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Introducing Competition in Public Services

- the Case of the Swedish Compulsory School

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Abstract

The subject of this thesis is introduction of competition in public services and its effects on public sector efficiency generally, and the Swedish compulsory school specifically. The issue is studied in a theoretical framework of institutional and transaction cost theory.

A concentration ratio competition measure is developed, covering public and private competition, as well as competition between public schools. Efficiency is divided into costs and quality. Since quality is difficult to observe, student achievement – in the form of school level national standardized test scores from 2004 – is used as a quality measure instead. A fixed effects model is employed in the cost analysis on a panel data set of total school costs per student in the municipalities from 1998-03, whereas the effects on student achievement are estimated with a cross-sectional OLS model. No statistically significant effects are found on either costs or student achievement.

Comparisons show that the cost results are similar to earlier studies made in a Swedish context. But the results of the student achievement analysis differ in certain respects. A likely explanation to this is the difference in data used. Suggestions to why the effect of competition is not more noticeable include the lack of measurability of school outputs and outcomes and the Swedish institutional arrangement, which disallows price competition and implies incentives for independent private schools to start up in high cost municipalities.

Keywords: Competition, Swedish compulsory school, Student achievement, School costs

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1 Introduction

The issue of public sector efficiency has been fiercely debated during recent decades, often with political or ideological affiliation determining opinions. Most agree though that the public sector and the welfare systems of a majority of developed countries face serious challenges already today and more so in the years ahead; especially with the coming demographic changes as populations on average grow older.

The introduction of competition has been suggested as a remedy to some of the efficiency problems. Many countries have allowed competition in a wide range of areas and activities; examples include garbage waste disposals, public utilities, postal services, hospitals and schools. Schools have, at least in Sweden, been at the heart of this debate. The Swedish primary and upper secondary school system underwent in the early 90s the perhaps most radical school choice reform ever implemented. By changing regulation, the system went from a state of minimal competition and very few private elements to a system where private and public schools alike receive public funding on more or less equal terms. Students are now also allowed to choose schools freely, whereas a principle of closeness was used earlier.

There have been efforts made to measure the effects of this reform and the introduction of competition, but all of these have focused on the influence of private schools rather than competition in general. Thus neglecting the possible competition created by allowing students to choose also between public schools. As private alternatives are entirely lacking in many municipalities and the vast majority of schools still are public, it is possible that this type of competition is at least as important. The following study will try to examine this.

1.1 Statement of purpose

The purpose of this thesis is to study how the introduction of competition influences the efficiency of public services. This is done by presenting a theoretical framework suitable for the issue and an empirical study of the Swedish compulsory school system. Two particular questions are guiding the empirical part:

- Does competition influence the quality of schools?
- Does competition influence school costs in the municipalities?

Since quality is difficult to observe, student achievement is used as a measure of quality. Achievement and costs taken together provide a picture of how competition affects the efficiency of schools and could say something more general about the effects of competition on public sector efficiency. The decision to study both was based on the thought that there usually is an interesting connection between them. Lower costs and higher quality is positive things, other things equal. But if costs are decreased to the price of lower quality or vice versa, there might not be any gains made at all.

1.2 Method and material

The theoretical framework of the study is based on work done within what is usually called New Institutional Economics (NIE). NIE should not be considered one single theory, rather a multitude of approaches. But what these approaches have in common, and where they differ from neo-classical theory, is the focus on transaction costs and institutions and their importance for the behaviour and economic performance of individual and collective actors. The approaches within NIE differ in certain assumptions and levels of analysis but are not in my view mutually exclusive, rather complementary. Oliver Williamson asserts that “to be sure, transaction cost arguments are often best used in conjunction with, rather than to the exclusion of, other ways of examining the same phenomena” (1985:xii).

A transaction cost perspective is useful in the analysis of efficiency of public services for several reasons. There is no assumption that markets are always more efficient than bureaucracy, or the other way around. Markets and bureaucracy are instead viewed as different governance structures, each suitable under certain circumstances. To me, this is a more open way of approaching the issue.

Such a perspective also highlights features that are often left out in studies of public sector efficiency. Two examples are administrative costs and costs for follow up and enforcement of procurement contracts (Andersson, 2002:39).

The empirical part of the thesis is a quantitative study. Two kinds of regression models are used; a panel data model in the cost analysis and a cross-sectional model in the analysis of student achievement. The data for both is compiled using mostly statistics from the Swedish National Agency of Education (NAE)¹, but also from Statistics Sweden (NAE 2005b, 2005d and Statistics Sweden, 2005). The panel data set spans the years from 1998 to 2003; no earlier years were available for the construction of my competition measure and no later years for total costs. I use a cross-sectional model for student achievement – defined as national standardized test scores from 2004 – due to test scores from different years not being comparable. A panel data model would otherwise have been preferred. More thorough definitions of achievement and cost, as well as descriptions and discussions of the models, included variables and data are found in chapter 3. The results obtained are also compared to other Swedish studies made.

A further note on the statistical material is warranted already here though. It was not possible for me to obtain data of student achievement on an individual level, due to restrictive NAE regulations. Instead, achievement is measured on school level. Data over individual achievement would of course have been better, but the study has, in my view and hopefully in the reader's too, enough validity to say something interesting about the subject.

1.3 Delimitations

This thesis should not be considered a full evaluation of the effects of competition on public services, or for that matter on the Swedish compulsory school. James Q. Wilson suggests four standards against which to measure alternative arrangements of public services – efficiency, equity, accountability and authority (1989:349). Of these four is only efficiency thoroughly examined herein. Although of great importance efficiency is not necessarily the most important standard.

It is unfortunately common in economic analysis not to include the others. Any serious recommendations about alternative arrangements of the public sector needs in my view, to

¹ Skolverket.

have at least reflected on questions of accountability, authority and equity. However, in defence of economists, and myself, efficiency is the issue closest to the core of economics. And the limited amount of time, space and resources often present demand prioritization.

Also, if competition cannot be shown to improve efficiency, the case for introducing competition in public services is substantially weakened. Therefore I would like to argue that it is at least a good point of departure.

I have chosen to focus on the possible competition among schools within municipalities. However, there could also be competition present *between* municipalities, in the sense that families choose to live in municipalities where there are schools with good reputation. The difficulties in quantifying and measuring this type of competition are immense and it is also in a way beyond the scope of this study, since this type of competition would have existed before the Swedish reform. It is thus not an example of introducing competition in public services.

Earlier research about competition and the efficiency of schools in Sweden will be reviewed in sections 3.5 and 3.6. The quite substantial body of research on these subjects in other countries will not be systematically reviewed, due to the limited space. Two examples of such reviews can be found in Blomquist – Rothstein (2000) and Björklund et al (2003).

1.4 Disposition

The remaining chapters are outlined in the following way: Chapter 2 contains the theoretical framework, which is divided into three parts: transaction costs, institutions and competition and the public sector. Chapter 3 starts with a description of the Swedish compulsory school and continue with the choice of econometric models, variables and data. The results are then presented and compared to other studies. I try to keep the number of tables displaying regression outputs, tests and etcetera to a minimum to make the presentation less tedious. For the interested reader these are available in the appendix. In chapter 4, the results are analysed. Chapter 5 contains a summary of the findings, the conclusions and further research suggestions.

2 Theoretical Framework

The following chapter contains the theoretical framework of the study. The first part deals mainly with the concepts of transaction costs and institutions and how these affect the organization of economic activities. Especially transaction cost theory was originally developed for analysing the organization of the private sector and of firms. The account below is therefore mostly held in a private sector context. The overwhelming majority of transaction cost studies has also been applications on private sector phenomena, although there are examples of public sector studies using a transaction cost perspective as well (see for example Williamson, 1998b, Hart et al, 1997, Appel – Pedersen, 2003, Boardman – Hewitt, 2004).

The second part describes the special features of the public sector and attempts to adapt the framework to this context. It also discusses the general arguments for introducing competition in the public sector.

2.1 Transaction costs

The principal origin of Transaction Cost Economics (TCE) is Ronald H. Coase's article from 1937, "The Nature of the Firm". Coase's point of departure is the neo-classical assumption that the economic system is co-ordinated by the price mechanism, which determines the allocation of resources. But this description does not fit how resources are allocated within a firm, where workers for example move between departments, not because of changes in relative prices but because they are ordered to. This observation leads to the question of why there are such organizations as firms in an economic system, if the co-ordination can be done efficiently by the price mechanism. Coase's answer is that there are costs of using the price mechanism: transaction costs. Firms exist when a transaction is more costly to perform on a market – by using the price mechanism – than within a firm (Coase, 1993a:18-22).

More generally, the so-called Coase Theorem – which states that the assignment of property rights is not relevant in a world without transaction costs² – has an analogy for organization: “organization is irrelevant in a world of zero transaction costs, because any other mode of governance can costlessly replicate the properties of any other” (Williamson, 2000:50).

But since virtually every transaction implies costs to some degree, these will have an influence on how transactions are organized, in other words what kind of governance structure that is chosen for the transaction. The governance structures range from discrete market exchange at one end to centralized hierarchical organization on the other. (Williamson, 1985:16-19).

There is no standard definition of transaction costs, although most have much in common (Benham – Benham, 2000:368). Two general definitions of transaction costs are the “costs of running the economic system” (Arrow, 1969:48 (in Williamson, 1985:18) or the costs of “reaching, modifying and implementing agreements” (Masten, 1996:44). A more detailed definition of the concept is provided by Furubotn and Richter:

[T]ransaction costs include the costs of resources utilized for the creation, maintenance, use, change and so on of institutions and organizations. [...] When considered in relation to existing property and contract rights, transaction costs consist of the costs of measuring resources or claims, plus the costs of utilizing and enforcing the rights specified. Applied to the transfer of existing property rights and the establishment or transfer of contract rights between individuals (or legal entities), transaction costs include the costs of information, negotiation, and enforcement (1997:40).

2.1.1 Behavioural assumptions

TCE builds primarily upon two assumptions about human behaviour, *bounded rationality* and *opportunism*, which are both different from the assumptions of neo-classical economics. These two are considered in turn below.

Bounded rationality means that human behaviour is assumed to be “*intendedly* rational, but only *limitedly* so” (Simon, 1976:xxviii, emphasis in original). Neo-classical economics usually maintains an assumption of utility or profit maximizing agents that are completely rational. Acknowledging the limited cognitive capacity of individual and collective agents,

² The idea was developed by Coase in the article “The Problem of Social Cost” from 1960 (for a reprint, see Coase, 1992). The reason for property rights being irrelevant is that in a world without transaction costs, perfect competition will prevail and private cost will be equal to social cost.

(for example organizations), invites a deeper study of the institutional arrangements these agents work in and of the costs of planning, adapting and monitoring transactions; subjects that can be neglected with an assumption of complete rationality (Williamson, 1985:44-46).

Opportunism could be looked upon as the willingness of one economic agent to strategically exploit the cognitive limits, the bounded rationality, of another agent (Lindenberg, 1996:130). Opportunism is a stronger assumption of self-interest seeking than what is usually made in economics. The economic man in neo-classical theory are seen as self-interest seeking but also to fully and accurately disclose preferences, to correctly state intentions and to execute for example contracts in an oath- or rule-bound manner (Williamson, 1985:49).

