

4 Education Systems: Assignment, Admissions, Accountability and Autonomy

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Abstract

This chapter focuses on education market systems, as one of the key issues for policy in education. Research suggests that a coherent market structure for schools is very important for attainment. The key elements are: assignment of pupils to schools and admissions policies, and school accountability and autonomy. The central element of the market structure is the assignment mechanism, which allocates each child to a school. There are different such mechanisms available: school choice, neighbourhood schooling and elite schooling or ‘tracking’, which assigns pupils on the basis of an exam. Other key elements include governance rules and hierarchy: school accountability and school autonomy. Finally, the nature of school leadership is tied up with the degree of autonomy – leaders are far more important in autonomous schools.

4.1 Introduction

Education is crucially important for many of the policy outcomes that citizens and politicians care about. At an individual level, your education affects your earnings, your employability and your chance of succeeding in life starting from a disadvantaged neighbourhood. It also affects your health, future family structure, intellectual fulfilment and other aspects of a good life. At a national level, a country’s stock of skills matters hugely for its prosperity and growth rate. The distribution of skills is a big determinant of inequality, and the relationship of a person’s skills to their background is central to the degree of social or intergenerational mobility.

Providing education costs a lot: on average in 2011 OECD countries spent over 6 per cent of their GDP on educational institutions; and it accounted for almost 13 per cent of total public spending in the OECD (<http://www.oecd.org/edu/education-at-a-glance-2014.pdf>), so governments are keen to make it as productive as possible. And schooling takes up a lot of time in young lives – if you’re under 20 years old, being at school, thinking about school and doing

school work take up a huge fraction of your time awake, on average perhaps around 10,000 hours in school over the OECD. And in older lives too, parents of school-age children also spend a lot of time, energy and stress worrying about their child's education.

Unsurprisingly then, there has been a lot of research on education. A lot of progress has been made, there are a number of things researchers are now fairly confident about. But there are also many open questions, and no doubt new questions yet to be asked, so a great deal of research is still needed. One of the corollaries of this is that more and different datasets are needed. New knowledge has been gained by using traditional surveys, including the difference in earnings that people receive for having higher skills. But increasingly, new data types are being exploited in this field and it is often these that are yielding the current big breakthroughs.

I take 'human capital' to mean the stock of skills, traits and knowledge that an individual possesses. It is important to be clear that there are multiple valuable skills, and that human capital does not just mean IQ. It is really only relatively recently that researchers have begun to map out the range of skills that can be considered part of human capital and we cannot yet determine precisely which types of human capital matter most in particular areas and contexts. Like other capital, human capital grows through being invested in, and that investment is called education. Not all education is done in schools; families are a very important part of the process. But education in schools is perhaps the primary lever for policies on human capital.

The full review as a whole aims to describe the research frontier on human capital and education in economics research. It delineates what is known and largely agreed, and what the most promising lines for future research are.¹

In this chapter, I focus on education market systems, as one of the key issues for policy in education. A coherent market structure for schools to operate in is very important for attainment, as cross-country comparisons suggest. The central element of the market structure is the assignment mechanism, which allocates each child to a school. There are different such mechanisms available: school choice, neighbourhood schooling and elite schooling or '*tracking*', which assigns pupils on the basis of an exam. Other key elements include governance rules and hierarchy: school accountability and school autonomy. Finally, the nature of school leadership is tied up with the degree of autonomy – leaders are far more important in autonomous schools. The evidence reviewed in this chapter will chiefly consist of research that identifies causal effects.

Education policy-making in the European Union happens on different levels. Policy is determined at a national level,² but the European Commission offers support to its members addressing common educational challenges, primarily focussing on skills deficits. The relevant framework is 'Education and training 2020'.³ ET2020 has four common EU objectives: enhancing lifelong learning;

improving the quality and efficiency of education; promoting equity and social cohesion; and enhancing creativity, innovation and entrepreneurship. In 2015, the EU set new priorities for education again around promoting employability and skills, increasing social mobility, but also this time aiming to counteract '*fanaticism*' and promote democracy.

4.1.1 *What Can Economics Contribute to the Study of Education?*

The decisions by families and individuals on how much to invest in human capital are the standard types of decisions that economics can fruitfully analyse. They involve trade-offs between current costs and future benefits, interrelated dynamic decisions and risk. The education system has actors with goals and constraints who interact in an allocative mechanism. This is well-suited to an economic analysis. Researchers are using the tools of industrial economics to understand the incentives and constraints of all the different players in the market, and to analyse their interactions. Typically in Europe and the US, education does not function as a straightforward marketplace, so there has been interest in other forms of accountability to replace pure market discipline.

Another key contribution of economics is a strong quantitative approach. The majority of research in the economics of education is empirical, and uses a range of techniques including computable general equilibrium models and programme evaluation (see Meghir and Rivkin, 2011 for a review of methods in the field). However, perhaps the most important feature is an emphasis on trying to estimate causal relationships. Causality is not everything and descriptive studies can be extremely useful, for example in identifying need for action, but a policy discussion can really only take off from causal studies.

Of course, other disciplines also bring insights to education. In recent years, economists have started to combine effectively with psychologists and neuroscientists in the study of the development of cognitive and noncognitive abilities and traits (for example, Cunha et al., 2006), with geneticists in studying the origins of traits and abilities (Benjamin et al., 2012) and also with behavioural scientists in trying to understand motivations and the best way to design incentives (for example Levitt et al., 2012).

4.2 **The Aims of Education: Rates of Return, Inequality and Social Mobility**

Education is central to three very important policy domains. First, human capital and education are key, causal, drivers of growth and prosperity. Second, the distribution of human capital across people is an important determinant of income inequality, ever more important with a high wage premium for skills. Third, with higher inequality has come a renewed interest in social mobility,

and the relationship between a person's human capital and their background is a major determinant of social mobility.

Starting with growth, Goldin and Katz (2008) write simply that higher levels of education lead to higher labour productivity, and that higher aggregate levels of education in a country support faster national economic growth. They explain why: 'Economic growth ... requires educated workers, managers, entrepreneurs, and citizens. Modern technologies must be invented, innovated, put in place and maintained' (pp. 1–2). Recent cross-country analysis bears this out. Hanushek and Woessmann (2012) show that measures of cognitive skills are strongly associated with economic growth. Previous research had found mixed evidence of a role for education in influencing growth, but Hanushek and Woessmann argue that this previous research used the wrong measure of attainment, and that completed years of schooling or national enrolment rates in education do not capture skills. Instead, they use direct measures of cognitive skills from international tests of maths and science abilities among pupils in 50 countries. The effect size is not trivial, since even small additions to a long-run growth rate are valuable. A quarter of a standard deviation rise in the cognitive skill score implies a higher growth rate of 0.3 to 0.5 percentage points; for comparison, the authors note that the difference between the US's PISA performance and the top performers is 40 per cent of a standard deviation.

To establish that the relationship is causal, Hanushek and Woessmann implement an instrumental variables strategy and use school institutional features (the presence of external exit exams, the share of privately operated schools, and the centralization of decision-making) as instruments. The implication is therefore that these policies are effective drivers of growth. They have since expanded the argument at greater length in Hanushek and Woessmann (2015), and quantified the very high cost of low skills to national income in Hanushek and Woessmann (2010).

