. Students are nested within schools, and their grades within the school structure can differ in countries with grade repetition or tracks. The PISA database includes information on student performance in the main assessment areas, academic achievement, and students’ responses to a questionnaire. PISA employs a stratified sampling design; in the first stage, individual schools with 15-year-old students are sampled systematically, with probabilities proportional to their sizes. The second-stage sampling units in countries using the two-stage design are students within the sampled schools. After a school is selected to be in the sample, a complete list of its 15-year-old students is prepared. Typically, for each school, 35 students are selected with equal probability (OECD, 2014).

For Korea, a total of 156 schools were selected from the target population, and 5,033 participating students from the PISA. This study included only students who responded to the questionnaire in order to understand the relationship between peer effects and shadow education.
without missing variables. The 2012 PISA used the rotated student context questionnaires to increase the content coverage of topics of interest to PISA in the questionnaire without increasing the response time for individual students to more than 30 minutes (OECD, 2014). Therefore, the questionnaire about shadow education was missing in one of the three forms, which is Form B. However, the rotated question was also given to students randomly, and so the responses of students who only answered the question about shadow education were expected to be representative. Focusing on these students who responded to shadow education questions resulted in the final sample of students to 3,107 out of the 5,033 students who originally participated.

3.2 Measures

3.2.1 Use of Shadow Education

The use of shadow education was measured using the question: “How many hours do you spend each week attending out-of-school classes organized by a commercial company and paid for by your parents?” The original responses recorded the number of hours per week each student spent on shadow education activities. I created a dichotomous variable indicating whether students (1) attended no out-of-school classes offered by commercial companies and paid for by parents (recoded 0) or (2) attended at least one such class (recoded 1). Although other questionnaires asked about out-of-school activities (e.g., a question asking how many hours do you spend each week on working with a personal tutor: whether paid or not), I concluded that this question was the best to measure shadow education since it satisfied all three characteristics of shadow education: supplementary, private, and academic subject-oriented.
3.2.2 Ability Composition

Ability was used as an independent variable and includes two levels: student- and school-levels. In other words, each student’s ability and each school’s ability was used. Student-level abilities were measured by academic achievement, calculated by taking the average of mathematics, reading, and science scores. The average of all plausible variables was used to create a single variable called academic achievement. Since the question of the dependent variable asks about all school subjects and is based on the characteristics of shadow education (i.e., academic subject-oriented), I believe that it was better to use the average achievement across three major academic subjects emphasized by PISA. Then, I created the school ability variable using the student academic achievement variable through aggregation.

3.2.3 Control Variables

Socioeconomic status. Socioeconomic status (SES) was measured by using the following indicators: parental education, parental occupation, and home possessions. The measurement of parental education was based on the International Standard Classification of Education (ISCED), which is scaled as follows: (0) None, (1) ISCED 1 (primary education), (2) ISCED 2 (lower secondary), (3) ISCED 3B or 3C (vocational/pre-vocational upper secondary), (4) ISCED 3A (general upper secondary) and/or ISCED 4 (non-tertiary post-secondary), (5) ISCED 5B (vocational tertiary), and (6) ISCED 5A, 6 (theoretically oriented tertiary and post-graduate). I recoded this variable into the years of schooling (i.e., 6 = ISCED 1, 9 = ISCED 2, 12 = ISCED 3B or 3C, 12 = ISCED 3A, 14 = ISCED 5B, 16 = ISCED 5A or 6). Parental occupation was coded according to the International Standard Classification of Occupations (ISCO) system (Ganzeboom, 2010). Home possessions are comprised of family wealth, home educational
resources, home cultural possessions, and the number of books at home. Family wealth was determined by students’ answers to yes/no questions about whether they have their own room and whether their home has Internet access, a dishwasher, and a DVD player, plus three additional items defined by country (in the case of Korea, an air conditioner, digital TV, and kimchi refrigerator). The answers to questions asking about the number of several items (cellular phones, televisions, computers, cars, and rooms with a bath and shower) were coded as (1 = 0, 2 = 1, 3 = 2, 4 = 3). Home educational resources, which were coded as (yes = 1, no = 0), were determined from questions about having a desk for studying, a quiet place to study, a computer to study with, educational software, books to help with school work, technical reference books, and a dictionary. Cultural possessions were also recoded as (yes = 1, no = 0) based on questions about having classic literature, books of poetry, and works of art. Finally, the number of books was recoded as (0–10 books = 1, 11–25 books = 2, 26–100 books = 3, 101–200 books = 4, 201–500 books = 5, more than 500 books = 6). I conducted a factor analysis using a varimax rotation to create a composite score of the student SES. As I did for school ability, I aggregated students’ SES to create the school-level SES. Each school SES represented the average SES of the students in that school.
Table 1 Items for Socioeconomic Status