Taken together these two assumptions make the problem of economic organization non-trivial. If economic agents were perfectly rational, it would be possible to secure every transaction with a complete contract. If economic actors never were opportunistic, promises, good faith and mutual adjustment could be used for coordination purposes. Safeguards would not be necessary under such circumstances. Thus, both assumptions are needed to make the choice of governance structure important (Noorderhaven, 1996:106).

2.1.2 Dimensions

According to Williamson, transactions differ in three principal dimensions: asset specificity, uncertainty and frequency (1985:52). Here has a fourth dimension been added, measurability. Williamson mentions measurement problems but does not include it among his dimensions. It can be argued that measurability is an important dimension for many types of transactions, not least for those considered in this study. As explained below, several of the dimensions only gain importance when they exist in conjunction.

Asset specificity

Asset specificity refers to “durable investments that are undertaken in support of particular transactions” (Williamson, 1985:55). There are many types of asset specificity, for example: site specificity; physical asset specificity; human asset specificity; brand name capital; temporal specificity and dedicated assets (Williamson, 1998a:36).

The more specific an asset is, the harder it is to use it for other purposes. Asset specific investments cannot be easily redeployed without losing productive value; hence such investments are more risky and pose more problems than investments suitable for general purposes. This makes the continuity of the relationship between the transacting partners important. Contractual or organizational guarantees are therefore needed. Asset specificity is an important dimension only in combination with uncertainty and the behavioural assumptions made earlier – otherwise complete contracts or mere promises could remedy problems (Williamson, 1985:54-55).

Uncertainty

Governance structures differ in their capacity to deal effectively with disturbances. A primary source of disturbance is uncertainty. It could originate in lack of information and communication between the transacting parties, but also from the fact that individuals and organizations behave opportunistically from time to time. This dimension thus rests on the bounded rationality assumption made earlier. Complete rationality implies that a strategy could be constructed for every conceivable outcome (Williamson, 1985:56-59).

For transactions of non-specific nature uncertainty is not important. But when assets are specific it becomes important for the transacting parties to have organizational or contractual machinery that helps to work things out. This is because the things and situations that are not contractible and the number of possible adaptations increase with the degree of uncertainty (ibid., 1985:60).

Frequency

The frequency of transactions also gains importance in conjunction with asset specific investments. The costs of setting up specialized governance structures can easier be recovered if the transactions are frequent. If so, asset specific investments and governance structures that support the transactions for which the investments are made can be more easily justified (Williamson, 1985:60-61).

Measurability

A fourth factor influencing the choice of governance structure is the measurability of an organization's and its members' outputs and outcomes. According to North is the cost of information the key to transaction costs (North, 1993:51). It is a reasonable assumption that a decrease in measurability leads to higher costs of information. The reason for increased

transaction costs could be for example that those activities, which are hard to measure, have to be defined accurately and relatively more monitored for uncertainty to be lowered (Ter Bogt, 2003:153-54).

2.1.3 Governance structures: market, hierarchy and hybrid

According to TCE, different governance structures are more or less suitable for different types of transactions. In the private sector, these structures are usually separated into three general categories: markets, hierarchies and hybrids. This section describes the three categories, their characteristics and how the dimensions outlined above affect the choice of governance structure.

Markets

Markets are characterized by high-powered incentives, which could be exemplified by a firm not employing sales staff on their own. The sales function is thus bought on a market, instead of being a part of the firm's hierarchy. It is likely that the contracted sales staff will have a relatively higher share of provisional pay and more freedom to choose their way of work than an in-house sales team would. Another difference is that disputes over contracts can be settled in court (Andersson, 2002:22-23).

Hierarchies

The hierarchy form on the other hand implies low monetary incentives, and a more rule bound and controlled work environment. Disputes are to a high degree solved within the firm (Andersson, 2002:22-23).

Hierarchies are normally better at cooperative adaptations, whereas markets have the upper hand when autonomous adaptations in response to changes in relative prices are considered (Williamson, 1998a:37).

Hybrids

Hybrid forms of governance are structures that neither can be classified as market nor as hierarchy. Activities in hybrid forms are controlled by so-called relational contracts. Such contracts are implemented less strictly, but can under special circumstances be brought before

a court. These contracts are in part dependent on the development of a deeper relationship between the two parts. (Andersson, 2002:23).

Nooteboom argues that when industries are characterized by rapid innovation, technological change and fiercer competition hybrid forms will become more numerous – whereas markets or hierarchies are normally more common. The hybrid form allows firms to be more flexible, to share knowledge and competence in networks and to share costs and profits of investments in “detailed, complex information” (1996:328-29).

2.1.4 Dimensions and governance structures

Williamson expresses the decision to vertically integrate transactions, i.e. to organize them in a hierarchy, as mostly dependent on asset specificity:

The incentives for trading weaken as transactions become progressively more idiosyncratic. The reason is that as human and physical assets become more specialized to a single use, and hence less transferable to other uses, economies of scale can be as fully realized by the buyer as by an outside supplier. The choice of organizing mode then turns entirely on which mode has superior adaptive purposes. [...] vertical integration will ordinarily appear in such circumstances (Williamson, 1985:78).

The above is conditioned on uncertainty being present to a sufficient degree. More frequent transactions are also more likely to be organized in a hierarchy. However, a non-specific investment does not warrant a vertically integrated structure, even if the supported transaction frequently occurs (Williamson, 1985:72-73).

High-powered incentives and government by contract works best with activities for which the results are measurable. Measurability is thus important and transactions of products and services, where quality is easily measured, are more often organized as markets (Andersson, 2002:22-25).

The move from market to hierarchy, or vice versa, is always aligned with a trade off between the benefits of added coordination and cooperation possibilities and the costs of bureaucracy. This make-or-buy decision is also a choice between having contractual safeguards or organizational safeguards of a transaction (Williamson, 1998a:38-44).

To sum up, the fundamental question from a transaction cost perspective is: which is the most efficient structure in a particular environment? By comparing feasible institutional

arrangements and governance structures, the structure that economizes most on transaction cost should be chosen (Polski, 2001:8). Blois claims that:

Transaction costs [sic] analysis shows that firms will use the mode of organization which enables them to attain the lowest accumulated (production plus transaction) costs for their economic activity (1996:214).

Such comparisons should not be between existing governance structures and ideal conditions – such as perfectly competitive markets – which are rarely or never present. Instead, TCE proposes that flawed but feasible structures should be compared. This is called the *remediableness criterion*. More formally, the criterion holds that a “mode of organization for which no superior *feasible* alternative can be described and *implemented* with expected net gains is *presumed* to be efficient” (Williamson, 1998b:316, emphasis in original).

2.2 Institutions

Transaction cost analyses often take the institutional environment as given. However, this study is concerned with the effects of a change in the institutional arrangement – the exposure of public services to competition – why a discussion of institutions and how they affect transaction costs is needed.

There is no generally agreed definition that exactly describes institutions. But most theorists working within NIE, or broader, within what is usually called the New Institutionalism “movement” within the social sciences in general would probably agree that institutions form the rules of the game in a society (see for example North, 1993:16, Furubotn – Richter, 1997:7, Lowndes, 2002:103).

More formally, institutions structure, shape and restrict the available choices for agents. These restrictions are both formal – like laws and other written rules – and informal; for example social conventions (North, 1993:16-17). In this way, institutions can be said to form the incentive structure of a society (Mantzanvinos et al, 2004:77).

Institutions and organizations both structure human behaviour, but they are not to be equated. An analogy with a sport, for example football, can be used to explain the difference. The institutions are then represented by the formal and informal rules of the game. The former includes that only eleven players are allowed on the field and that an outfield player cannot

touch the ball with his/her hands. The latter includes the various rules of sportsmanship that guides the players. Organizations can be likened to the teams. Each team face the same rules, but differ in such aspects as strategies and players (North, 1993:18).

2.2.1 Efficiency and path dependency

There is often in neoclassical and transaction cost analysis a similar notion that organisations and governance structures that prevail are efficient. March and Olsen calls this notion historical efficiency (March and Olsen, 1984:737)

There are (at least) two problems with this. *First*, it relies on the assumption that inefficient organizations will be driven out of business. This is likely to happen when markets are characterized by perfect competition, or at least have a relatively strong degree of competition. However, if a mechanism for exclusion is missing, this need not be the case.

Secondly, efficient is used in a narrow way, in the sense of organizational efficiency and not societal efficiency. An organisation or a governance structure might be efficient under one set of institutions, but inefficient under another.

Institutions are not necessarily or even usually created to be socially efficient; rather they, or at least the formal rules, are created to serve the interests of those with the bargaining power to create new rules (North, 1994:360-61).

Thus, if inefficient institutional arrangements are in place, seemingly efficient governance structures may prevail, even though are highly inefficient they from society's point of view.

Path dependency is an often used term to describe the influence of past decisions on future decisions. It is not certain that the past experiences of a society necessarily are helpful in solving new problems. The failure of institutions to confront and solve new problems can therefore create societies that get stuck (North, 1994:364).

2.2.2 Institutions and transaction costs

Douglass North calls transaction costs the key to explain economic performance in a society. Poor countries are poor mainly because the cost of transacting on all kinds of market is very

high. The engagement and interaction of people in economic activities are so costly that the exchange of goods and services – and with it the gains from specialization – becomes rare or for certain transactions, non-existent. The institutions of a society – which provides the incentives and disincentives for economic activities – are the most important determinants of transaction costs (2000:37-38).

An example of missing institutions being an obstacle to economic growth is when countries' legal systems are not able to predictably enforce contracts in their courts. This leads to higher costs of investment caused by more uncertainty, hence decreasing volumes of investment and lower growth.

2.3 Competition and the public sector

A public agency is an extreme form of hierarchy, normally more rule bound and with lower, or no monetary incentives, compared to firms. Public agencies differ amongst themselves as well; these differences will be examined more thoroughly below. As all the other governance structures reviewed before, they are also suitable for some transactions and less suitable for others (Williamson, 1998a:45-47). The question is of course which types of transactions and under which circumstances?

Wilson comments that it is difficult to come up with a government activity that has never been done or is not presently being done by a private firm or organization in some country. Even such activities as money supply and war have at times been handled by private actors – private banks issued their own money and mercenary armies fought in wars (1989:346). Thus, history provides no clear-cut answer to the questions of which governance structure public services should have. And as always, what is and what has been should not be confused with what ought to be.

Furthermore, as Williamson notes:

the common practice of condemning public bureaus because they have lower-powered incentives, more rules and regulations, and greater job security than are associated with a counterpart private bureau completely misses the point. Those features have been *deliberatively crafted* into the public bureau, thereby giving it the desired governance result (1998a:46, emphasis in original).

A more interesting critique is that the public bureau or organization is a relatively inefficient governance structure in many cases. To use the remediableness criterion, are there other feasible governance structures that could be used with better results?

The two main strands of criticism against publicly provided services and goods are (Besley – Ghatak, 2003:236):

- *The absence of choice.* This argument is based on the fact that the needs and preferences among citizens differ, whereas public provision often has a uniform design. If private providers or competition between public providers is allowed, the choices will increase.
- *Inefficiency of production.* The incentives to improve production are weaker in the public sector, where competition is relatively weak or entirely absent.