Turning to inequality, Goldin and Katz (2008) argue that we can think of earnings inequality and growth as the outcomes of a 'race' between education and technology. When the education system produces skilled people at a fast rate (at least keeping up with the increasing demand for skills from technological advance) then average income rises and inequality falls. For example, they argue that this picture characterizes the US for the first three-quarters of the twentieth century. But when the supply of skill slows behind technological advance, then inequality rises, distinguishing the time since the 1980s. They say 'the skill bias of technology did not change much across the century, nor did its rate of change. Rather, the sharp rise in inequality was largely due to an educational slowdown' (p. 8). A lot of the foundational work understanding the sharp rise in inequality was carried out by Katz and co-authors, summarized in Katz and Autor (1999). It has been established that the higher inequality is

largely accounted for by a rising premium for skills, for education, from the 1970s. Whilst a lot of the early discussion focussed on technological change, it is now clear that the return to skills depends on both demand ('technology') and supply ('education').

One of the enduring concerns in developed economies is the question how you get on in life. Getting an education has always been part of the answer, evidenced by innumerable stories from around the world. At an individual level, education can be seen as a way out of an unpromising start in life, an escape route. Over the last decade, policy-makers have focussed on this, and comparing rates of intergenerational mobility between countries (Jäntti et al., 2006). Intergenerational mobility or social mobility is about where you end up in an economy relative to where you started; basically a correlation between the income of the present generation and their parents' income.

Black and Devereux (2011) see a substantial shift in emphasis in economists' studies of intergenerational mobility over the previous decade, away from refining measures of persistence towards understanding the underlying mechanisms that generate that persistence. Education, skills and (natural) abilities are at the heart of this. A very useful simple model by Solon (2004) considers intergenerational transmission as depending on parents passing on genetic endowments and investing in the education of their children, on the return to that education, and on the progressivity of government policy on education. Since heritability is fixed, Black and Devereux note that we can best understand differences in intergenerational mobility by focussing on 'differences in the returns to skills ...and differences in government investments [in education]' (p. 1500). Evidence from international cross-sections (Ichino et al., 2009) and across US states (Mayer and Lopoo, 2008) backs up the idea that social mobility is higher when public education is better funded. Recently, Chetty et al. (2014) have used administrative data to characterize cities in the US as having high or low intergenerational mobility; they show considerable variation across the country, and one of the correlated factors is the quality of primary education. Gregg et al. (2013) in an international comparison stress variations in the return to education as a driver of differences in intergenerational income persistence. A much more focussed version of essentially the same question is put by Dobbie and Fryer (2011a) and Fryer and Katz (2013): is a high-quality school enough to break out of a cycle of intergenerational poverty? Focussing on the Harlem Children's Zone schools and using quasi-experimental methods, they answer optimistically.

So education matters centrally in many of the biggest economic policy debates. Before moving on, it is worth noting that education has been shown to have impacts on other outcomes too: health, crime, household structure and happiness. Last in this list, but first for some people, it is a source of personal fulfilment and inspiration.

4.3 Education Systems: Assignment, Admissions, Accountability and Autonomy

The processes underlying the formation of human capital, the delivery of effective education, and the returns to schooling form the ‘fundamentals’ of human capital. The systemic issue is to design an education system that facilitates the best outcome given these fundamentals. The important role of the family in early education suggests that an education system could be construed in a very broad sense to include areas of social policy. However, that is beyond the scope of this chapter and this section relates to the education system as typically understood, relating to schools and higher education.

4.3.1 *Assignment Mechanisms*

At the heart of every school system is a set of rules to assign pupils to schools. Consider one city; there is a set of pupils with particular characteristics (location, parental background, ability) and a set of school places with characteristics (for example, a highly effective school or an ineffective school, a particular specialism, location). Assuming that there are enough places overall, the question is: which pupil goes to which school? What is required is a mapping that assigns each pupil to a school based on her characteristics and its characteristics. The dependence on characteristics can be null – for example, a simple lottery over all pupils into all schools. Or the function might assign pupils purely on location, or on ability, and so on. Another mechanism is choice: families list their preferred schools and this plus school priorities, determines the assignment.

The assignment mechanism constitutes the main element in the ‘*rules of the game*’ in the education market. As such, it is part of the incentive structure of all the players, families and pupils, and schools. Different assignment mechanisms will generally yield different outcomes for a range of measures of interest: mean attainment, variation in attainment, school sorting, social mobility and inequality.

The most common assignment mechanisms are: neighbourhood schooling (each pupil goes to her local school); tracking or elite schooling (schools are allocated on the basis of a test score); and choice-based schooling (school assignment depends on parental choice and school capacity). I also consider assignment based directly on income – the role of the private sector interacting with state schools. I discuss these in turn, and the evidence on how they affect outcomes. But first, I review evidence on parents’ preferences for schools.

What Are Parental Preferences for Schools?

Preferences matter most obviously under a regime of school choice. But they also matter whatever the assignment mechanism, as there will in general be

strategies available to parents to raise their chance of getting their most preferred school. This includes moving house under a neighbourhood schooling rule, and intensive additional coaching under an exam-based assignment rule.

There are a number of empirical challenges in estimating preferences for schools, particularly around identification. It is generally impossible to know the pool of schools that parents consider when making their choice, so this has to be estimated. Also, given that admissions to popular schools have to be rationed, it can be difficult to disentangle parental preferences from school priorities. Finally, as I discuss below, it is not always optimal to put down the truly preferred school as the top choice and this also complicates the analysis.

Hastings et al. (2008) use school choice data from Charlotte-Mecklenburg, North Carolina, to estimate a mixed-logit demand model for schools. They find that parents value school-home proximity and academic attainment highly. They also find considerable heterogeneity in preferences and for example show that the preference attached to a school's mean test score increases with household income and with the child's academic ability. They use their model to estimate the elasticity of demand for each school with respect to mean test scores in the school. They find that demand at high-performing schools is more responsive to increases in mean test scores than demand at low performing schools. Their model also implies a 'mobile', more affluent group of families exerting pressure on school performance, and a less mobile, less affluent group essentially going to the local school.

Hastings and Weinstein (2008) make an important distinction between a family's preferences for school characteristics and the information they are able to access about the schools. Using a mix of field and natural experiments, they show that the provision of additional information on school characteristics does change school choices, particularly for disadvantaged families.

Burgess et al. (2015a) estimate the preferences of parents for schools in the UK, as a function of the school-home distance, the academic performance of the school, school composition in terms of socio-economic status and ethnicity, and whether it is a faith school. They pay attention to the key method for rationing access to over-subscribed schools (distance) and define a set of schools for each family in the data that they could almost surely access. They also find academic performance and proximity to be highly valued; social composition is also valued, but ethnic composition has no effect. By comparing schools that are feasible by distance and the subset to which the family has almost-sure access, they show that the use of the distance rule for rationing access has strong regressive effects.

There are a few other studies using different techniques. Schneider and Buckley (2002) use an online schools database in Washington, DC to track parent search behaviour for schools as an indicator of parent preferences. They find that patterns of search behaviour depend on parent characteristics, and find a

strong interest in the demographic composition of a school. Rothstein (2006) adopts a more indirect approach to evaluate the relative weight parents place on school effectiveness and peer group and finds little evidence that parents focus strongly on school effectiveness.

Pupil Assignment by School Choice

School choice has been much studied, principally, but not only, in the US. It is seen as a way ‘out’: a way of escaping a low-quality local school and attending a better school further away. It is also seen as the basis of school competition, raising standards in all schools. Research has considered the outcome of this process, for individual pupils as well as at a systemic level.