<table>
<thead>
<tr>
<th>Variables</th>
<th>Description</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Parental Education</td>
<td>What is the longest years of schooling completed by parents? (6 = ISCED 1, 9 = ISCED 2, 12 = ISCED 3B or 3C, 12 = ISCED 3A, 14 = ISCED 5B, 16 = ISCED 5A or 6)</td>
<td>14.02 (2.20)</td>
</tr>
<tr>
<td>2. Parental Occupation</td>
<td>What is your parents’ main job?</td>
<td>53.38 (18.10)</td>
</tr>
<tr>
<td>3. Home Wealth</td>
<td>Which of the following are in your home? a) a room of your own, b) a link to the Internet, c) a dishwasher, d) a DVD player, e) air conditioner, f) digital TV, g) kimchi refrigerator (0 = No, 1 = Yes)</td>
<td>-0.70 (0.61)</td>
</tr>
<tr>
<td></td>
<td>How many of these are there at your home? a) cellular phones, b) televisions, computers, c) cars, d) rooms with a bath and shower (1 = 0, 2 = 1, 3 = 2, 4 = 3)</td>
<td></td>
</tr>
<tr>
<td>Home Educational Resources</td>
<td>Which of the following are in your home? a) a desk to study, b) a quiet place to study, c) a computer to study with, d) educational software, e) books to help with school work, f) technical reference books, g) a dictionary (0 = No, 1 = Yes)</td>
<td>-0.10 (0.96)</td>
</tr>
<tr>
<td>Home Cultural Possessions</td>
<td>Which of the following are in your home? a) classic literature, b) books of poetry, c) works of art. (0 = No, 1 = Yes)</td>
<td>0.27 (0.94)</td>
</tr>
<tr>
<td>Number of Books at Home</td>
<td>How many books are there in your home? (1 = 0–10 books, 2 = 11–25 books, 3 = 26–100 books, 4 = 101–200 books, 5 = 201–500 books, 6 = more than 500 books)</td>
<td>3.91 (1.31)</td>
</tr>
</tbody>
</table>

**Gender.** Gender was based on students’ report on their sex (boys = 0; girls = 1).

**Urbanicity.** Urbanicity was measured by the location of schools with the following five categories: village, small town, town, city, and large city. I collapsed these categories to create a dichotomous variable indicating whether students attended a school in city (= 1) or elsewhere (= 0).
3.3 Analytical Strategies

The dependent variable in this study was a dichotomous variable reflecting whether students attended out-of-school classes that were organized by a commercial company and were funded by the students’ parents. To address the research question (i.e., Does ability composition have an effect on the use of shadow education?), a logistic regression was employed. From this analysis, we can predict the likelihood of students using shadow education according to their abilities. To examine the relationship between shadow education and peer effects more systematically, this study employed three models, adding additional variables in each stage.

For the first model, I focused on the effect of student ability on the use of shadow education, controlling for students’ socioeconomic status (SES), gender (i.e., female), and students’ school location (i.e., in an urban area). In the second model, I added school-level ability controlling other variables to understand how the influence of students’ abilities on the use of shadow education still holds when the school-level ability was added. Model 3 added all the variables.
4.1 Descriptive Results

Table 2 presents the descriptive statistics for the variables used in the analysis. The results indicate that the prevalence of shadow education was approximately 48%, which means almost half of 15-year-old Korean students participate in shadow education related activities. The average of the individual students’ academic achievement indicates that Korean students outperformed (547.80) students in other countries (OECD, 2012). Since school ability was the aggregate of all student scores, it was nearly the same score as that for student ability. Between-school variation (53.74) appeared lower than the individual level of differences in academic achievement (81.78) and the range was smaller at the school level (from 367.51 to 692.39) than student level (from 210.33 to 791.79).

With respect to the other control variables, female students made up 46% of the student sample. Almost 86% of students in Korea were living in a city because of the high rate of urbanization and urban population in Korea (Kim, 2014).