To some degree, these two are interrelated; inefficiency may for example arise because it is difficult for a public agency to know the preferences of citizens when these are not disclosed by active choices. To involve the citizens in the activity by allowing them to choose among providers could therefore enhance efficiency (Söderström et al, 2001:11).

The identification sometimes made of competition with privatization can be misleading; it is possible to have several government agencies or firms competing with each other instead. At the same time it is also possible to have private monopolies (Hart et al, 1997:1129). Domberger and Jensen claims that competition, not ownership, is the key element in the impact of privatization or contracting out of public services (1997:75).

A useful separation can instead be made between the privatization of financing, production and consumption of public services. When financing is privatized, users pay for the service themselves. Production is privatized when some or all the control over production is transferred from public to private producers. Private consumption refers to cases when the users by individual choice determine the content and/or shape of a service. To privatize both financing and production implies that the service is moved from the public sector and fully into the private. Usually this means that consumption will be privatized as well (Andersson, 2002:21-22).

In short, arrangements that support each other have best possibilities of creating an efficient result. For example, private production with strong incentives for cost reduction along with public consumption, with limited or no choice for consumers, run the risk of compromising quality (if lower quality is assumed to be less costly) since consumers cannot punish producers by changing to another (Söderström et al, 2001:49).

2.3.1 Public and private sector differences

Earlier mentioned dimensions – asset specificity, uncertainty, frequency and measurability – are still applicable on public sector transactions. But there are features of the public sector that make the characteristics of some transactions differ in kind or make problems substantially worse than in the private sector.

Probity is a contractual hazard that is only present within the public sector. The concept refers to the loyalty and rectitude that must be present in certain transactions handled by the public. Williamson argues that it should be seen as an additional dimension of its own (1998b:322).

Probity is most important in such services as foreign affairs, the military and intelligence work. All of these are examples that very few people believe, for good reasons, should be exposed to competition and this study will not delve deeper into the issue of probity, even though it might be present to a lesser degree in other public services as well.

Besley and Ghatak mention three principal respects in which public services differ from private ones: *multiple principals*, *multi-tasking*, and *measurability* (2003:39). A firm can have multiple principals (for example shareholders) as well but these normally share the same goal – profits. Public services typically have multiple principals, such as politicians, bureaucrats and the public, who rarely have the same objectives (Martens et al, 2002:11-12). The result is that incentives are easily distorted when several different goals are to be satisfied.

Another source of distorted incentives is that many services involve several different tasks. The schools are to provide students with good education, something that includes teaching students basic knowledge that can be shown in tests. But schools should also encourage creativity and curiosity and teach “good” values (Besley – Ghatak, 2003:239). The former is easier to measure, and “work that produces measurable outcomes tends to drive out work that produces not measurable outcomes” (Wilson, 1989:161). This does not necessarily lead to efficient behaviour.

Public sector organizations differ to a large degree with respect to how observable the agencies operators’ outputs are and how observable the outcomes of those activities are. Depending on the difficulties of observing an organization’s outputs and outcomes, it can be placed within one of four categories³ (taken from Wilson, 1989:159-71):

³ According to Wilson this typology should be used with some caution, since many agencies do not fit neatly into one category. But it can still be a useful device to highlight differences among organizations.

- *Production agencies*: In a production agency are both outputs and outcomes relatively observable. An example of this is a tax collection agency, where the activities of its clerks can be observed and the outcome, how much tax that is collected, can be measured.
- *Procedural agencies*: In these agencies outputs can be observed but not outcomes. A good example of a procedural agency is an army in peacetime. Almost every aspect of training, equipment and deployment can be inspected, but the outcome – an army that can defeat an enemy or defend a country against an invasion – can only be discovered or tested in wartime. Standard operating procedures are pervasive in a procedural agency, because if outcomes cannot be measured it becomes important to show political superiors that the rules for government work are being followed.
- *Craft agencies*: The outputs of craft agencies cannot be observed, whereas outcomes can. In a war, an army becomes a craft organization. Location and action of entire battalions can be hard to find out at a certain time, but it is reasonably easy to find out who has won a battle. Craft agencies rely heavily on their members' sense of duty to control their actions.
- *Coping agencies*: Neither outputs nor outcomes of coping agencies can be observed with any precision. It is difficult both to observe the level of order maintained by a patrolling police officer and, if observed, to discern the police officer's contribution. In a coping agency, there will be strong incentives for the management or the administrator to focus on the most easily measured activities of the operators.

The nature of an agency's tasks has important implications for which governance form it should have. The degree to which outcomes and outputs are observable relates to the cost of using the price mechanism on a market, i.e. the transaction costs. Outcomes that are difficult to observe are hard to put a price on. The degree to which outputs are observable relates to which kind of incentive system that is feasible; the less observable output, the more the management have to rely on the operators' sense of duty and professionalism rather than pecuniary incentives.

2.3.2 Exclusion in the public sector

Another difference between private and public is that the lack of a mechanism for elimination is far more evident in the public sector. This makes a notion of historical efficiency, that efficient organizations survive as discussed earlier, even more doubtful. In part, the reason can be traced to the political governing and the lack of competition, but many public services are also of a kind that makes it unwise close down inefficient units. For example, letting an inefficiently run hospital go bankrupt and out of business would probably cause severe disruptions to planned treatments and distress among patients. To reorganize instead of starting anew is probably more humane *and* economically efficient.

An exception could be if a certain amount of extra capacity is built into the system. This would of course constitute additional costs, but some wasted resources can be necessary to create functioning competition (Andersson, 2002:33).

The resulting stronger competition could potentially offset these costs by making the units more efficient over time. It is important to note that reforms intended to increase competition should not be expected to have an instant effect. Hoxby writes in relation to school choice and competition that it might take a decade or more before the full effect of a reform can be evaluated (2000:1210).

3 The Swedish compulsory school

This chapter begins with a description of the Swedish compulsory system. It continues with the empirical study. First, the econometric models are discussed. The study is then divided into one achievement and one cost part. Models and variables are first described more closely, thereafter are the results presented. Other studies of schools costs and student achievement in Sweden are then presented. Comparison and analysis of similarities and differences are provided last.

3.1 School choice in Sweden

The Swedish compulsory school has during the last two decades changed from a very homogenous form under central government control, to a more decentralized system with comparatively large elements of choice (Björklund et al, 2003:11).

The governance of the compulsory schools was decentralized by the social democratic government to municipality level in 1988. The earlier central management of schools was also abandoned and replaced with a goal- and result orientated management, giving municipalities and schools substantially more freedom to decide over the organization of their activities (Blomqvist – Rothstein, 2000:162-63).

The social democratic government took a first step towards school choice in 1990-91 by making it easier for independent private schools (“fristående skolor”, hereafter referred to only as independent schools) to receive state subsidies and by encouraging municipalities to comply as far as possible with parents’ and students’ choice of school within boundary of the municipality. The full introduction of school choice was decided in 1992 by the right-wing coalition government; municipalities became obligated to assign approved independent schools at least 85 percent of the average cost per student in their own public schools (Pettersson, 2001:70-71).

Students are after the reform allowed to choose freely among schools, with the only restriction that the school applied to have room for more students. If not, a principle of closeness – after which students were assigned to schools before the reform – is guiding, meaning that the student living closest to the school has priority in public schools. The independent schools have usually some sort of queuing system (Björklund et al, 2003:12 and 88).

The only major nationwide changes made since are that the social democratic government in 1995 lowered the rate of independent schools right to funding to 75 percent, but then changed the terms again in 1996. It was decided that independent schools were to work under the same financial conditions as the public schools; they have the right to the same amount of funding per student as the average cost of the public schools in a municipality. At the same time, independent schools lost their right to charge tuition fees. Earlier, they had been allowed to take out fees for so-called special costs (Blomqvist – Rothstein, 2000:163-64, Pettersson, 2001:71).

A major difference between the two types of schools is that public schools have an obligation to make sure that all students have somewhere to go to school so the compulsory school attendance (“skolplikten”) is followed. As this obligation implies that the public schools keep an overcapacity, they are considered to have higher costs than independent schools. For this the municipalities are allowed to make a deduction when the remuneration to independent schools is calculated (Konkurrensrådet, 2003:3).

The authority to approve new independent schools lies with the NAE. They inspect applications according to several criteria stipulated by law. Every application is also sent to the municipality in question for consideration and the municipality has the opportunity to state its opinion about the effects of a new school, but they have no veto right (NAE, 2005a). It is thus possible for NAE to disregard a negatively disposed municipality. According to Ahlin the decisions have in practice not depended on the municipalities opinions (Ahlin, 2003:6).

In 1990, before the reform, there were less than one percent of students in primary and secondary school enrolled in 90 private schools (Björklund et al, 2003:12 and 94). The number of schools has since then increased steadily and was 565 in 2004. The number of students enrolled in independent schools has increased as well and is almost 69500, which add up to 6.8 percent of the total student body. It can also be noted that that the total number of students is and has been high over the last couple of years, increasing with almost twelve percent over the ten year period 1994-04 (NAE, 2005b). The distribution of students over the different types of independent schools is displayed in the table below.

Table 3.1 *Share of students in various types of independent schools 2004*

Direction	Percent
General	42.9
Special teaching methods	27.9
Confessional	9.8
Language/Ethnic	7.6
Special subject profile	8.4
International schools	2.4
National boarding schools	0.4
Other	0.6
Sum	100.0

Despite the diversity of independent school directions shown in the table, do almost all follow the national curricula and course plans which are centrally determined by the national government (NAE, 2005c).

The share of students enrolled in independent schools varies between municipalities, from zero percent in 54 municipalities up to 25.3 percent in Täby. There are also differences between types of municipalities: the share is higher in larger municipalities and in urban areas (NAE, 2005b). Students with parents who have higher education are 4.5 times more likely to attend an independent school compared to students whose parents only have compulsory school education (Björklund et al, 2003:97).

Besides the scope of school choice, is also the share of students and parents who make an active choice important for the degree of competition. If school choice exists but few exercised the possibilities, the actual competition would be low and would probably not affect the behaviour of schools and individuals working therein. A study made in 2003 found that in municipalities characterized by a high degree of choice possibilities did approximately 67 percent make an active choice, compared to 34 percent in other municipalities. Most parents choose the nearest public school in both types of municipalities. However, proximity was not listed as one of the most important determinants of choice. Over 60 percent of parents in both types experienced no limitations to their choice, such as distance or availability of school transport (NAE, 2003:48-49).

3.2 Choice of econometric models

To measure the effects of competition on costs and achievement in the Swedish compulsory school two models will be used: a panel data model for the cost analysis and a cross-sectional regression model for the analysis of student achievement.

Panel data could be described as a combination of cross-sectional and time series data, where for example individuals, firms or countries are observed over a period of time. There are several advantages with this approach. The most prominent is perhaps that it can remedy the problem of omitted variables to some degree. There are in any cross-section unmeasured explanatory variables that affect the unit being measured. Similarly, there are often in time series analysis variables that influence each unit uniformly, but have different effects in different time periods. The exclusion of both these types of variables causes estimation to be biased (Kennedy, 2003:301-2).