It is useful to distinguish two senses of ‘school choice’: as a systemic market rule for assigning all pupils to schools; and as a specific individual entitlement to attend a different school to your current one, rather like a voucher. I deal with the systemic market rule first.

Does School Choice as a Systemic Market Rule Raise Attainment?

The claim is that school choice induces competitive pressure on low-performing schools to improve (Hoxby, 2003b). If parents value academic attainment and have the information to recognize it in a school, if their choices make a difference to the allocation, and if schools benefit and expand with greater demand, then the market should operate to raise the attainment. Low-performing schools lose pupils, lose funding and so work to reverse this by raising their performance. A counter-claim is that enhanced choice results in greater sorting or stratification across schools in poor and affluent neighbourhoods. Academic and policy debates on school choice remain controversial and unresolved. A recent contribution from Avery and Pathak (2015) reminds us of the complexities of school choice programmes when residence is a choice variable, and that the distributional consequences can be surprising.

Research in this field proceeds by defining some measure of the degree of choice that families have, and relating this measure to attainment scores. As always, the key issue is to identify a causal effect; there are many studies reporting associations between the two (reviewed in Belfield and Levin, 2003), but plausibly exogenous differences in competition are much harder to find.

A market for school places is inherently spatial – you have to actually be in the school all day, so measures of competition are about geography. This includes the number of different school districts that are close together (so could be chosen whilst working in the same job for example), the number of schools within a short drive from home and so on. For example, a number of studies use the HHI (Herfindahl-Hirschman Index) of local districts as proxies for competition (Hoxby, 2000, for example). Alternatively, Burgess et al. (2007) combine school locations with a complete road map to define 10-minute drive

time zones around each school, and then for each school count the number of other schools in the zone. Feasible school choice is almost always going to be higher in densely populated urban areas, which are, of course, different in many ways from rural or suburban areas. Consequently, simple associations between this measure of choice and attainment are likely to be biased by confounding variables.

The best known attempt to establish causality is Hoxby (2000), who uses natural landscape features to instrument for historical school district boundaries and the HHI. She shows that areas with more school districts – higher competition – raise attainment. The findings have been strongly questioned by Rothstein (2007), however, arguing that they are not robust to simple changes in data coding; taking these into account he finds no impact of competition. A more structural econometric approach is taken by Bayer and McMillan (2010), who adopt an equilibrium sorting model between neighbourhoods (see Bayer et al., 2007) and use the slope of the school's demand curve to measure the degree of competition each school faces. They find that a one standard-deviation increase in competition leads to a 0.1 standard-deviation improvement in attainment.

In the UK, there have been two attempts to estimate a causal effect, both yielding low to zero impacts of competition. Gibbons et al. (2010) use the distance of a school from its nearest local authority boundary to instrument the amount of competition it faces; they find no overall effect of choice or competition on school performance. Burgess and Slater (2006) use the administrative boundary change of 1998 that split Berkshire into six local authorities to estimate the impact on pupil progress of possible falls in competition across the new boundaries. They also find no significant impact of these boundary changes on pupil achievement.

School choice as a systemic rule has a long history in the Netherlands and in Denmark, and something of a history in Sweden since 1992. A number of studies of the Swedish system are discussed below. In the Netherlands, parental choice of school has been in place since the early twentieth century. Dijkgraaf et al. (2013) find that increases in competition as measured by the HHI are associated with a small decrease in attainment, but this is not a causal study. Competition specifically from Catholic schools also appears not to have an impact. de Haan et al. (2011), using a law change for identification, find a negative effect from a city having more but smaller schools, although the effect disappears once school size is controlled for.

Lavy (2010) considers a school reform in Tel Aviv that switched from an inter-district bussing programme to a school choice system. As this is not experimental variation, Lavy uses alternative identification strategies and comparison groups and shows that the choice system increases school completion and raises cognitive achievement (it also raises students' satisfaction with the school).

Choice as a Voucher

The idea of an educational voucher is that it entitles a child to go to a different school than her default or 'normal' school. Details vary hugely by scheme, but in essence it is seen as an 'escape' from a low-quality local school. This is generally a specific entitlement (for example, Figlio and Page, 2002 consider a scheme in Florida in which students in 'failing' schools are given vouchers, which they can use to move to an alternative school) rather than a system-wide assignment mechanism, although it is sometimes combined in system-wide reforms as in Sweden. The outside option school can be a private school (as in Sweden, though with capped fees) or a charter school as is often the case in the US. The biggest voucher programmes are in Chile and Colombia (see Bettinger et al., 2011, for a survey) but they are also part of the system in Sweden and the Netherlands; and of course in the US.

In all of these cases, there are two main research and policy questions: what is the impact of the voucher on the individual who receives it? And what is the impact on the system as a whole, on those '*left behind*' in the low-performing schools? There are also complex general-equilibrium theoretical issues in voucher schemes that are summarized by Eppe and Romano (2012).

There still appear to be no definitive answers to the two core empirical questions. In a substantial recent review, Eppe et al. (2015) argue that the bulk of the findings suggest no significant effect, yet 'multiple positive findings support continued exploration'. The task now seems to be to understand the role of the context in determining the variation in outcomes. In surveying work outside the US, Bettinger et al. (2011) argue that evidence from Columbia on the impact on the voucher-user is possibly the strongest, but it may not be causal. On the second question, there is some evidence that the system improved in Sweden (for example, Björklund et al., 2004 and Böhlmark and Lindahl, 2007) but it is difficult to single out the voucher component as many reforms were introduced together in 1992. More recently Böhlmark and Lindahl (2012) now find small positive results from competition and choice, ten years after the reform.

Evidence from the US is also complex and contested, and generalizing is difficult given the differences in design (Ladd, 2002) and in some cases small numbers. The evidence on the impact on the voucher-using student is mixed. Peterson et al. (2003), for example, examine data from three privately funded school voucher programmes in New York, Washington DC and Dayton, Ohio. In all three schemes, a lottery is used to allocate vouchers among eligible (low income) families, and the voucher does not cover full costs. Test-score gains from switching to private schools are evident for African-Americans but not for students from other ethnic backgrounds. Hoxby's (2003b) review of the evidence from recent studies using randomized control groups of students from lottery allocation mechanisms shows the same. Cullen et al. (2006) collect data

from the lotteries used to allocate students to oversubscribed schools in the Chicago Public School (CPS) system; arguably in the CPS choice is essentially systemic as over half the pupils do not attend their default school. Cullen et al. (2006) find that winning a lottery has no impact on test scores at ninth or tenth grade. They speculate why this might be, but it is not because the treatment had no effect, as the lottery winners did attend schools that are better across several dimensions. Nor is it that winners had longer school commutes and more disruption to their friendship groups. It is true that lottery winners have lower in-school rank than the losers, which may be a factor in greater school drop-out. They do find positive effects on nonacademic outcomes and consider that this might be the reason that parents enter school lotteries rather than for attainment improvements. Howell's (2004) work on New York City also cautions that the final users of targeted vouchers may differ significantly from the average intended user: among targeted voucher schemes, those actually using them tend to be the better off in the group.