Table 2 Descriptive Statistics

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
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<td>0.5</td>
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<td>81.78</td>
<td>210.33</td>
<td>791.79</td>
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<td>692.39</td>
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<tr>
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<td>0</td>
<td>1</td>
</tr>
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</table>
4.2 Logistic Regression Results

Table 3 shows the results of the logistic regression model. This model predicts the likelihood of participation in shadow education based on each variable. Model 1 shows the likelihood of participating in shadow education according to their abilities, controlling for student SES, gender, and urbanicity. It indicates that students with higher abilities are more likely to engage in shadow education. As mentioned earlier, since it is not easy to distinguish the causal relationship between academic achievement and the use of shadow education, this regression equation implies only a high correlation between both variables. Student SES also has a positive influence on shadow education. Students who reside in an urban area are more likely than students in a rural area to engage in shadow education activities. There is no relationship, however, between gender and participation in shadow education.

Model 2 adds the variable of ability at the school level. It shows that while, on average, students in schools with higher abilities are more likely to engage in shadow education, the significance of ability at the student level disappears. The insignificance of the influence of student-level ability suggests that students’ use of shadow education is affected by school ability, and that student ability by itself is not related to shadow education use. In other words, when school ability is added, students with higher ability peers are more likely to engage in shadow education regardless of their own abilities. Despite small changes in the sizes of the coefficients of the control variables, Model 1 and Model 2 have no differences in terms of significance.

In Model 3, however, the influences of both student ability and school ability on the use of shadow education lose their significance. Results of Model 3 suggests that, on average, students in schools with a higher SES are more likely to participate in shadow education. The influence of student SES on shadow education is still significant, which means that students who have a higher SES are more likely to engage in shadow education. The results also suggest that
the reason students in higher ability schools are more likely to engage in shadow education in Model 2 may be due to high levels of school SES. The significance of the other control variables remains the same.
### Table 3 Estimated Coefficient of Logistic Regression Model Predicting Participation in Shadow Education

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th></th>
<th></th>
<th></th>
<th>Model 2</th>
<th></th>
<th></th>
<th></th>
<th>Model 3</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β</td>
<td>SE</td>
<td>OR</td>
<td>95% C.I.</td>
<td>β</td>
<td>SE</td>
<td>OR</td>
<td>95% C.I.</td>
<td>β</td>
<td>SE</td>
<td>OR</td>
<td>95% C.I.</td>
</tr>
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<td>0.000</td>
<td>1.002***</td>
<td>-0.000</td>
<td>0.001</td>
<td>0.100</td>
<td>-0.001</td>
<td>-0.000</td>
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<td>-0.001</td>
</tr>
<tr>
<td></td>
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<td>0.001</td>
<td>1.005***</td>
<td>0.003</td>
<td>0.006</td>
<td>1.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>1.001</td>
<td>0.001</td>
</tr>
<tr>
<td>SES</td>
<td>Student</td>
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<td>0.041</td>
<td>1.507***</td>
<td>0.329</td>
<td>0.491</td>
<td>1.449***</td>
<td>0.288</td>
<td>0.453</td>
<td>0.296</td>
<td>0.045</td>
<td>1.344***</td>
</tr>
<tr>
<td></td>
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<td>0.749</td>
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<tr>
<td>Female</td>
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<td>0.998</td>
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<td>0.144</td>
<td>0.006</td>
<td>0.075</td>
<td>1.006</td>
<td>-0.140</td>
<td>0.153</td>
<td>0.025</td>
<td>0.075</td>
</tr>
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<td>1.874***</td>
<td>0.408</td>
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<td>0.604</td>
<td>0.113</td>
<td>1.829***</td>
<td>0.383</td>
<td>0.825</td>
<td>0.557</td>
<td>0.114</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-1.503</td>
<td>0.284</td>
<td>0.222***</td>
<td>-2.060</td>
<td>-0.945</td>
<td>-3.029</td>
<td>0.425</td>
<td>0.048***</td>
<td>-3.863</td>
<td>-2.195</td>
<td>-1.321</td>
<td>0.569</td>
</tr>
<tr>
<td>N</td>
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<td></td>
<td></td>
<td>3.107</td>
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<tr>
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<td></td>
<td></td>
<td>-2040.572</td>
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<td></td>
<td></td>
<td>-2030.495</td>
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<td></td>
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<td>0.0462</td>
<td>0.0518</td>
<td>0.0565</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: β; Regression Coefficient, SE; Standard Error, OR; Odds Ratio, CI; Confidence Interval

*p < 0.05, **p < 0.01, ***p < 0.001
Chapter 5

Discussion

5.1 Key Findings

Since the Coleman report (Coleman, 1966), peer effects have been considered a significant factor influencing inequality in education. If students have different educational experiences when they are with different groups, then peers matter, and inequality is an issue. In this study, I attempted to extend literature on peer effects by examining how different peer abilities affect students’ use of shadow education. Though there are many ways to influence students’ educational experiences, I chose to analyze the impact of peer effects on shadow education. Given the prevalence of shadow education in Korea, I argue that it is important to examine whether ability composition affects the use of shadow education, how this relationship, if any, works, and what mechanism it produces.