Panel data sets often have more observations and the data is more informative because of the possibility of measuring variation over both units and time. This makes problems of multicollinearity less common and allows for more secure estimation and inference. Some issues are also not possible to study by either cross-sectional or time series analysis alone. One example is unemployment. Cross-sectional analysis can inform us who are unemployed each period and time series can describe how the unemployment level changes over time. But only a combination can tell if it is the same people being unemployed each period or if people go in and out of unemployment. Dynamic adjustment is more easily studied with panel data as well. Cross-sectional data does not contain information about dynamics, and time series have to be very long to produce good estimates. By using information about several individuals' reactions panel data avoids this problem (ibid.).

To model how competition influences student achievement a cross-sectional OLS model is used. The reason for not using a panel data model in the analysis of student achievement is that it was simply not possible to retrieve comparable data of national standardized test scores – the measure of student achievement used herein – from several periods to be able to create a good panel data set. In 2003, NAE started to collect test results from all schools, but before that only a sample was collected. The municipalities included varied from year to year, which makes it difficult to compare. Since there are results available from 2003 and 2004, a two-year panel could have been created. But due to unclear procedures there were a large number

of missing observations, whence NAE advise not to use 2003 data for comparisons with other years (Henningsson, 2005, NAE, 2005d).

There is average grade data available for a longer period, but grades are a less reliable measure. Grades are more based on teacher subjectivity than test scores, which are marked and graded according to national guidelines (Ahlin, 2003:6). There is also evidence of grade inflation in municipalities characterized by relatively larger shares of students in independent schools, as shown by Wikström and Wikström in a recent article. Independent upper secondary schools inflate grades with approximately 15 percent for the average male student compared to public schools, when controlling for students' knowledge level by comparing grades with score on the Swedish Scholastic Assessment Test ("högskoleprovet"), a test used as selection instrument for higher education. The effect seems to be smaller for females but is still significant. The suggested explanations are that independent schools, since they are new in the education system, need to prove themselves in order to be chosen. And secondly that by inflating grades independent schools can attract more students and thereby raise profits by capturing increasing returns to scale. Public schools are in general larger and could therefore be working under decreasing returns to scale (Wikström – Wikström, 2005). There is reason to believe that these mechanisms are present in compulsory schools as well, why grades are a risky measure of school quality.

3.3 Student achievement analysis

3.3.1 Student achievement measure

The dependent variable is for the reasons explained above the ninth form national standardized test scores for 2004. These national and compulsory tests are taken in mathematics, English and Swedish. This thesis only uses the results in mathematics and English due to considerable problems of collecting the data. NAE publishes data for each school that displays the percentage of students, divided into male and female, receiving each test grade (MVG, VG, G and IG⁴). These grades are here converted into a school mean by assigning a value to each grade and then dividing by number of students taking the test. This

⁴ Pass with special distinction (MVG), Pass with distinction (VG), Pass (G) and Fail (IG).

is done in a similar way as when subject grades are converted into credit values; meaning that MVG equals 20, High Pass equals 15, G equals 10 and IG equals zero. The converted values form a continuous variable taking values between zero and 20. The English test grades are reported for three sub-tests that are all used, whereas there is only one grade reported in mathematics.

3.3.2 Competition measure

Competition is measured by the combined percentage share of the two largest 7-9 form schools⁵ in a municipality averaged over the years 2002-04, since it is not likely that competition affects instantaneously. The municipality is thus taken to be the relevant boundary of the school market. This is a so-called concentration ratio, CR_n , generally defined as the market share of the largest n firms or organizations (Pepall et al, 1999:62). The CR_2 is chosen over CR_1 because it is a less sensitive measure. At the same time there are many municipalities with few schools, so using the three or four largest schools would mean that a majority of municipalities would get the value 100, meaning no competition and this would be misleading.

There are some problems with this definition. For example, it is not likely that all schools within every municipality are really competing with each other. Such factors as schools being far away from each other could of course influence the decision of which school to choose and offset competition. To some degree this problem is lessened by including two explanatory variables to control for how densely populated a municipality is (population distance and degree of urban area).

Other studies of student achievement have used the share of students in independent schools as their measure, which is measured over all forms not just on 7-9. Ahlin argues that the establishment of independent schools in lower grades could affect senior level schools through increased potential competition as “entry of private senior level alternatives is likely to become easier in the future” (2003:11). But the risk of overstating the existing competition is in my opinion a more serious problem since senior level schools, public and private, are far less numerous.

⁵ These three senior levels are almost without exception provided in the same school.

3.3.3 Other explanatory variables

- Tax base: Taxable income divided by the number of residents at the start of each year.
- Population distance: Average distance in meters between the closest neighbours, should the population be spread evenly throughout the municipality.
- Degree of urban area: Percentage share of population that lives in densely populated areas.
- Foreign born: Percentage share of all citizens in a municipality born abroad.
- Foreign citizens: Percentage share of foreign citizens measured in the age group of 20-64, who has immigrated within n – 9 years, excluding Danish and Norwegian citizens.
- Educational level: Number of individuals in the ages 16-74 who has post-upper secondary education divided by the population in the municipality.
- Average grades in 1992: Average grades among ninth form students in the municipality.
- Female share: Share of females taking the tests in each school.
- Independent school dummy: Dummy variable indicating if the school is an independent school.
- School size: Number of students in each school included.

There are other possible explanatory variables such as for example resources, teacher density and share of teachers that have a pedagogical education. However, these are likely to be influenced by school competition or instruments through which school competition affects the quality of schools (Ahlin, 2003:9-10). They have therefore been left out of the regressions. Such school input variables are also likely to be endogenous to school quality; something that is a risk with competition measures as well. This is described and tested in the next two sections.

3.3.4 Endogeneity

A problem attracting much attention in the school choice literature is the risk that competition and student achievement are determined simultaneously; that there is not a one-way causal

relationship. The question asked here is if competition influences the quality of schools, as measured by changes in student achievement. But it is not difficult to imagine a situation where for example poor quality in a municipality's public schools leads to more independent schools being started and thus to a higher degree of measured competition (Hoxby, 2000:1214, Ahlin, 2003:11-12).

This is one source of what is generally called an endogeneity problem and constitutes a violation of the basic assumptions made about OLS, because the endogenous variable will be correlated with the error term. This causes the estimator to be biased and inconsistent⁶. Not only for estimations of the endogenous variable but often for all variables in a regression (Wooldridge, 2002:83).

Since OLS estimates is not to be trusted if endogeneity exists, a few tests are performed in the next section.

3.3.5 Testing for endogeneity

A Hausman test is employed to test whether or not competition is endogenous. Following Wooldridge's description (2002:118-20), the test's null hypothesis is that the estimated residuals from a regression of all explanatory variables thought to influence competition, including all those thought to influence student achievement, do not have a significant explanatory effect in the original regression. So, first this equation is estimated with a Tobit model because competition is a limited dependent variable (it can only take values within certain limits:

$$Co = X\pi + v$$

Where Co is a competition measure, X is a vector including a constant and the explanatory variables, π is a vector of coefficients to be estimated and v is the residuals. The explanatory variables are the ones presented in section 3.3.3, plus three others thought to influence competition: total school costs (1992), years of right-wing municipal government (1992-2004) and mean vote share of right wing parties⁷ (averaged over the elections 1994, 1998 and 2002). Then v is put into the student achievement equation, yielding:

$$Y = X_1\delta + \rho v + \varepsilon$$

⁶ The other main sources are omitted variables and measurement error (Wooldridge, 2002:50-51).

⁷ The Moderate Party ("Moderata Samlingspartiet"), the Centre Party ("Centern"), the Liberals (Folkpartiet Liberalerna) and the Christian Democrats (Kristdemokraterna).

Y is the dependent variables, i.e. one of the four measures of student achievement. X_1 is a vector of competition, a constant and the explanatory variables described above in section 3.3.3. It is thus a strict subset of X, which is needed for identification. δ is a vector of coefficients for X_1 . The interesting coefficient here is ρ . If it is significantly different from zero, the residuals from the first equation are correlated with Y and this indicates that there is an endogeneity problem. Two variants of the test are run, one using CR₂ as the competition measure and one using the share of students in independent schools. The idea behind this is that if new schools have been started in response to low quality in public schools, these are more likely to be independent schools. So the share of students in independent schools ought to be a more sensitive measure to endogeneity. By including this measure as well, the possibility of the result being a coincidence decreases (see Appendix, table A1-2, for a full report).

Table 3.2 *Result of Hausman test for endogeneity of competition*

Dependent Variable: Mathematics				
Sample (adjusted): 1 1465				
Included observations: 1252 after adjustments				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient (ρ)	Std. Error	t-Statistic	Prob.
ν , CR ₂	-0.013407	0.009623	-1.393265	0.1638
ν , share of students in ind. schools	-0.147687	0.151912	-0.972191	0.3311

The null hypothesis that $\rho = 0$ cannot be rejected on neither the five nor ten percent level of significance for any of the measures, the p-value⁸ being 0.1638 and 0.3311 respectively. Competition is therefore taken as exogenous and the model is estimated with regular OLS.

The reported test results above have test scores in mathematics as dependent variable in the second part regression of the test. Hausman tests of the CR₂ measure with the three tests in English as dependent variables gives similar results, but with even higher p-values.

⁸ The p-value can be interpreted as the risk of a result being a mere coincidence. Normally are p-values of 0.05, or at least 0.1, used as significance levels.

3.3.6 Results

The effect of competition on the four measures of student achievement is shown below. The included variables in the estimated equation is almost the same as above, only leaving out the residuals from the regression on competition:

$$Y = X_I\delta + \varepsilon$$

All estimates except where the receptive sub-test in English is the dependent variable have been estimated using White's heteroskedasticity consistent standard errors and covariance. This regression showed signs of autocorrelation in addition to heteroskedasticity, whence Newey-West's standard errors have been used instead. These are robust in the presence of both heteroskedasticity and autocorrelation (For full tables, see Appendix, table A3-6).

Table 3.3 *The effect of competition on student achievement*

Dependent Variable	Competition	Std. Error	t-Statistic	P-value	Adj. R ²	Incl. obs
Mathematics	-0.001705	0.002455	-0.694508	0.4875	0.166903	1254
English, oral	-0.000555	0.001838	-0.301752	0.7629	0.227402	1249
English, receptive	-0.001089	0.002126	-0.512281	0.6085	0.254370	1253
English, written	-0.000978	0.001868	-0.523601	0.6006	0.182692	1252

In all of the four regressions there are negative signs on the competition coefficients, meaning that higher value of the competition measure and thus less competition is correlated with worse results. But in none of them is competition even close to being significant; the p-values are much too high. Therefore it is not advisable to draw any sort of conclusion about the effect of competition. The result is robust to excluding some of the other explanatory variables that could be highly correlated to the competition measure, such as population distance, degree of urban area and average grades. If so, a problem of multicollinearity could have been at hand, but this does not seem to be the case.

To further check the robustness of the results and the accuracy of CR₂ as a competition measure, the share of students in independent schools is used as an alternative. The results are more or less the same; the p-values are lower in all cases but one, but still far from significant (Appendix, table A7).

There is a substantial number of missing observations, around 14.5 percent in all four cases; the total number of schools in the sample being 1465. The main reason for this is that test score data for schools with less than ten students taking the test are not provided by NAE.