Turning to the question of the systemic impact, Hoxby (2003c) investigates the causal impact of three school choice reforms: vouchers in Milwaukee, charter schools in Michigan and charter schools in Arizona. In each case, state schools responded to competition from the choice programme by raising the achievement levels of their remaining students. This increase was sufficient to outweigh any negative allocation effects. Hoxby's analyses are not unchallenged, Ladd and Fiske (2003) noting that the Milwaukee programme was part of a broader package. Bettinger (2005) challenges the findings for Michigan, and Bifulco and Ladd (2006) find negative impacts in North Carolina.

Does Choice Raise Sorting?

Analysis of choice and sorting is complex with theoretical analysis as well as empirical work contributing insights. Hoxby (2003a) argues that there are no general theoretical predictions about student sorting with choice. In particular, she argues that '*cream skimming*' (schools actively selecting high ability students) is not a general prediction, but is more likely with broad eligibility for vouchers and a uniform value of vouchers; if vouchers are targeted, this will necessarily reduce sorting. Nechyba (2003a,b, 2006) uses a theoretical approach to explore the complex 'spillover' effects of school choice and sorting. For example, Nechyba (2003b) shows that a pure state school system leads to more spatial segregation than a private system. Nechyba (2006) summarizes work on income and ability sorting, discussing different channels of sorting. Similarly, Epple and Romano (2003) analyse three different student assignment regimes: neighbourhood schooling (a strict residence requirement for admission); school choice with no choice costs; and choice over many school districts and show that different public policy regimes have dramatic effects on the nature of sorting. Neighbourhood schooling leads to strong income

stratification across neighbourhoods, whereas costless, frictionless choice equalizes peer groups across schools. Much of this theoretical work, however, analyses a system where individual schools can grow or shrink costlessly to accommodate the outcome of parents' choices; this flexibility is often lacking, in which case the theory is not so useful a guide.

Evidence from England, New Zealand, Sweden and the US suggests that the degree of choice does influence the degree of sorting. For example, Burgess et al. (2007) analyse student-level data from England, and show that the degree of student sorting in terms of ability and socio-economic status varies considerably across the country. Looking at choice, they measure the degree of choice as the number of schools that can be reached within a particular drive time and show that school sorting relative to residential sorting is considerably higher in areas where there is more choice. Cullen et al. (2006) show that in the Chicago state school system, the exercise of parental choice leads to an increase in sorting by ability, although Hoxby (2003b) argues that Chicago does not have pure school 'choice' as money does not follow students, and schools cannot expand or contract much in response to the demand. Again it is worth noting that the last feature is not uncommon. Soderstrom and Uusitalo (2010) analyse student level data from Sweden, and compare student sorting before and after a significant reform to the school admission process in Stockholm, switching from a predominantly residence-based admissions system to an explicitly ability-based system. Unsurprisingly, they find a significant increase in ability sorting in schools, but no change in residential sorting.

Overall, the evidence suggests that, compared with neighbourhood schooling, parental school choice with supply-side flexibility reduces sorting. Parental choice plus poor flexibility on the supply side means that schools have to use some criteria to choose students. The evidence from a number of countries suggests that this combined process of choice by parents and proximity rationing schools leads to greater sorting.

What Are the Best (Truth-revealing) Market Mechanisms to Implement Choice?

Allocations based on school choice need a way of aggregating parental choices and school priorities to yield an assignment. In turn, the nature of the mechanism will affect parents' school nominations (Roth, 1984). Ideally, that mechanism should have optimal properties, for example including the Pareto characteristic that there is no other assignment preferable to all; and whether it elicits parents' true preferences. Abdulkadiroğlu and Sonmez (2003) set out the mechanism design approach to school assignment, and Abdulkadiroğlu et al. (2005a,b) apply this approach to the Boston and NYC school districts respectively, and Pathak and Sonmez (2008) and Abdulkadiroğlu et al. (2009b) subsequently update the design. These papers determine the properties of particular

assignment mechanisms and whether they elicit true preferences from the participants. Revealing true preferences is a weakly dominant strategy in two common mechanisms, Student Proposing Deferred Acceptance (SPDA, Gale and Shapley, 1962, also called Student Optimal Stable Matching) and Top Trading Cycles. More recent refinements, for example restricting the number of schools that parents are allowed to nominate, show that when parents can make only limited nominations, truth telling is not optimal in some circumstances even with an SPDA mechanism (Haeringer and Klijn, 2009 and Calsamiglia et al., 2010).

What is the Effect of Tracking and Selective Schools on the Distribution of Attainment?

An alternative way to assign pupils to schools is by a measure of ability, typically by setting an exam. This is the way that the school system works in a number of European countries. The public school system in Germany is tracked, with entry to the Gymnasium schools determined by exam performance. In the Netherlands, Switzerland and France (from age 15) too, pupils are assigned to different curricula based on their ability or attainment. In some cases these are different curricula within the same school, and in others, different schools; I return to this issue below. This was also the case in England and the Nordic countries until a wave of comprehensive reforms were adopted from the 1950s through the 1970s. In the US, elite ‘*exam schools*’ in New York or Boston are accessed by taking a competitive exam.

The two main questions that researchers have asked are: What is the impact on the system as a whole in terms of inequality and social mobility, and what is the benefit to the student of attending the elite schools? Again the empirical concerns are around dealing with the selection issues inherent in the problem and identifying a causal effect. A theoretical contribution from Brunello (2004) sets out the trade-off in designing an optimal tracked system, differentiating vocational and general education in terms of required labour market skills.

There are two core distributional questions on tracking. Using cross-country evidence and a difference-in-difference methodology, Hanushek and Woessmann (2006) show that it raises inequality. Brunello and Checchi (2007) show that tracking from an early age across schools reinforces the impact of family background on attainment and labour market outcomes and so reduces social mobility. On the other hand, they report more nuanced results of tracking on the scope to access vocational training. The overall level of attainment is lower under tracking and it seems plausible that some families and pupils might reduce their investment in schooling if they know that they cannot go on to higher education. Atkinson et al. (2006) use NPD data to compare value-added attainment across selective and nonselective school districts in England. They use matched selective and nonselective districts and show that

grammar-educated children in selective districts outperform similar children in nonselective districts on average, while nongrammar-educated children in selective districts underperform compared to similar children in nonselective districts. This fits well with the results of Burgess et al. (2014), which show that earnings inequality among children growing up in selective areas is greater than that of similar children growing up in nonselective areas.

Major systemic school reforms took place in Sweden in the 1950s and Norway in the 1960s. These raised the school-leaving age so that mandatory schooling was extended by two years and the system became comprehensive so that all students followed the same track. These have been studied by Meghir and Palme (2005) and Aakvik et al. (2010). Both studies found a weakening of the influence of family background, and Meghir and Palme (2005) show a causal impact of increased earnings among pupils from disadvantaged families. Pekkarinen et al. (2009) exploit a similar reform in Finland in the 1970s and show that the elimination of tracking reduced the intergenerational elasticity of income very substantially.

Students in the elite schools may benefit in many ways, as Brunello and Checchi (2007) describe: pupil peer effects, more effective teachers and possibly greater resources. Estimating the gain to the marginal student of attending an elite school, Clark (2010) uses access data from a district in England to estimate the causal impact of attending a grammar school. He finds small effects of grammar schools on test scores at 16 but larger effects on longer-run outcomes such as taking more advanced courses and more academic courses. Clark and Del Bono (2014) implement a regression discontinuity design to assess the impact of attending a grammar school for a cohort of young people born in Aberdeen in the 1950s. They find large effects on educational attainment, and for women there are long-run impacts on labour market outcomes and reduced fertility. For men no long-term impacts were identified. In the US, Abdulkadiroğlu et al. (2011) and Dobbie and Fryer (2011b) assess the effect of attending elite exam schools in Boston and New York on attainment and test scores. Both studies find limited impacts on student achievements, though Dobbie and Fryer (2011b) find positive effects on the rigour of the courses taken.