My analyses of the PISA 2012 data revealed that shadow education and academic achievement are positively correlated. Without controlling for students’ previous academic ability, however, it is difficult to know whether higher academic achievement causes greater use of shadow education. Since PISA does not track the abilities of the same cohorts, causal relationships are difficult to establish. Yet, given the extensive use of shadow education and the high educational expectations in Korea, the high correlation between shadow education and academic achievement does indicate that shadow education is used for enrichment purposes and high achieving students frequently use shadow education in Korea (Baker et al., 2001).

Second, ability composition does not affect the use of shadow education, after controlling for other variables, especially school-level SES. In other words, the relationship between shadow
education and peer effects disappears when controlling for school-level SES. The strong influence of both individual and school SES and the nonexistent influence of ability composition all suggest that, though peers matter, rich peers matter more. That is, when students attend higher SES schools, students are more likely to use shadow education services. Therefore, though prior studies show that peer pressure in academic achievement certainly exists (Henderson et al., 1978; Rumberger & Palardy, 2005), the current study suggests that the main issue regarding shadow education is SES, which can provide more opportunities to explore a variety of academic resources.

Though this study cannot establish a causal relationship between shadow education and academic achievement, it is obvious that having access to shadow education enables students to have more educational experiences beyond formal education. As Bray (1999) mentioned, shadow education is supplementary to formal education, and the demand for shadow education is higher when students’ desire for academic achievement is higher. Especially in Korea, where shadow education is extensively used, it may provide an advantage to those who can access it, even though all low-achieving students are greatly motivated in academically integrated schools (Summers & Wolfe, 1977; Zimmer & Toma, 2000). In this case, since shadow education is a private resource, its allocation depends heavily on the student’s SES; thus, the high prevalence of shadow education and the high correlation between the use of shadow education and academic achievement in Korea is likely to result in uneven resource distribution and, thus, discontent.

In keeping with the focus of this issue, attention to school-level SES is needed to maintain positive peer effects. Peer pressure does not appear in shadow education because shadow education is an economically exchangeable resource that is strongly affected by SES. In considering the positive relationship among academic ability, SES, and the use of shadow education, school-level SES provides an opportunity to experience positive peer effects for students in schools with high SES. Therefore, ability and SES is highly connected (Lee &
Burkam, 2002). This correlation benefits students in high SES schools with positive peer effects because students in high SES schools are more likely to be surrounded by high-achieving peers. There is an insignificant relationship between ability composition and shadow education; however, in the relationship between ability and high SES, the school-level SES allows students in higher ability schools to access shadow education easily since students in high-ability schools also seem to be in schools with high SES. This mechanism, taken as a whole, raises the importance of SES at the individual level and at the school level. Although many studies have found a positive correlation between individual SES and academic achievement (Sirin, 2005), this relationship could be magnified in the school context, demonstrating the danger of SES segregation among schools.

5.1.1. Shadow Education and Inequality

As a new educational resource, shadow education creates another problem: inequality. Since shadow education is private by nature, it is more likely to be accessible to students from higher socioeconomic backgrounds. These students are also more likely to attend universities (Stevenson & Baker, 1992). Therefore, if it is proven that shadow education increases students’ academic achievement, its influence on social inequality should be highlighted. According to Buchmann, Condron, and Roscigno (2010), social class inequalities in test preparation—including, particularly, costly SAT courses and private tutoring—are notable and have at least moderate consequences for SAT scores and selective college enrollment.

The large amount of attention given to shadow education lies in its contribution to social inequality. When shadow education is closely related to SES, and it is the resource used to increase academic achievement, this emerging resource definitely contributes to an inequality issue. Stevenson and Baker (1992) noted that shadow education matters when there is a tight
linkage between the outcomes of educational opportunities, occupations, and general social status. The connection between the selective universities and the high-paying occupations lead to the extensive use of shadow education (Stevenson & Baker, 1992). Making a clear transition from school to career emphasizes the importance of academic achievement, which leads to shadow education being used as cultural capital that helps students attain the diploma that leads to economic capital (Bourdieu, 1986).