This is not necessarily a bad thing, because with that few students the result for the whole school could be misleading. However, there are other schools where results are lacking for no apparent reason. If the schools are randomly missing it should not cause any major problems, but whether they are or not have been difficult to find out. The individual dropout rate within each school could also cause problems, but without individual level data it is not possible to make any prediction if this causes the results to be biased.

To make extensive remarks about the other explanatory variables is beyond the scope of this thesis, but one needs explaining. The independent school dummy is positive and highly significant in all four regressions. However, this should not be interpreted as independent schools necessarily having higher quality. Students in independent schools are to a higher degree of a kind that can be expected to achieve better results. They have as mentioned earlier more often higher educated parents for example. Since no individual level data was included there is no way to control for such selection.

3.4 Other studies of student achievement in Sweden

All the below reviewed studies of student achievement have used the share of students in independent school and not competition in general, which is what this thesis is trying to do by including also possible competition between public schools. However, a comparison and analysis of similarities and differences between the studies' results is still useful and informative.

The first study of how the Swedish reform and the introduction of competition have affected student achievement was performed by Bergström and Sandström in 2001 (this first study was later complemented and extended in Sandström – Bergström, 2002). The authors are interested in how the share of students in independent school affects student achievement in public schools. They use several statistical methods and models and definitions of student achievement, for example grades, national standardized test scores and the share of students who did not fail any subject. The most interesting and reliable result in the study is obtained by using a sample selection model, controlling for the possibility that the choice between public and private schools is not random and that the share of students in independent schools is not independent of student achievement. This model is applied on a material of

approximately 28 000 public school students' national standardized test scores in the ninth form from 34 selected municipalities. The estimated coefficient is positive and significant for all variations of the model, leading the authors to suggest that competition from independent schools are beneficial for students in public schools (Sandström – Bergström, 2002:26).

The study led to a quite fierce public debate laced with political undertones⁹. Some of the more serious objections were directed towards the arbitrary selection of variables to control for endogeneity and the fact that the selection of municipalities leaves the study with few observations on the explanatory variable of interest, despite the large sample of individuals (Björklund et al, 2003:101).

However, two more recent studies present results that support the findings of Bergström and Sandström. Ahlin (2003) uses a similar method as Bergström and Sandström (albeit with less observations, approximately 8500 students from 34 municipalities), but has also access to national standardized test scores on two occasions from each student, from the sixth and ninth form. The sixth form results are used as a value added specification, controlling for students previous knowledge and unmeasured characteristics. Students from private schools are also included in her study, making the results more a measure of overall competition effects rather than the effects on just public schools. This lessens the possible endogeneity problems as well as bias caused by omitted variables affecting student achievement (Ahlin, 2003:3).

The results reported are very similar to those of Sandström and Bergström; a significant positive effect is found in mathematics. A ten percent increase of the share of students in independent schools increase the test result in mathematics with 0.19 standard deviations in Sandström and Bergström and 0.17 in Ahlin. This is roughly equivalent to a ten percentile improvement in the sixth form math test scores. However, no significant effects are found in English and Swedish. (Ahlin, 2003:21-22).

Björklund et al (2003) uses panel data of national standardized test scores and grades from the period 1998-2001. Test score observations are available for all students in approximately 30 municipalities each year. The whole population of ninth form students are covered when it comes to grades. The results based on test scores are inconsistent and seem to be sensitive due to the small number of observations of the share of students in independent schools. The grade based results shows a positive and significant effect of the share of students in independent schools; students improve their position in the grade distribution by half a percentile when the share in independent schools increases with one standard deviation. As

⁹ See for example Wibe, 2002 and Bergström – Sandström, 2002.

discussed earlier, the use of grades as a measure of school quality can be questioned though (which the authors also do).

3.4.1 Comparison

The results of this study differ from the studies described above. One possible reason for this is the different competition measures. The competition between public schools could be overstated in the competition measure used in this study in regards to the real level of competition. Public schools are not companies striving for profits or in the case of non-profit schools, for perquisites to their employees, as several of the independent schools are, which would imply lower incentives to maximize profits by attracting more students. They could therefore be less sensitive to competitive pressure. Public schools are also often established and older than independent schools. It is thinkable that a newer school must make a stronger effort to attract students and as a consequence improves its quality more.

Another source of differences is that the measured share of students in independent schools is an average of the whole compulsory school (forms 1-9), not just the senior level of the compulsory schools (forms 7-9) (Sandström – Bergström, 2002:10, Ahlin, 2003:11). This could present a problem if the difference between lower and higher grades systematically differs between municipalities. For example, small municipalities could have independent schools in the lower levels, when schools typically are smaller and more numerous. Senior level schools are often larger and therefore less numerous; many senior level public schools could thus in reality face little or no competition from independent schools whereas the measure shows that they do. If municipalities with such characteristics systematically have better results, this would bias the estimates based on share in independent schools upwards.

But the most probable reason is the difference in data. This is supported by the fact that share of students in independent schools did not have a significant effect in my study when used as an alternative competition measure. All of the above mentioned studies have had access to a richer, individual level material, something that was not possible to obtain for this study. It is possible that the effect of competition is not strong enough to be detected when measured on school level.

What is similar to all studies is that no evidence of negative effects has been found. But even the most reliable study – in my opinion Ahlin's because it manages to control for

previous knowledge of students in a convincing way – only finds significant effects in one subject, mathematics. The effects in English and Swedish are not statistically significant. Bergström and Sandström do not use test scores in English and Swedish in any of their studies. But in Wibe's (2002) critique of their study he claims to have found no statistically significant correlation using the same material. Ahlin mentions that mathematics could have a higher priority in a competitive environment as an explanation to this (Ahlin, 2003:24).

Another reason why the results differ between mathematics on one side and English and Swedish on the other, is that mathematics is a subject where students acquire almost all knowledge in school – except for maybe the most basic concepts – whereas knowledge of English and Swedish comes from many other sources as well, such as books, films and newspapers. They could therefore be less dependent on the quality of teaching and schools in general and therefore also not as affected by competition.

Despite these explanations, English and Swedish are not subjects where competition theoretically cannot be expected to have a positive influence. The possible explanations suggested above only explain to a certain degree why the effect might be smaller. So one conclusion of the collective result of the studies is that despite the growth of independent schools and increased choice possibilities, competition is still not as strong an influence on student achievement as perhaps was hoped for.

3.5 School cost analysis

3.5.1 School cost variable

The cost analysis is using data from 289 municipalities over six years, 1998 to 2003¹⁰. This would add up to a total of 1734 observations, but due to some missing observations, the total number of observations is 1696. There does not seem to be any pattern as to which municipalities are lacking observations, so the results should not be biased because of this¹¹. The reason for not using earlier years is that data about number of students attending each

¹⁰ There are presently 290 municipalities in Sweden but Knivsta did not exist until 2003 and has thus been omitted.

¹¹ An exception is the observations in 1998 for Nykvarn, where all but one is missing. This is most probably because the municipality was created in that year.

school – which is needed to construct the competition measure – was not available for earlier years than 1998.

To measure cost, the total cost per registered student for compulsory schools in the municipalities is used. This measure does not include the information costs faced by students and parents when choosing what school to attend. This is an obvious drawback, more schools to choose among would at least intuitively increase these costs, but such information is very difficult to obtain. The measure does include administrative costs that fall on all schools (Pettersen, 2005), which could be thought to increase with more schools and more competition.

3.5.2 Competition measure

Competition is measured by the combined percentage share of the two largest schools in a municipality, averaged over the three levels (1-3, 4-6, 7-9). It is the same measure as used in the analysis of student achievement, and thus same problems apply, the only difference is that all levels are included. But this is in order since total costs is measured for the whole compulsory school. Besides the two largest schools' market share, the share of students attending an independent school is included as well. This share is already partly included in the competition measure. But it is interesting to study if independent school have any effect of its own, in addition to a general increase in competition.

3.5.3 Other explanatory variables

The definitions of tax base, population distance, degree of urban area and foreign citizens are the same as in the achievement analysis. The other included variables are:

- Political majority: A dummy variable for municipalities with socialist majority has been included in the model since earlier studies indicated a positive correlation between this and costs for education (see NAE, 2004:11).
- Average school size: Total number of students divided by number of schools.
- Other municipality: Share of students that attend a school in a different municipality than where they are residents.

- Teacher density: Number of full time teacher services per 100 students.
- Independent schools: Share of students in independent schools.
- Educational level: Share of population ages 20-64 with no higher education than compulsory school.

The foreign born variable has been excluded because no data was available for the earlier years of the panel; which is also why the definition of education level has changed.

3.5.4 Fixed effects model

The results below are estimated using a (cross-section) fixed effects model¹². The resulting fixed effects estimator is created by implicitly including a dummy for each individual – or in this case, municipality – in the model. This makes it possible for every municipality to have its own intercept and avoids the problem of having to assume a common intercept for every municipality – a very unlikely situation because of the influence of unmeasured variables. Using normal OLS would thus create a bias in the estimates. Since including 289 dummy variables in the model is cumbersome, a transformation of the data is necessary. By subtracting from every observation for each individual the average of all observations for that same individual, and then using OLS on the transformed data, the same result is obtained as if dummies were included for all individuals (Kennedy, 2003:303-4). A general model for municipality m in time t can be written:

$$Y_{mt} = \alpha_m + X_{mt}\beta + \varepsilon_{mt}$$

Where in this study, Y_{mt} would represent an observation of a municipality's total cost for a certain year, α_m is the same municipality's intercept, β is a vector of coefficients for the vector of explanatory variables, X_{mt} (not including a constant). Finally, ε_{mt} is the error term (ibid, 2003:315).

The way the fixed effects estimator is constructed implies that it focuses on the differences within individual cross sections; it is also sometimes called the within estimator. It explains to what extent, in this context, an observation of a municipality differs from the average of that class of observations for the same municipality. It does not explain why the average of one municipality differs from that of another (Verbeek: 2004:347). Another way to explain it is

¹² It is possible to include period fixed effects in the model as well, but this is rarely done because it means losing large numbers of degrees of freedom and hence getting less efficient estimates (Greene, 2003:292).

that it measures how changes in the explanatory variables relate to changes the dependent variable (NAE, 2004:15-16).

The influence of all variables that are time invariant is therefore not measured. This can be both a blessing and a curse, depending on what one would like to examine. In this case, it is likely that unmeasured time invariant variables influence costs and it is thus an advantage.

One problem with the fixed effects estimator is that by including a dummy for all individuals, N-1 degrees of freedom are lost and the estimates become less efficient. Another estimator, the random effects estimator, has been developed to solve these problems and to incorporate the extra information available by the variation between individuals in a sample. The random effects model thus produces a more efficient estimate than the fixed effects model. However, it is sensitive for correlation between its composite error term and the explanatory variables. In such instances where this occurs, as when unmeasured variables influence the explanatory variables, the estimator will be biased. This influence is then caught by the error term. The fixed effects estimator is not biased in these instances. This can be tested with another version of the Hausman test, which tests if the random effects estimator is significantly different from the fixed effects estimator. If not, the random effects estimator is the more efficient one and should be used (Kennedy, 2003:305-7).

The result of the Hausman test is shown in the table below; the null hypothesis being that the two estimators do not differ significantly and that no bias exists.