The top-level distinction is between comprehensive and tracked systems. As with the discussion of peer groups above, the key trade-off is between the unequalizing effect of differential peer groups (and potentially lower overall investment) in tracking, against the potentially more efficient teaching possible from more homogenous classes that tracking brings. There is also an important distinction between within-school tracking and between-school tracking; the former meaning different curricula, different tracks, offered within the same school, and the latter meaning different schools. Here the issues are about the difficulty of rectifying incorrect assignment of children to schools, versus the cost and practicality of running many curricula within the same school. It

seems that the slowly increasing age of tracking and the greater frequency of within-school tracking suggests that the latter is less of a problem.

What Are the Effects of Neighbourhood Schooling Assignment Rules?

Neighbourhood schooling means that every child goes to her neighbourhood school. This is well illustrated by Fack and Grenet (2010) for Paris: 'During the period under study (1997–2004), primary and middle school assignment was purely residence-based. It was also "strict" in the sense that each school catchment area contained one school only, which means that in principle parents had no control over the choice of their child's public school' (p. 62) and 'School catchment areas are released every school year in the form of book-lets that indicate, for each street section, the assigned public middle school' (p. 63).

What are the implications of this? It does not make families into passive players in the school choice process; it simply turns the school choice into a choice of residence. Given parents' preferences for schools discussed above and a rule that you gain access to a certain school by living in a certain place, popular schools imply popular neighbourhoods. This affects housing demand and so house prices.

There is a substantial literature trying to estimate the true house price premium arising from a popular local school. An influential study is that of Black (1999), in which she adopts a regression discontinuity approach, comparing house prices either side but very close to a school assignment boundary to model the impact of school quality on house prices. She finds that families paid 2 per cent more on the value of the house for a 5 per cent increase in academic quality measured by test scores. Gibbons and Machin (2003, 2006) carry out a similar analysis for primary schools in England, with similar results. The literature as a whole has been summarized by Black and Machin (2011): 'parents are prepared to pay substantial amounts of money to get their children educated in better performing schools. ... A not unreasonable benchmark summary of the magnitude of the average causal impact is that a one standard deviation increase in test scores raises house prices by around 3%'.

This has implications for schools and for neighbourhoods themselves. These are principally around sorting or segregation as discussed above; there are subtle externalities and dependencies at work. Nechyba (2003b) and Epple and Romano (2003), among others, have shown that neighbourhood schooling in a model with peer effects implies income and residential sorting in equilibrium. One of these models' key parameters is the valuation of school performance by parents: the higher this parameter, the higher the level of sorting. It is important to stress that, far from producing an even mix of students (no sorting), neighbourhood schooling produces strong sorting of students by income and ability. This is because parents take steps to achieve their chosen school through other

means – by choosing where they live. So the level of sorting in the absence of choice is potentially quite high.

This sorting produces very heterogeneous income-segregated neighbourhoods, which may matter for reasons beyond education. For schools, this will affect the distribution of attainment if peer groups are important in the education production function. But it also matters for inequality in access to the best schools. The high house prices exclude access to the highest-performing schools. Note that this also applies to choice-based schooling when the proximity criterion is used for rationing places under choice rules (see Burgess and Briggs, 2010 and Burgess et al., 2015b, for estimates of this effect).

Assigning by Income: Private Schools and the State Sector

A fourth mechanism for assigning children to schools is by income and choice, to private, fee-paying schools. There is huge variation across the OECD in the fraction of pupils attending private schools, see OECD, 2012, p. 21. This variation arises in part exogenously from different national laws and regulations, and in part endogenously from the attractiveness of free state schools. There are different dimensions of ‘private’ schooling. This includes the degree of public/private funding and also whether the school is privately managed (again see OECD, 2012, pp. 19–21). An alternative way of thinking about this is whether private schools fees’ are unregulated (for example in England) or are capped at the level of state funding (for example in the Netherlands and Sweden), in which case the ‘private’ aspect is in the operations and management of the school, and the system is more akin to a voucher scheme.

What are the implications of these schools for the national education system? Focussing first on the pupils themselves, since attending these schools is a proactive choice, the revealed preference suggests that the parents are happy with the outcome relative to the marginal state school (for example, Green et al., 2012, track the changing earnings return to a private school education in England). As Brunello and Rocco (2008) note, this outcome may not always be the level of attainment, but may be the ability to cope with difficult-to-teach children.

The main question is about the systemic impact, and the interaction between state and private sectors. Eppele et al. (2004) set out a model of price-setting by private schools faced by state schools in the same market. Fack and Grenet (2010) discuss interaction in admissions – the impact of a local private school on admissions in an otherwise neighbourhood schooling scheme. The OECD (2012) shows that socio-economic stratification across schools is not associated with the prevalence of privately managed schools in a country, but is associated with the level of public funding to those schools. For example, in Sweden, Germany, Belgium, the Netherlands and Ireland, over 80 per cent of school funding for privately managed schools comes from the government. By contrast, in the

United Kingdom and Greece 1 per cent or less of funding for privately managed schools comes from the state. In those countries where privately managed schools receive higher proportions of public funding, there is less stratification between publicly and privately managed schools. Green et al. (2008) consider competition between state and private schools in the market for teachers. They show that private schools are increasingly recruiting teachers from the state sector. Teachers in the private sector report greater job satisfaction; while this may be causal, it may well be about selection into sector and a better worker–job match.

4.3.2 *Accountability, Autonomy and Regulation*

Schools are given two very valuable resources by the government – a large amount of public money and, far more valuable, the future skills of the nation's children. Schools should be accountable for how they deal with these resources. This accountability is enacted in different ways and to differing extents in countries around the world. The implications of this are discussed below.

Accountability makes most sense when those being held accountable can actually make a difference to the outcome – that is, have some autonomy in the running of their schools. Strong accountability mechanisms seem inefficient and unfair without autonomy. Evaluating school autonomy is a relatively recent topic of research generating interest in the US and the UK in particular, and this is reviewed below. Studies using international comparative tests suggest that market features enabling school accountability and autonomy are important for student performance (e.g., Woessmann, 2007).

School Accountability

The essence of school accountability is the provision of rewards or sanctions attached to the test performance of pupils in the school. The sanctions or rewards can be explicit, such as the replacement of school leaders, or implicit, such as good performance raising applications to the school. The theoretical argument basis for the accountability system is a principal-agent model; the publication of school performance data helps to monitor the output of the school. These tables might be scrutinized by parents, who could react by avoiding low-performing schools and/or by the education authorities, who may take action against such schools.

What Effects Does the Accountability System Have on Pupil Performance?

Researchers face two main difficulties in trying to establish the impact of accountability systems on pupil performance. Figlio and Ladd (2008) note that typically a multifaceted performance management reform is introduced all at

once, removing the possibility of evaluating an individual component; and that finding an adequate control group for the counter-factual is often hard.