The findings of this study include peer effects in a society where meritocracy and capitalism are closely related. The students’ access to shadow education depends on their own socioeconomic backgrounds, even though higher-achieving peers provide positive peer effects. This limited access to academic resources contributes to the freezing of social mobility; therefore, society should be aware that shadow education could be a catalyst of inequality. In contrast, a positive correlation between academic achievement and shadow education adds to the existing negative peer effects in low-achieving schools, suggesting a potential increase in the danger of segregation among schools.

5.2 Policy Implications

This study has important implications for educational policies in Korea and other countries. The global trend of the growth of shadow education (Byun & Baker, 2015) is likely to contribute to unequal resource allocation. Since shadow education is highly correlated with academic achievement, more research about the effect of shadow education on academic achievement is required.

This study emphasizes the significance of mixed composition in abilities and SES in schools. Positive correlations among academic achievement, SES, and the use of shadow education indicate that any type of segregation may aggregate inequality in education. Peer
effects can contribute to the students’ academic achievement; therefore, if there is a wide variation of abilities and SES in schools, the variation will negatively affect some students by preventing them from accessing more resources and will affect others by not allowing them to benefit from positive peer effects. That is, when the students’ academic achievement increase in academically integrated schools, it is important that they can access various academic resources, regardless of their own SES. Even the government aims to minimize the academic variation between schools; if the socioeconomic variation between students in schools is wide, the positive peer effects could be limited in terms of using more resources. The government needs to, therefore, keep an eye on the variation between and within schools with the consideration of peer effects in mind. In particular, attention should be given to students in lower-achieving schools. Even though the causal relationship of these variables is still vague, any disadvantages in the use of educational resources causes an unequal educational environment. To prevent academic and social segregation with respect to educational quality, quality of schools still needs attention to compensate for the negative peer effects.

The case of Korea implies that the peer effects on shadow education are significant in the particular situation where shadow education is prevalent, closely related to academic achievement, and generally used for enrichment purposes. Though there are huge variations in the prevalence of shadow education across countries, the Korean case suggests the need for discussion of the inequality problem caused by shadow education. In a country where shadow education is more likely to be used for remedial purposes, it seems less likely to be associated with academic success. Yet, even if shadow education is generally used for low-achieving students who aim to catch up with their peers, this study suggests the importance of awareness of the danger of economic differences in integrated schools. Since the difference in SES still causes frustration and limited opportunities to use academic resources, even the government expects the
positive peer effects in academically integrated schools, especially if students want to catch up to
their peers and use shadow education for remedial purposes.

5.3 Limitations

There are several limitations. First, since the questionnaire on out-of-school activities included all subjects, any significant spending on non-academic subjects (e.g., sports, music) could have been counted as shadow education, thus affecting the results. Therefore, the hypothesis of this study assumed that most paid out-of-school activities fell into the three main academic subjects mentioned earlier: reading, math, and science. Furthermore, due to data limitations, this study was unable distinguish between shadow education effects and academic achievement effects. Despite their high correlation, no causal relationship could be determined without knowledge of previous academic achievement, which could reveal a clearer relationship. If future study could make a clear causal relationship between two variables, it would be easier to give constructive suggestions to policymakers regarding inequality in shadow education.

In addition, school type is another major issue in the Korean context, since different types of schools (e.g., vocational schools) could use shadow education differently. However, PISA 2012 provided school type data only for private and public schools. Since this distinction does not make a major difference with respect to the use of shadow education in Korea (Lee, 2004), this study did not control for school type. Finally, various cultural contexts and specific government policies that have not been addressed could have influenced the results. Future studies could develop the issue of peer effects in shadow education by investigating more countries’ educational systems. Even though this study only problematized the peer effects in Korea based on the particular context in which shadow education is used extensively, studies in other countries might suggest different implications for this field. Thus, adding more control variables based on
the precise techniques in this study may support the existence of peer effects in shadow education and their contribution to educational inequality.
Appendices

Appendix A. Distribution of shadow education

<table>
<thead>
<tr>
<th>Out of school study time-commercial company</th>
<th>Freq.</th>
<th>Percent</th>
<th>Cum.</th>
</tr>
</thead>
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<td>51.56</td>
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<tr>
<td>2</td>
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<td>Total</td>
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### Appendix B. Correlation among variables

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<th>Use of Shadow Education</th>
<th>Student Ability</th>
<th>School Ability</th>
<th>Student SES</th>
<th>School SES</th>
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### Appendix C. Missing rate of variables

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References