Table 3.4 *Hausman test of random or fixed effects*

Correlated Random Effects - Hausman Test			
Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	347.394580	11	0.0000

The high value of the Chi-square statistic above means that the null hypothesis can be firmly rejected and the random effects estimator is biased and should not be used¹³.

¹³ The outcome of the test remains the same for quite a few alternative specifications of the model, including various logarithmic models and models where one or several explanatory variables are excluded.

3.5.5 Results

The results below are estimated using White's robust cross-section standard errors and covariance¹⁴.

Table 3.5 *Results of the fixed effects model*

Dependent Variable: Total costs				
Sample: 1998 2003				
Cross-sections included: 289				
Total panel (unbalanced) observations: 1696				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	39679.39	5889.572	6.737228	0.0000
Competition	34.86217	24.52723	1.421366	0.1554
Tax base	0.337257	0.040270	8.374925	0.0000
Population distance	0.499520	0.376643	1.326243	0.1850
Degree of urban area	-281.8167	70.04439	-4.023402	0.0001
Foreign citizens	-174.3817	68.57771	-2.542834	0.0111
Political majority	91.90022	368.0067	0.249724	0.8028
School size	-3.051418	7.548703	-0.404231	0.6861
Other municipality	105.5423	113.8522	0.927011	0.3541
Teacher density	2292.134	251.9936	9.095998	0.0000
Independent schools	36.17042	42.21189	0.856878	0.3917
Education level	-617.0489	153.3713	-4.023237	0.0001
R-squared	0.899423	Adjusted R-squared	0.877882	
S.E. of regression	2851.613	F-statistic	41.75239	
Sum squared resid	1.14E+10	Prob(F-statistic)	0.000000	

The effect of competition on total costs is uncertain, according to the results of the model. Although it is positive, meaning that a higher value of the competition measure and thus less competition is associated with higher costs, the low value of the t-statistic and consequently high p-value makes it risky to draw strong conclusions. There are on the other hand no indications of competition increasing total costs.

One possible explanation to why the results are not significant is that, as discussed earlier, the fixed effect model only takes account of variable variation within the municipalities. It is possible that the competition measure, which does vary but for many municipalities not that

¹⁴ The fixed effects have also been tested for redundancy, but the null hypothesis that they can be rejected (see Appendix, table A8).

much, does not contain enough variation under the period to yield significant results – despite the number of observations.

It can also be noted that independent schools does not seem to have a significant effect on costs. The coefficient is positive, meaning that more students in independent schools imply higher costs, but the p-value of 0.3917 is well above regular significance levels. If the independent school variable is excluded from the model, this does not change the conclusion that the effect of competition is uncertain. These two variables could have been difficult to estimate together, since they might be collinear, but this seems not to have been the case. There is also no change in the results when share of students in independent schools is used as competition measure; the coefficient is still not statistically significant (Appendix, table A9).

A note is also warranted on the R^2 and the adjusted R^2 measures, which are relatively high. These are not really appropriate goodness-of-fit measures unless the model has been estimated with OLS (Verbeek, 2004:352).

Teacher density has been included in the model although it was argued in the student achievement analysis that it could be a result of competition. To check if competition is a significant influence on teacher density, a regression is run with the other explanatory variable on teacher density, i.e with teacher density as dependent variable. The effect of competition is not statistically significant in that regression (p-value of 0.2424, Appendix, table A10).

3.6 Other studies of school costs in Sweden

There have been, to my knowledge, three other similar studies made about how competition has affected school costs in Sweden. They have all, as the ones dealing with student achievement, focused specifically on the influence of independent schools and not on competition in general.

A study by Fransson and Wennemo from 2003 examined how the share of students attending independent schools affected the total costs per student in the municipalities. They used cross-sectional OLS models – varying in the number of explanatory variables included – on data material from all Swedish municipalities for each year from 1995 to 2001. The study found that the share of students in independent schools had a positive and statistically significant effect on a 95 percent level in 2001 for all relevant models used. For each extra percent in independent schools the costs for the municipality increased approximately with

250 Swedish Crowns (SEK) per student. This means that every student attending an independent school implies an extra cost of 25000 SEK¹⁵. No significant effect – with the exception of one specific model in 1999 and 2000 – could be found for the other years. The authors suggests that the reason for only finding a significant influence in 2001 could be that the share of students in independent schools were earlier too small for the effect to show (Fransson – Wennemo, 2003).

Björklund et al argue in their study that a purely cross-sectional analysis does not address the right question. Instead of asking if total school costs are higher in municipalities with a larger share of students in independent schools, the question should be whether changes in the share of independent school students lead to changes in costs. The reason is that unobserved differences between municipalities are likely to influence the result of the cross-sectional analysis. For example, one feature of the Swedish system for remuneration to independent schools is that there are incentives for such schools to establish themselves in municipalities with higher total costs per students. By using the change between 1992 and 2001 as a dependent variable the authors try to avoid this problem. The conclusion drawn from their results is that neither the hypothesis that independent schools increases total costs per student can be supported, nor the opposite that they decrease costs (Björklund et al, 2003:98-100).

The third study published by NAE in 2004 and initiated as a response to the two earlier studies, is more comprehensive and uses several types of models to examine the relationship between share of students in independent schools and total costs. The data is in principle the same though, material from 1995-2002 is used. The study also separates its analysis into two parts, one where the municipalities are treated as one group and one which separates between municipalities in big city-regions¹⁶ and the others, taking into account the large differences in the share of students in independent schools in these two groups (NAE, 2004).

The approaches and models used yield different results. First, the differences between municipalities with at least one independent school and municipalities with none are examined, but no systematic differences are found. Secondly, a panel data set is created to test the hypothesis that there is a correlation between share of students in independent schools and average total costs. The results confirm a positive relationship; an increase of one percent of the independent schools share is associated with an increase in the cost per student with 92 SEK per year. The third approach is a similar fixed effects model as used in this study. The

¹⁵ If a municipality has a population of 1000, the extra cost is $1000 \times 250 = 250000$. If the share of students in independent schools is one percent for example, this equals 10 students; 250000 divided by 10 equals 25000.

¹⁶ Stockholm, Göteborg and Malmö.

results are similar too; no significant effect is found. The authors' main conclusion of these results is that although there is a connection between a larger share of students in independent schools and higher average total cost, the former cannot be said to *cause* the latter. The incentives of the Swedish system are, as in the study above, cited as a more likely explanation for the differences between the municipalities (NAE, 2004:16-19).

When the municipalities are split into two groups another pattern emerges in the fixed effects estimation. In the big city-regions, the change in the share in independent schools is positively and significantly correlated with an increase of average total costs (by 145 SEK per student and year), whereas in the other municipalities it is negatively and significantly correlated (by 64 SEK per student and year). Three possible reasons for the difference between the groups are suggested. A less secure basis for students, as in the big city-regions where student numbers have been more volatile, could lead to planning difficulties and as a result, higher costs. More competition between public and independent schools could have made the municipalities increase the resources to public schools to make them more attractive. The last, and according to the study most likely, reason is the different attitudes in the municipalities towards independent schools and following this, how much the deduction is from the remuneration to independent schools due to them not having an obligation to fulfil the compulsory school attendance. A positively inclined municipality, as has been common in the big-city regions, is likely to be less restrictive when this reduction is calculated (*ibid.*).

3.6.1 Comparison

The results of this study are as mentioned similar to the last two described in the previous section, but dissimilar to Fransson and Wennemo's. This is not strange considering the different models used. This study agrees with the notion that the important issue is whether or not a change in competition is related to a change in costs. A fixed effects model that measure this avoids more of the bias caused by the omitted factors or variables that influence costs in the municipalities. If the argument for this type of model is accepted, then the introduction of competition cannot be said to have meant higher school costs in general; whether the measure of competition is independent schools' share of students or a general measure with competition between public schools included as well. It is of course an interesting result that school costs are higher in municipalities with higher degree of competition and there seems to

be some evidence of changes in competition being positively correlated related to changes in costs (higher competition meaning higher costs) in the big city-regions. But rather than drawing the conclusion that this is caused by competition one should look deeper for the reasons.

4 Constraints on school competition

In this chapter, explanations are suggested to why the effects of competition are absent or weak. First, problems originating in the nature of schools are examined and then secondly, by analysing some of the special features of the Swedish rules and regulations.

4.1 General problems of school competition

Wilson (1989) use the school as an example of a coping agency; an agency where neither outputs nor outcomes can be observed with great precision. This has consequences for schools, for instance how good teachers can be rewarded and how students and parents are able to evaluate the quality of schools.

Starting with outcomes, it is problematic to make a full evaluation of a student's education until the education is finished and even then it might be troublesome, since first-hand experience of alternatives might be difficult for the student to obtain. It is therefore difficult for students and parents to make informed decisions about which school to choose. Factors other than quality concerns, like a school getting a reputation for giving high grades, might therefore be a larger influence instead. If outcomes are difficult to observe it is also harder to change schools during an education. It is of course possible, but it is not as you might switch from one brand of car to another when quality or price is disappointing. Voting with your feet is for these reasons relatively more difficult and competitive pressure is thereby lost.

Continuing with outputs, i.e. what teachers and other school personnel do and how they do it, these are difficult to observe for various reasons. How can for example a school principal evaluate a teacher's efforts in the classroom? Direct observation is troublesome since both teacher and student behaviour would probably change in the presence of an observer. Grades or test results are also problematic because it is hard to control what the teacher's contribution is and what the student already knew or acquired elsewhere. Neither do such measures cover

the whole range of things that a school is supposed to teach nor what should be included in the concept of school quality. A certain set of values appreciated in society and social skills are two examples that grades or results do not measure. Putting focus on the more measurable aspects diverts attention from the less measurable, leading to distorted incentives and not optimal performances. A third suggestion could be student evaluations, but these are subjective and not necessarily rewarding good teaching skills.

The problem of measuring outputs makes it difficult to reward good teachers, quite possibly the most important influence on school quality. The use of a more market-like governance structure is usually accompanied by higher powered incentives; strong incentives that drive individuals to perform better are a prime source of markets' relative efficiency. This problem is made worse by outcomes not being easily observed either. In cases where objective grounds are lacking, rewards could be even counter-productive by focusing on the more measurable activities and therefore neglecting other, just as important, parts of the schools' tasks.

Because school administrators have to rely on teacher's sense of duty and professionalism instead of using stronger incentives the effect of competition in schools is weakened. There could very well be a strong competitive pressure on a school to provide quality education to be able to attract students, but the pressure is difficult to translate into incentives for the personnel.

Besides these problems of measurability, there are also issues concerning asset specificity. A compulsory schoolteacher's education is a fairly specific asset, which limits the possible career paths, the possibilities of promotion and thus the use of career options as an incentive to improve performance.

Another weakening effect is the problem of discontinuing schools that are inefficient. In part this is due to the asset specificity of school buildings and material. Hence, once the investment in a school has been made it is hard to justify discontinuance for efficiency reasons if that mean leaving a school unused. Even if the school was inefficiently run, it would often be better to try and reform the activities than to discontinue. The threat of going out of business is thus relatively lower. This is of course much more so for public schools than independent schools, which work under more firm-like conditions and in many cases are regular for-profit firms with education as their product. But where public schools are more numerous than independent, as in Sweden, they have the largest influence on the general level of both quality and costs.