Causal evidence on this comes from changes in accountability systems. Burgess et al. (2013) are able to exploit a policy experiment that changed school accountability in Wales but not in England. Following a referendum, power over education policy was devolved to the Welsh Assembly Government, which immediately stopped publication of school performance tables. This event is useful for analysis as it sidesteps the two issues raised above. First, we have a ready-made control group of students in England as the education systems of the two countries were practically identical until that point. Second, there were no other major changes to the education system in Wales at the same time. Using a difference-in-difference analysis, Burgess et al. (2013) find significant and robust evidence that this reform markedly reduced school effectiveness in Wales. The impact is sizeable, 0.23 of a (school-level) standard deviation, equivalent to 0.09 of a pupil-level standard deviation. In this study, the significant heterogeneity shows a much stronger effect on attainment of low-achieving pupils.

Two other recent studies have evaluated the introduction of school accountability in Portugal and the Netherlands. In Portugal, Reis et al. (2015) show that the publication of school rankings makes a significant difference to parents' choice of schools and to schools' enrolment. Koning and van der Wiel (2012) show that once school quality scores are published (following campaigning by a newspaper), the lowest ranked schools raised performance substantially.

Much of the available evidence uses the introduction in the US of a mandatory school accountability system under the No Child Left Behind (NCLB) Act in 2002; this evidence is usefully summarized in Figlio and Loeb (2011). Dee and Jacob (2009) use the federal introduction of NCLB to estimate its effect on school performance, comparing states that had implemented a system of school accountability before NCLB as the control group. They found that NCLB had no impact on reading scores and a 0.15 pupil-level standard deviation impact on maths scores. Wong et al. (2009) triangulate their evidence using different approaches, essentially by defining different control groups; they find a positive impact of the introduction of accountability in both approaches on both the fourth and eighth grades. Hanushek and Raymond (2005) actually use state-level accountability, pre-NCLB, and adopt a state-level fixed effects model to identify the introduction of NCLB and find a positive effect of around 0.2 of a (state-level) standard deviation on test scores. Other studies exploit discontinuities in school accountability ratings and adopt a regression discontinuity approach. They show that schools receiving low ratings subsequently showed positive conditional impacts on pupil achievement gains, with strong and substantial effects (for example, Figlio and Rouse, 2006, Chiang, 2009, Rockoff and Turner, 2010 and Rouse et al., 2013).

There is consensus that accountability measures raise performance, and typically more for low-performing pupils. There are fewer studies showing how this is achieved. Rouse et al. (2013) show that schools do change their teaching practices, for example spending more of the school day on instruction; Reback et al. (2014) show that teachers work harder but also narrow the curriculum; and Craig et al. (2015) show that school district administrators reinforce the effect of the ratings, rewarding high-performing schools by allocating them more funds.

To date there have been few studies of the long-run consequences of accountability; Deming et al. (2013) find substantial positive long-run effects of accountability pressure on high-ability pupils, but find equally substantive negative effects for low-ability students.

What About Gaming, Unintended Consequences and Cheating?

Whilst one of the main issues in this literature is the impact of accountability on attainment, the other main focus is quantifying the strategies that schools undertake to game the system. These behaviour distortions can take many forms, from a particular concentration of teacher time and effort, to outright cheating in the exams.

It has been generally established that schools will tend to focus their resources on whatever is tested: the subjects that are tested, the topics within subjects that are tested, the topics in which scores can be increased most easily, the school grades that are tested, and on the pupils who may be pivotal in reaching a threshold. Figlio and Loeb (2011) summarize all this evidence, and Rouse et al. (2013) also review evidence on a range of responses by schools. Whether this focus on the things tested is a bad thing depends on the tests: this focus may in fact be what society wants and intends, and if the test is well-designed it may be wholly appropriate. Conversely, if the high-stakes tests are not well-designed, then the lack of broader knowledge and skills can be deleterious.

Boyd et al. (2008) also show that high-stakes testing also altered the allocation of teachers to grades in New York. Relatedly, teachers face greater work pressure from accountability. Reback et al. (2014) show that accountability pressure from NCLB lowers teachers' perceptions of job security and causes untenured teachers in high-stakes grades to work longer hours than their peers.

One way of gauging the degree of '*teaching to the test*' is to compare performance on high-stakes tests with that on low-stakes tests covering the same material. Jacob (2005) compared test score gains in maths in high stakes tests to those on comparable, but low-stakes, tests; he shows that the gains for eighth graders were confirmed in the low-stakes tests, but that those for fourth-grade pupils were not. Similarly, Figlio and Rouse (2006) find a smaller impact of accountability on low-stakes tests than on high-stakes tests.

Beyond focussing school resources on a subset of subjects, topics and pupils, researchers have documented other practices which, while not illegal, are certainly not what the accountability systems' designers would have had in mind as appropriate tactics. Figlio and Winicki (2005) show that schools change their lunch menus at the time of the tests, 'substantially increasing calories in their menus on testing days'; Bokhari and Schneider (2009) show that pupils in schools under stronger accountability threat 'are more likely to be diagnosed with Attention Deficit/Hyperactivity Disorder (ADHD) and consequently prescribed psychostimulant drugs'; and Anderson et al. (2011) find that pupils in such schools have a higher chance of being obese, with one of the channels they cite being less exercise in school.

Finally, there is straightforward cheating on the test by teachers or school administrators. Jacob and Levitt (2003) show that the frequency of cheating appears to respond strongly to relatively minor changes in incentives, such as those implied by school accountability measures. Bertoni et al. (2013) also implicitly detect cheating by noting that test scores in Italy are lower when external monitoring of tests takes place.

Of course, the existence of these inappropriate behaviours does not mean that accountability measures should be abandoned; the costs need to be weighed against the benefits. There are also implications for the design of the tests underlying the system and perhaps for the monitoring of the testing system.

What Is the Best Content for an Accountability System?

A subsidiary, but important question, is the nature of the performance data to be included in the accountability system. One key issue is whether it should be based on the level of student performance, or the per-pupil change in test score, also called value-added. The former is certainly of interest to policy-makers and parents, but the latter is fairer to the schools in that it takes account of prior attainment. An excellent early analysis of the statistical issues involved for the implementation of NCLB is in Kane and Staiger (2001). Allen and Burgess (2011) and Allen (2013) use the long run of pupil-level data available in England to model different possibilities. There is a trade-off between functionality (whether the data actually help parents to identify high-performing schools) and comprehensibility (whether the presentation is straightforward enough to make sense).

There is reasonable consensus that test-based school accountability measures raise pupil attainment, sometimes substantially. It is also clear that schools can be very sophisticated in designing strategies to game the metrics; some of these are arguably positive or benign (such as assigning strong teachers to the key classes), while others are strongly negative (risking pupil obesity, or cheating). Research priorities in this field include further exploration of the long-run impacts of schooling under strong accountability, and the impact of introducing

accountability systems in a number of other countries, including Australia, Poland and Spain.

School Autonomy

There are two introductory questions to answer: why autonomy and autonomy from what? The basic concept behind the attraction of school autonomy is a simple one and a familiar one in economics: the people best placed to make 'production' decisions are those with most information, those closest to the process. This means teachers and school leaders; it follows that they should be able to implement those decisions, free from constraints from higher up the hierarchy. The argument is that school autonomy will therefore raise attainment, which is the empirical question I discuss below. The constraints placed on schools vary over time and countries. Typically, autonomy involves schools being able to determine all or some of: their own curriculum; hours and days of teaching; pedagogy and general approach; hiring and firing of teachers, and teachers' pay.

Does School Autonomy Raise Pupil Attainment?

The main cases of experimentation in school autonomy are Academies in England, Free Schools in Sweden (and more recently in England, too) and Charter schools in the US. Of these, the most secure evidence comes from recent quasi-experimental studies of the US case.

In England, there have been many new school 'types' tried over the past three decades, some introduced as offering more autonomy. One of these was Grant Maintained (GM) schools, studied by Clark (2009). These schools were able to opt out of the control of local government, and given control of teacher contracts and admissions. This reform is particularly susceptible to evaluation because the conversion to GM status required a vote of parents, and Clark is therefore able to do a like-for-like comparison between schools that just voted to convert and those that just voted not to (a regression discontinuity design). Attainment in the GM schools rose substantially, by about a quarter of a school-level standard deviation. Clark notes that GM schools were also more generously funded and he cannot rule out that this contributed to the rise in attainment. Looking at a more recent reform and schools with similar types of 'freedoms', Foundation schools, Allen (2013) repeats the regression discontinuity approach and finds little evidence for improved attainment having taken account of a rich set of pupil characteristics.

Academy schools are the latest type of school offered much greater freedoms in England. Machin and Veroit (2011) evaluate the impact on attainment of attending such schools, updated in Eyles and Machin (2015). This analysis provides the most robust evidence on Academies but was undertaken early in the Academy programme and relates to the schools set up under the Labour

government before 2010, not those set up under later governments under very different criteria. There is no natural identification structure so the authors compare early converters to similar late converters. They find positive effects on attainment, of around 18 per cent of a school-level standard deviation. The effect appears to be stronger the greater the increase in autonomy, either because of simply more time as an academy, or because of switching from a school with the lowest initial degree of autonomy.

The establishment of Free Schools followed a 1992 reform in Sweden, allowing schools with great operational and strategic autonomy to compete with state schools for pupils and funding. The evidence is mixed and studies vary in finding no, small or large effects. Because of the data they assemble, Böhlmark and Lindahl (2007, 2008) is possibly the most persuasive approach (see Allen, 2010, for a useful summary). They find a small positive impact of municipality-level free school growth on municipality-level academic performance for 16-year-olds, though this dissipates by age 19. Again, the larger positive effect is on higher ability pupils. Using siblings data, Böhlmark and Lindahl show that this improved performance is due in part to the greater effectiveness of the free schools, but that competitive threat played a bigger role. Other studies include Ahlin (2003), Björklund et al. (2005) and Sandström and Bergström (2005).

However, it is not clear that these results can be attributed to increased school autonomy itself, as that reform was introduced alongside others (as documented in Björklund et al., 2005) and the increased autonomy is confounded with increased parental choice.

Turning to the US, Charter schools have much more autonomy than regular state schools, and there are now many thousands of such schools since the first in 1992. Whether this improves the attainment of pupils is a controversial question. A comprehensive study of Charter schools across 16 states is published in CREDO (2009). The authors use matching techniques (creating a ‘*virtual twin*’ for each Charter school pupil based on demographics and poverty status) to compare the outcomes for pupils in Charter schools and regular schools. They find that about half the Charter schools do no better for their pupils, 17 per cent of Charter schools perform better and the remaining 37 per cent perform worse than the comparator regular school. Epple et al. (2015) provide a wide-ranging survey of the Charter movement as it approaches its 25th anniversary. They concur that the impact of Charters on pupil performance is very variable: some produce dramatically higher performance, but most are about the same, a bit worse or a bit higher.

More recently, an important set of studies has used an experimental approach to isolate the role played by Charter schools. The key is that some Charter schools that are over-subscribed use random chance, lotteries, to determine which of the applicants are given a place. This means that among the set of applicants to a school, Charter attendance is exogenous. While these studies are

small-scale, this may be appropriate: charter schools are very heterogeneous, so charter school treatment effects are also likely to be heterogeneous. On the other hand, the very fact that the schools are over-subscribed suggests that they are likely to be at the higher end of the outcome distribution rather than representative. Hoxby and Rockoff (2004) is an early example, studying the Chicago Public School system. They find that pupils who win the lottery and enroll in lower elementary grades have higher subsequent attainment than students who are lotteried-out, but find no effect for pupils joining in the upper elementary grades. Using the same methodology, Hoxby and Murarka (2009) find positive and significant effects of charter school attendance in New York City charter schools, with the impact increasing for each additional year spent at a charter school. Sticking with New York, Dobbie and Fryer (2011a) focus on the charter schools associated with the Harlem Children's Zone (HCZ). They too find significant increases in attainment in both maths and English, for pupils of all abilities. Likewise, in Boston, Abdulkadiroğlu et al. (2009a) also using assignment lotteries find large and significant gains in attainment for lottery winners in both middle school and high school. In a related paper, Angrist et al. (2010) focus on a school belonging to the largest charter group, the Knowledge is Power Program (KIPP), a strong advocate of the '*No Excuses*' approach to public education. This means they have a long school day and a long school year, highly selective teacher hiring, strict rules for behaviour and a focus on traditional learning. The lottery methodology shows huge gains in attainment: 0.35 standard deviations in maths and 0.12 standard deviations in reading for each year spent at KIPP Lynn.

The comparison of winners and losers within lotteries only provides a causal effect for charter school applicants, who might be very different to nonapplicants. Abdulkadiroğlu et al. (2014) study a case in which regular public schools are taken over by charter schools so the pupils are not as selected a group as lottery applicants. They confirm substantial test score gains for these pupils too, suggesting that there is something in the schools that substantially and significantly raises attainment. Discovering what that something is, is clearly a question of the first importance. Dobbie and Fryer (2013) and Angrist et al. (2013) make a start on explaining this, and Fryer (2014) reports the impact of attempting to introduce those practices into regular public schools.

What Aspects of Autonomy Are Crucial?

Given that autonomy matters, what sorts of 'freedoms' matter for attainment? The main evidence on this comes from Abdulkadiroğlu et al. (2009a) who are able to compare regular charter schools with Boston Pilot schools: 'These schools have some of the independence of charter schools, but operate within the school district, face little risk of closure, and are covered by many of the same collective bargaining provisions as traditional public schools.' The same

lottery methodology that found large effects for the regular charter schools found small and insignificant effects for the Pilot schools.

Reviewing this evidence, the results from Sweden are mixed, but are somewhat difficult to evaluate as the increased school autonomy coincided with other major changes to the school system. In England, this was not the case and the increased autonomy was legislated within a settled system of parental choice. However, the way that academies were introduced means that the identification of a robust causal effect is difficult. The best evidence to date is from the lottery-based studies of US charter schools. There are two caveats here, however. First, the effect is identified among applicants to charter schools, so it is not clear how the findings will carry over to the wider population of pupils, although as discussed Abdulkadiroğlu et al. (2014) find similar nonexperimental results. Second, as is widely noted, charter schools are very heterogeneous, and lottery-based results necessarily imply that these are very popular schools.

The stand-out results are for ‘*No Excuses*’ schools, both the HCZ schools and the KIPP schools, which bring very substantial causal impacts on attainment. Dobbie and Fryer (2011a, 2013) make a start on understanding what it is about these schools that works, but this is surely a key endeavour for future research. We cannot necessarily expect similar results for all charter schools, and so from a systemic perspective, the rules on monitoring performance and awarding and removing autonomous status are likely to be very important.