In addition to the problems of specific assets, public schools are also politically governed and often sensitive matters, where special or local interests are given higher priority than efficiency. Public schools do not make losses as regular firms and do not go broke as an independent school might. There are good reasons for public schools being run and governed this way, so it should perhaps not be labelled as problems. But in the context of competition it is not efficiency enhancing and are thus explanations to why the effect of competition on quality and cost is not stronger.

Besides these general problems of making a more market-like governance structure work in schools, there are special features in the Swedish institutional arrangements and conditions that hinder the effect of competition. These are mostly concerning costs though.

4.2 Institutional arrangements in the compulsory school

The reform of the early 90s transformed the governance structure of the Swedish compulsory school from rather extreme hierarchy into a more market-like structure by the introduction of choice and competition in a voucher-type system. But the system is still quite far from a regular market. Returning to the earlier division of privatization in consumption, production and financing, then consumption is privatized since students and parents face no legal obstacles to their choice of schools. Production is done by both private and public actors, even though the great majority of schools still are public. Financing is with a few minor exceptions totally public.

This sort of arrangement implies that schools do not compete for students with lower prices of education, but with better quality. This is perhaps the most important reason why competition does not lower costs. Independent schools receive pay for each student according to the average cost per student in the municipality. They have of course incentives to lower their own costs to be able to earn more profit or perquisites, but this does not reflect back into lower costs for the municipality. At the same time do not public schools have any special incentives within themselves to decrease costs; there may at times be budget cuts but such demands normally originate externally.

The Swedish regulation that independent schools are not allowed to charge additional tuition fees is often cited as the cause of the non-existent price competition¹⁷ (see for example Sandström – Bergström, 2002:1). The thought behind the regulation is to promote equity and limit the risks of schools being segregated along the lines of rich and poor.

But if the objective is to create incentives for schools to be more cost efficient, additional tuition fees is not a necessary ingredient. One possibility is to let each student explicitly, rather than implicitly as is done today, receive a voucher that would also serve as highest fee per student allowed and then let the student collect the difference between the voucher amount and what the school charges. Using the price mechanism in this way would make it possible to take advantage of a more market-like governance structure by creating competition between schools over both costs and quality. Such a system would not cut school costs for municipalities, but perhaps for society as schools – public and independent – would be given incentives to economize on costs. The efficiency gains would be channelled back directly to the citizens. And it would not increase municipality costs. The risk for segregation would still be higher than in the present system but partly mitigated by having a ceiling. There is also a psychological difference between paying extra and getting money back. There are probably less people who would choose a more expensive school if a voucher covered only part of the fee for that school, then it would be if the voucher covered all but it was possible to get a refund of the same amount as the additional fee by choosing a less expensive school.

The demand placed on public schools that they have to make sure that every student can attend a school – in case there is no availability elsewhere – implies that the system needs to have some overcapacity. This is a necessary and perhaps not a specifically Swedish feature, but it still increases costs.

One institutional feature mentioned before that is worth mentioning again, is that as the system for independent school remuneration is constructed it is economically rational to start schools in municipalities with relatively high costs. This is since the remuneration is calculated after the average cost of public schools in a municipality. One indication that this feature really is influencing independent schools' start up decisions is that total costs from 1992 have a statistically significant influence on the CR₂ measure (Appendix, table A11). Higher total costs were associated with lower value of the competition measure, meaning higher competition.

¹⁷ This rule applies to public schools as well but that is a more normal state of affairs.

Another cost increasing effect is caused by the remuneration system in conjunction with the fact that students with relatively highly educated parents are more prone to choose independent schools. This is because education level of parents in many studies has been shown to be a positive influence on student achievement. When students with better prerequisites for studying, which can be expected to be less costly to educate, leave the public schools they have to increase cost per student to maintain the level of quality. Since independent schools' remuneration is calculated from the average cost per student in the public school, the remuneration will increase. While income for independent schools thus is raised, there is no extra cost for them. Independent schools can therefore be expected to improve their quality, which will make even more attractive and then a vicious cost increasing circle is created (Fransson – Wennemo, 2003:13).

The fact that municipalities cannot veto NAE's decision about approving establishment of independent schools could have negative cost effects, besides being slightly odd since the compulsory school is the municipality's responsibility and considering the autonomous status granted municipalities by Swedish law. To give the municipality veto rights would give them bargaining power at least in an initial negotiation over the remuneration. Decisions to turn down an application from an independent school would of course risk being politically motivated instead of economically, but since the government of the municipality is democratically elected it could be seen as representing the views of its citizens. Hence, from a democratic point of view it is hard to see anything wrong such a motivation.

One last possible reason, this one having nothing to do really with the institutional arrangement and applying to both costs and quality, is that there have been more students in the Swedish compulsory schools over the past few years than usual. The consequence of this could be that independent schools have just relieved some of the pressure on public schools, rather than acting as competitors. Real competition could therefore in many cases have been small or non-existent, which is something that will change over the coming years when the age groups become smaller.

5 Conclusions

The purpose of this study has been to examine the effects of competition on public sector efficiency, in the context of the Swedish compulsory school. The empirical results show that the introduction of competition by allowing students to choose schools has not had a significant impact on the efficiency of schools. Neither student achievement, used as measure of school quality, nor total costs are significantly affected in a statistical sense.

The result that competition has not had any significant effect on total costs in the municipalities is similar to other Swedish studies of the same subject. Only one study have found increasing costs, but with a model that really address a somewhat different question. The competition between public schools, which my competition measure accounts for in addition to the competition between public and private alternatives, does not add an extra influence.

That my results in the analysis of student achievement differ from some of the other studies made, at least when test scores in mathematics is the dependent variable, can be interpreted in two ways. The first possible conclusion is that the competition between public schools is non-existent or at least not strong enough to influence how students perform. The important competition is thus the one between public and private alternatives, which should be measured as the share of students attending these schools. The other possible conclusion is that the difference in material between mine and the other studies cause the results to differ. This is of course difficult to know for sure, but when the share of students in independent schools is used as a competition measure in the regressions presented in this study, the results are still not significant. Because of this I lean towards the second conclusion and it would be interesting to be able to try my competition measure on the data used in the other studies.

However, considering the collected results, mine and others, the effect of competition on school efficiency have been weak. There have been no gains whatsoever regarding the total costs of the municipalities and the positive effect found in some studies on student achievement seems to only concern one subject – mathematics. Positive effects on grades have also been found but as has been argued before, grades are an unreliable measure of

school quality. On the other hand, there have been very few, if any, reliable results of negative effects found. And it should be acknowledged that efficiency was not the main motivation behind the Swedish reform. It was rather an ideological notion of wanting to create freedom of choice in a public service where there had been almost none earlier. Still, efficiency gains were often a part of the pro-arguments, perhaps because it is a less sensitive political concept.

There are several reasons why the efficiency enhancing effects of competition should be less pronounced in schools than in other public services where competition has been introduced. First, measurability is a considerable problem. Both outputs – for example what teachers do – and outcomes, for instance the quality of an education, are difficult to evaluate. Consequently, it is difficult to reward personnel doing a good job as well as it is difficult for students and parents to make an informed choice. Compare for example garbage waste disposal, which is a commonly privatized public service, where both outputs and outcomes are relatively easy to observe. An administrator can measure how much volume or area that is covered in a certain time and reward thereafter. It should not be any problem observing if the garbage was disposed off either. It thus possible to have higher powered incentives and to relatively easy change from one operator to another, should quality and/or price be disappointing. But for schools, even if school choice exists, it might be difficult to convert the competitive pressure into better performance.

The combination of asset specific investments in the form of for example school buildings and the political governing of public schools, including the obligation to keep a certain overcapacity, makes it difficult to discontinue schools that are inefficiently run. A part of the power of markets is that inefficient units are likely to be driven out of business. The most efficient organizations prevail, forcing everyone to constantly develop in order to survive. When this mechanism for exclusion is missing or weak, the efficiency gains from competition is likely to be smaller.

Apart from these general features there are also additional institutional arrangements and special circumstances in the Swedish compulsory school that works against competition improving efficiency, although these are mainly affecting the cost side of the concept. Most important among these is the fact that schools compete with quality and not with lower prices, since financing is public and taken from the tax revenue. The remuneration system to independent schools is another cost increasing institutional arrangement, whereas the unusually large amount of students is a passing phenomenon.

Some of these features are desirable for other reasons than efficiency, like the ban on tuition fees that is meant to counteract segregation. But the remuneration system is one

arrangement that could be changed in order to improve efficiency. A national system with more standardized independent school remuneration, replacing the current one where there are incentives for independent schools to start up in municipalities with high total costs per student, could be one way. Another suggestion could be to give municipalities veto rights in order to provide them with bargaining power.

To conclude this run-through of the findings and analysis of this study: It seems to me as the collected available evidence indicates that the change of governance structure entailed by the reform has, in terms of efficiency, improved the Swedish compulsory school. While the effect of competition might not be as strong as hoped for, which could be explained by a combination of institutional factors and features inherent to schools, it is important to notice that there are very little reliable evidence of negative effects.

When discussing the introduction of competition in public services more generally, it is important to take into account the nature of the service in terms of asset specificity and especially measurability. These dimensions are bound to have an influence on how competition will affect efficiency; if there will be any positive effects at all. Many of the school features that lessen the impact of competition are not easily improved or changed; they are more or less embedded in the nature of schools' tasks. Thus, when changing the governance structure of public services with similar characteristics to schools by introducing competition, one should not have large efficiency gains as the first objective. But as was mentioned early on in this thesis, efficiency is hardly the only standard of which public sector reform should be measured against. Then there is the issue of how the rules and regulations – the institutional arrangement – are designed. If the institutions of the Swedish compulsory school are taken into consideration, it is not surprising that no positive effects on total costs could be found.

There are often valid arguments why a school choice reform should lead to both increased and decreased costs for example, which makes it difficult to say what is going to happen and also makes the largely inconclusive empirical results of this study more explainable. But it also raises questions about how competition works on the micro-level, within in the schools. To be able back up theory with micro level empirical data, a qualitative study would have to be performed. Some interesting questions to research would be: Do teachers and other schools personnel feel affected by competition, and if so in what way does it affect their work? In municipalities where competition has been introduced, have schools changed the way they work? Can differences be found between schools in municipalities with high and low degrees

of competition when it comes to time and efforts spent on different tasks? Are there reward systems used and if so, do they differ among municipalities with certain characteristics?

The answers to these questions would give interesting insights to how the mechanisms of competition affect the compulsory school.

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Appendix

Testing for endogeneity

The two tables below are the outputs of the Hausman test, with CR_2 and share of students in independent schools as competition measures.