School Leadership

The nature of school leadership varies directly with the level of school autonomy. In a system of tight central control, school leaders are middle managers, line-managing teachers and implementing policies from the centre. The commitment to a centrally run system means that the values and beliefs of any one headteacher should not impact on the education outcomes for her pupils. In a decentralized model, the system needs good and great leaders, since there is much less central direction on how to run a school.

Policy-makers seem to set great store by the idea of transformational school leadership. The changing of headteachers or principals is taken very seriously as a school improvement policy. There are plenty of stories of how charismatic headteachers have turned failing schools into beacons of achievement. Grissom and Loeb (2011) and Branch et al. (2012) both document prior research, much of it qualitative, associating excellent school leadership with positive school outcomes.

But this is a hard arena in which to do quantitative research, and very hard to robustly identify causal effects. Changes in school leadership are rarely exogenous, and policy-makers are unlikely to be keen on randomizing high- and low-quality principals across schools. Typical changes in school leadership may occur when a school is under-performing, for example, making it difficult to

disentangle other compensatory responses, as well as mean-reversion from the leadership change.

While there is now a small literature on what effective schools do (for example Dobbie and Fryer, 2013 and Angrist et al., 2013), this has yet to be linked across to research on what effective or indeed transformative principals do.

Recent research on school leadership can be split roughly into papers attempting to measure the effectiveness of principals; papers looking at the career path or turnover history of principals and an association with school effectiveness; and a set of papers on what principals do, or the management of schools.

The Effectiveness of Principals

Grissom et al. (2015) set the scene by highlighting some of the problematic issues involved in using test score data to estimate principal effectiveness, and setting out a series of models to capture different ways of thinking about what principals do. This useful foundational work shows that the choice of model matters as different approaches can yield very different results, ranging from 18 per cent of a standard deviation to 5 per cent using the same data. They also compare the results with other school outcomes including administrative evaluations, although this yields some puzzling results.

Going down the same track, Coelli and Green (2012) can identify principal effects using a dataset in which principals were rotated amongst schools by districts (using Rivkin et al.'s 2005 approach) and assuming constant effectiveness within-school. They find substantial effects, with one standard deviation of principal effectiveness implying 33 per cent of a school-level standard deviation in graduation rates. Branch et al. (2012) also find large variation in principal effects; they also show greater variation for schools in disadvantaged neighbourhoods. They also note that schools with ineffective principals are estimated to have higher than average teacher turnover, and that this might be a mechanism through which low effectiveness affects school performance.

A different approach to estimating the importance of principals is taken by Lavy (2008). He exploits an experiment in Israel giving a very large pay rise (50%) to school principals. He finds statistically significant but quantitatively modest effects on attainment, probably insufficient to justify an expensive treatment.

Principals' Careers and School Effectiveness

Béteille et al. (2012) provide an overview of principals' career paths, and document substantial turnover rates: more than a 20 per cent annual separation rate for principals. A typical path is to use a low-attaining, disadvantaged school as a stepping-stone to a more preferred school. They show that high principal turnover rates are generally associated with lower school performance: 'The

departure of a principal is associated with higher teacher turnover rates and lower student achievement gains' (p. 905) and that this negative relationship is stronger in more disadvantaged neighbourhoods. Because of the interlocking issues of principal's desired career paths, endogenous principal mobility and school performance, robustly attributing causality to this is likely to be difficult. All of this research paints a picture of schools in disadvantaged neighbourhoods underperforming and struggling to hire principals, struggling to keep them, and struggling to hire effective principals.

Clark et al. (2009) try to characterize what effective principals look like in terms of observable characteristics. As with teachers, they find little evidence for a role for the principal's own academic record, nor for their pre-principal experience. Again as with teachers, there is evidence of learning through experience, particularly steep in the early years. By contrast, Grissom and Loeb (2011) try to characterize what effective principals do, combining survey responses with administrative data. They isolated five skill categories – instruction management, organization management, administration, internal relations and external relations. The results suggest that only organization and management skills are consistently associated with school performance across different outcome measures and sources.

School Management

This stress on organizational management ties in well with the findings of Loeb et al. (2010), who document principals' time use and relate that to school outcomes including student attainment, but also teacher and parental assessments. They show that time spent on organizational management is associated with positive outcomes.

Bloom et al. (2014) collect data on management practices in nearly 2000 schools (educating 15-year-olds) in eight countries. They show that higher management quality is strongly associated with better educational outcomes, and in particular that autonomous public schools have significantly higher management scores than regular government schools and private schools. They highlight the role of the principal, assigning a high fraction of the effect to differences in leadership and governance. Consistent with the evidence above on the connection between ineffective principals and high staff turnover, Bloom et al. (2014) note that schools are generally weak in people management practices.

A big part of what principals need to do well is the selection of teachers. Jacob and Lefgren (2008) show that principals can generally identify teachers at the extremes of the distribution of effectiveness, but are much less able to distinguish teachers in the middle of the distribution. In a companion piece, Jacob (2010) shows that principals do weight measures of teacher effectiveness when firing probationary teachers, but only alongside demographic factors.

4.3.3 *Education Market Structure: Policy Summary*

Two notes of caution are needed before offering a policy summary. As has been evident throughout this chapter, much of the research in the economics of education is about policy. However, it should be clear that we are nowhere near, for example, an engineering level of precision in policy discussion. An engineer could say ‘if you want the bridge $x\%$ longer it will need $y\%$ more concrete and be subject to $z\%$ more stress’. As education economists we cannot equivalently say: ‘if you reduce the schools budget by $x\%$ by raising class sizes and put that money into $y\%$ more child care, then end-of-schooling attainment will rise by $z\%$ ’. Secondly, European countries differ in very many ways, including in their education systems,⁴ both in terms of the overall system and in the detail, so it is impossible to describe the ways in which specific policies might work in each country.

This is the industrial organization approach to schools, determining the market rules and the market incentives. There are a number of interlocking factors that create an effective school system. Accountability matters for schools’ performance, even relatively low-stakes accountability (Reis et al., 2015). Accountability requires some common and consistent form of assessment, typically centralized external exit exams. Accountability also makes more sense if schools have autonomy in their operations. All of these factors have been robustly shown to raise school performance and pupil attainment. Such a policy also leads to a focus on two other things. First, if schools are held to account on a specific assessment basis, then this is undoubtedly what schools will focus on. So governments need to take care that the assessment is well designed, and that it does indeed test the skills that society wants pupils to have. Teaching to the test is detrimental if a test is badly designed. Second, publication of rankings showing schools are better performing can in principle increase socio-economic sorting of pupils, though the evidence on this is mixed. Whether it does so depends on the admissions process to schools and whether this is manipulable by parents. While the broad characteristics of a successful market structure are reasonably clear, the details of any implementation will vary according to existing institutional arrangements.

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Notes

1. The full review is available at <http://www.coeure.eu/wp-content/uploads/Human-Capital-and-education.pdf>; for space reasons, only a portion can be included here.
2. See <https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Countries> for levels of devolution.
3. ET2020; http://ec.europa.eu/education/policy/strategic-framework/index_en.htm.
4. See <https://webgate.ec.europa.eu/fpfis/mwikis/eurydice/index.php/Countries>.

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