Table A.1 *Hausman test for endogeneity (CR_2)*

Dependent Variable: Mathematics				
Included observations: 1252 after adjustments				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	9.168556	2.091984	4.382708	0.0000
CR_2	0.011138	0.009133	1.219502	0.2229
Independent school dummy	0.957076	0.188265	5.083669	0.0000
Tax base	1.33E-05	4.43E-06	3.003850	0.0027
Education level	0.094086	0.024985	3.765727	0.0002
Share of citizens born abroad	-0.096587	0.038613	-2.501413	0.0125
Share of foreign citizens	0.074701	0.066943	1.115897	0.2647
Population distance	-0.000665	0.000329	-2.019855	0.0436
Degree of urban area	-0.007770	0.007188	-1.080976	0.2799
School size	0.001050	0.001266	0.829127	0.4072
Share of females	-0.001884	0.006679	-0.282122	0.7779
Average grades 1992	-0.172276	0.693285	-0.248492	0.8038
Residuals (v)	-0.013407	0.009623	-1.393265	0.1638
R-squared	0.175991	Adjusted R-squared		0.168010
S.E. of regression	1.682022	Sum squared resid		3505.377
F-statistic	22.05203	Prob(F-statistic)		0.000000

Table A.2 *Hausman test for endogeneity (Share of students in independent schools)*

Dependent Variable: mathematics				
Included observations: 1252 after adjustments				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	8.357256	2.273202	3.676425	0.0002
Share of students in ind. schools	0.138762	0.151446	0.916251	0.3597
Independent school dummy	0.574936	0.360209	1.596118	0.1107
Tax base	-3.89E-06	2.12E-05	-0.183073	0.8548
Education level	0.040160	0.030085	1.334891	0.1822
Share of citizens born abroad	-0.206118	0.096045	-2.146056	0.0321
Share of foreign citizens	0.186545	0.097297	1.917280	0.0554
Population distance	-0.000785	0.000319	-2.460936	0.0140
Degree of urban area	-0.001179	0.013618	-0.086579	0.9310
Share of females	-0.000282	0.006788	-0.041526	0.9669
Average grades 1992	1.042733	1.068643	0.975754	0.3294
Residuals (v)	-0.147687	0.151912	-0.972191	0.3311
R-squared	0.173623	Adjusted R-squared		0.166292
S.E. of regression	1.683758	Sum squared resid		3515.452
F-statistic	23.68413	Prob(F-statistic)		0.000000

Results of the student achievement analysis

The tables in this section display the results of the student achievement analysis for all the four measures (mathematics and English oral, receptive and written). The coefficient estimates of when share of students in independent schools is used as the competition measure are also included.

Table A.3 *Results mathematics*

Dependent Variable: mathematics				
Included observations: 1254 after adjustments				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	8.973118	2.101756	4.269344	0.0000
CR ₂	-0.001705	0.002455	-0.694508	0.4875
Independent school dummy	0.980823	0.188144	5.213136	0.0000
Tax base	1.60E-05	3.97E-06	4.033090	0.0001
Education level	0.062112	0.012679	4.898943	0.0000
Share of citizens born abroad	-0.125729	0.034214	-3.674839	0.0002
Share of foreign citizens	0.121409	0.062587	1.939838	0.0526
Population distance	-0.000627	0.000326	-1.919808	0.0551
Degree of urban area	-0.013778	0.006002	-2.295524	0.0219
School size	0.001926	0.001071	1.798169	0.0724
Share of females	-0.001847	0.006660	-0.277364	0.7815
Average grades 1992	0.306185	0.635346	0.481919	0.6299
R-squared	0.174217	Adjusted R-squared		0.166903
S.E. of regression	1.682468	Sum squared resid		3515.728
F-statistic	23.82066	Prob(F-statistic)		0.000000

Table A.4 *Results, English oral*

Dependent Variable: English oral				
Included observations: 1249 after adjustments				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	4.193382	1.633550	2.567036	0.0104
CR ₂	-0.000555	0.001838	-0.301752	0.7629
Independent school dummy	1.175403	0.166610	7.054825	0.0000
Tax base	9.67E-06	3.40E-06	2.843585	0.0045
Education level	0.040443	0.009844	4.108209	0.0000
Share of citizens born abroad	-0.024046	0.028406	-0.846499	0.3974
Share of foreign citizens	0.068768	0.056548	1.216107	0.2242
Population distance	0.000251	0.000254	0.990261	0.3222
Degree of urban area	-0.006137	0.004651	-1.319579	0.1872
School size	0.001791	0.000812	2.207533	0.0275
Share of females	0.013886	0.005410	2.566461	0.0104
Average grades 1992	1.812695	0.476806	3.801749	0.0002
R-squared	0.234211	Adjusted R-squared		0.227402
S.E. of regression	1.296939	Sum squared resid		2080.697
F-statistic	34.39350	Prob(F-statistic)		0.000000

Table A.5 *Results, English receptive*

Dependent Variable: English receptive				
Included observations: 1253 after adjustments				
Newey-West HAC Standard Errors & Covariance (lag truncation=7)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	6.667949	1.776587	3.753234	0.0002
CR ₂	-0.001089	0.002126	-0.512281	0.6085
Independent school dummy	1.052293	0.158736	6.629219	0.0000
Tax base	1.23E-05	3.01E-06	4.098394	0.0000
Education level	0.067777	0.010843	6.250823	0.0000
Share of citizens born abroad	-0.016802	0.021154	-0.794232	0.4272
Share of foreign citizens	0.001675	0.036485	0.045907	0.9634
Population distance	0.000314	0.000332	0.944673	0.3450
Degree of urban area	-0.006385	0.004958	-1.287762	0.1981
School size	0.003648	0.000874	4.173399	0.0000
Share of females	0.007531	0.006272	1.200857	0.2300
Average grades 1992	0.671315	0.508529	1.320111	0.1870
R-squared	0.260921	Adjusted R-squared		0.254370
S.E. of regression	1.328396	Sum squared resid		2189.914
F-statistic	39.82887	Prob(F-statistic)		0.000000

Table A.6 *Results, English written*

Dependent Variable: PSE				
Included observations: 1252 after adjustments				
White Heteroskedasticity-Consistent Standard Errors & Covariance				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	6.272151	1.695821	3.698592	0.0002
CR ₂	-0.000978	0.001868	-0.523601	0.6006
Independent school dummy	1.034410	0.159453	6.487226	0.0000
Tax base	5.53E-06	3.81E-06	1.450803	0.1471
Education level	0.041011	0.009730	4.215018	0.0000
Share of citizens born abroad	-0.039765	0.027413	-1.450571	0.1472
Share of foreign citizens	0.084836	0.054537	1.555563	0.1201
Population distance	0.000219	0.000292	0.749889	0.4535
Degree of urban area	-0.002343	0.004576	-0.512086	0.6087
School size	0.002145	0.000849	2.525235	0.0117
Share of females	0.015724	0.005476	2.871253	0.0042
Average grades 1992	1.147197	0.505688	2.268586	0.0235
R-squared	0.189879	Adjusted R-squared		0.182692
S.E. of regression	1.289222	Sum squared resid		2060.997
F-statistic	26.42141	Prob(F-statistic)		0.000000

Table A.7 *Share of students in independent schools as competition measure*

Dependent variable	Competition	Std. Error	t-Statistic	P-value	Adj. R ²	Incl. obs
Mathematics	-0.007129	0.015127	-0.471256	0.6375	0.166760	1254
English, oral	-0.013847	0.010991	-1.259781	0.2080	0.166760	1254
English, receptive	-0.013709	0.010564	-1.297663	0.1946	0.228294	1249
English, written	-0.015996	0.011736	-1.362960	0.1731	0.255047	1253

Fixed effects model

To see if the fixed effects transformation of the material is necessary, a redundancy test can be made. The null hypothesis here is that the fixed effects are redundant. If it is accepted normal OLS can be used instead.

Table A.8 *Redundant fixed effects test*

Redundant Fixed Effects Tests			
Equation: EQ1			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	22.867539	(288,1396)	0.0000

The high F-statistic shown in the table above leads to a rejection of the null hypothesis and thus implies that the fixed effects model should be used.

School costs results

The last two tables shows the results of competition being measured by share of students in independent schools and a regression of the explanatory variables in the fixed effects model on teacher density. The last regression is included to see if competition is a significant influence on teacher density.

Table A.9 *Share of students in independent schools as competition measure*

Dependent Variable: Total costs per student				
Cross-sections included: 289				
Total panel (unbalanced) observations: 1696				
White cross-section standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	42034.80	6508.468	6.458478	0.0000
Tax base	0.334633	0.044839	7.463055	0.0000
Population distance	0.564692	0.433267	1.303335	0.1927
Degree of urban area	-288.2503	79.13982	-3.642292	0.0003
Share of foreign citizens	-160.8514	73.12538	-2.199666	0.0280
Political majority dummy	86.98301	409.8487	0.212232	0.8320
School size	-1.964303	8.030145	-0.244616	0.8068
Other municipality	121.0763	132.3405	0.914885	0.3604
Teacher density	2304.820	284.3478	8.105636	0.0000
Share of students in ind. schools	28.65883	49.05229	0.584250	0.5591
Education level	-620.5158	170.9259	-3.630320	0.0003
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.899353	Adjusted R-squared	0.877884	
S.E. of regression	2851.587	Sum squared resid	1.14E+10	
F-statistic	41.89000	Prob(F-statistic)	0.000000	

Table A.10 *Regression with teacher density as dependent variable*

Dependent Variable: Teacher density				
Cross-sections included: 289				
Total panel (unbalanced) observations: 1729				
White cross-section standard errors & covariance (d.f. corrected)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant	8.103953	0.895737	9.047251	0.0000
CR ₂	0.007060	0.006037	1.169393	0.2424
Tax base	1.65E-05	2.89E-06	5.708849	0.0000
Population distance	-0.000244	4.29E-05	-5.673544	0.0000
Degree of urban area	-0.023444	0.010233	-2.291063	0.0221
Share of foreign citizens	0.012707	0.014276	0.890078	0.3736
Political majority dummy	0.023817	0.030360	0.784476	0.4329
School size	-0.001661	0.000376	-4.419848	0.0000
Other municipality	0.046359	0.015154	3.059190	0.0023
Share of students in ind. schools	-0.007967	0.003449	-2.310266	0.0210
Education level	-0.015101	0.015177	-0.995013	0.3199
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.804179	Adjusted R-squared	0.763371	
S.E. of regression	0.334577	Sum squared resid	160.0763	
F-statistic	19.70665	Prob(F-statistic)	0.000000	

Institutional arrangement in the compulsory school

The table below shows the results of a regression examining in particular the relationship between competition and total costs (from 1992).

Table A.11 *Competition and total costs*

Variables	Coefficient	Std. Error	z-Statistic	Prob.
Constant	-3.841742	66.12390	-0.058099	0.9537
Average grades 1992	29.69370	20.36522	1.458059	0.1448
Total costs/student 1992	0.000799	0.000459	1.742472	0.0814
Years with right-wing govt.	1.014938	0.768263	1.321082	0.1865
Share of right-wing votes	0.262722	0.478886	0.548611	0.5833
Degree of urban area	-0.088951	0.223791	-0.397473	0.6910
Population distance	-0.011151	0.011348	-0.982593	0.3258
Share of foreign citizens	4.136926	1.755226	2.356919	0.0184
Share of citizen born abroad	-3.212750	1.150217	-2.793169	0.0052
Education level	-4.483598	0.555973	-8.064410	0.0000
Tax base	0.000214	0.000178	1.200467	0.2300
R-squared	0.508402	Adjusted R-squared		0.488521
S.E. of regression	19.49033	Sum squared resid		103325.5
Log likelihood	-899.6227	Avg. log likelihood		-3.167686
Left censored obs	0	Right censored obs		109
Uncensored obs	175	Total obs		284