

# Educational quality and equality – why are they so hard to reconcile?<sup>1</sup>

*Martin Schaffernicht*

*Facultad de Ciencias Empresariales*

*Universidad de Talca*

*Talca – Chile*

*martin@utalca.cl*

## **Abstract**

Since the '50s, there have been voices that governments should cease to operate schools and limit themselves to financing it via a voucher system and controlling schools' compliance to quality standards. In the early '80s, such a system has been implemented in Chile. There are three types of schools: private that freely charge fees, private subsidized that have a limited fee and public. Empirical studies suggest that the major part of private schools' better results stem from the favored pupils they have. The quality and equality of the school system fall short of expectations. This paper proposes a qualitative model to explain what is going on. Families are assumed to prefer higher performing schools, teachers prefer better labor conditions and schools prefer favored pupils and better teachers. Richer schools attract more favored families that enable improved results due to the favored-pupil effect; additionally their ability to charge higher fees allows them to attract the best teachers, which further enhances their advantage. We find 5 positive feedback loops. The result is a process of concentration of favored pupils and good teachers that increases inequality. It is concluded that there are unequal conditions amongst the types of schools, and as long as they persist, no initiative in favor of more equality will succeed. The institutional arrangement must be reformed; however, this paper can only call for an approach based on simulation and experiments.

**Keywords:** positive feedback, concentration process, schooling quality and equality

## **The role of government in education**

In 1955, Milton Friedman published a text under this title and gave rise to a string of discussion and reforms. In this paper, he gave reasons for the intervention of government in education and reasons for its limitation. He also argued that certain advantages could only be obtained by fostering competition amongst schools.

Friedman assumed that “society takes freedom of the [...] family [...] as its ultimate objective” (p. 123) and that the usual role of government is to “preserve the rules of the game” (p. 123). Only natural monopoly and externalities (“neighborhood effects” in his terms) would justify a different role for the government. In other words, the base conditions are those of individual liberty, and only as far as its exercise can be shown to have undesired outcomes, can its restriction on behalf of the government be justified. How does this apply to education?

Referring to general education, “a stable and democratic society is impossible without widespread acceptance of some common set of values and without a minimum degree of literacy and knowledge on the part of most citizens. Education contributes to both.” (p. 124). Thus there is a substantial “neighborhood effect”, since the education of one individual benefits the society of all. However, there is no way of determining how much or what its monetary value would be. Also there is a second justification, since the government will “require that each child receive a minimum amount of education of a specified kind” (p. 124), as expression of a “paternalistic concern for children” (p. 123). Thus, families might be forced to assure this education, and if in a community the majority of families can afford this financial burden, it

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<sup>1</sup> I wish to thank Erling Moxnes for encouraging me to go ahead with this inquiry.

may be imposed on them. However, different resource endowments make this difficult to achieve. As a consequence, government has assumed the financial burden of providing general education.

The fact of taking charge of the financial provision also meant taking over the operation of schools. However, the government could as well finance schools by means of vouchers given to families and let them freely choose amongst all schools –public or private- that satisfy certain minimal standards.

This would make it possible to denationalize schools without lowering the standards or renouncing on the government financing general education. As a consequence, “denationalization of education would widen the range of choice available to parents. [...] Parents could express their views about schools directly, by withdrawing their children from one school and sending them to another, to a much greater extent than is now possible.” (p.127). Even though public schools might also gain responsiveness, “here, as in other fields, competitive private enterprise is likely to be far more efficient in meeting consumer demands.” (p. 128).

Such freedom of choice would make it possible for families to “flock together”; however, Friedman dismissed it as “not at all clear that the stated results would follow” (p. 128).

Another argument in favor of governmental action is “natural monopoly”, mainly in rural areas where the population might not be sufficiently large to allow for a sufficient number of schools. Despite this, the “interjection of competition would do much to promote a healthy variety of schools. [...] and promote a more rapid adjustment to changes in conditions of demand or supply.” (p. 128).

At the time when Friedman wrote these lines, he could not draw on empirical evidence. So he expressed what, in his view, was likely to succeed, based on the assumption that education is an economic activity and that the fundamental ideas of self-interest and freedom apply to it. There were several more assumptions behind this text. First, it was assumed that the fact of government operating schools equals the absence of competition amongst schools. But decentralization may achieve competition amongst state-owned schools. Next, private enterprise is said to be *likely* to be more efficient at meeting consumer demands, tacitly assuming that this demand is perfectly clear to the consumers and also that they can perfectly assess the degree to which the schools satisfies it. Third, increased competition is posited to bring about a healthy variety of schools. Finally, the decentralization that conduces to competition is equaled with privatization.

Nowadays, this text is mentioned as the origin of the movement that promotes of private schools in national school systems. There has been an ongoing dispute between its critics who argue that where it has been tried to implement these ideas, the “likely” outcomes have not been realized; on the other side, the defenders reply that this is only due to bad implementation, not to a fault in principle. The interested reader may find an introduction on the “school choice” website at <http://www.schoolchoices.org>. Here, only Friedman’s argumentation has been reproduced because he was the inspirational source of the economic reforms implemented in Chile during the ‘70ies (of which the educational reform was only one part).

In this paper, we will concentrate on the case of Chile, which has been the only country to search a nationwide implementation, and has accordingly aroused a certain interest on behalf of other countries. While there has been a certain amount of empirical investigations about this subject, this article contributes a potential causal explanation of what is going on.

First, some important facts about the case will be introduced, including the findings of existing assessments: sorting of favored families towards favored schools and no significant quality improvement. These studies did not suggest explanations, though. In the following section, a possible explanation is proposed in form of a qualitative model (with a causal loop diagram) that takes into account the self-interest of the involved parties – families, schools and teachers. In this context, if a subset of schools is allowed to operate under privileged financial rules, a concentration process amongst families and teachers is unavoidable. Even though this has only

been empirically detected for families so far, it is shown that the same process must be operating for teachers, too.

Since there are only reinforcing feedback loops, it is possible to gain some qualitative insights from this thought-experiment, which are then discussed: for once, the “rules of the game” are not the same for all schools, and under these conditions it is not to be expected that there is competition in the way imagined by Friedman; concentration and stratification are unavoidable, and since the less favored pupils tend to depend more on schools, this is socially undesirable. It becomes clear that under the current institutional arrangement, any attempt of the government to foster equality is deemed to be counteracted by all the interested parties – families, schools and teachers.

In the last section, the question of which institutional arrangement would be recommendable is posed; it will be argued that the current qualitative model should be developed into a laboratory for policy experiments which would allow to answer this kind of question.

## **Chile’s schooling system**

### *Decentralization and privatization in the early ‘80s*

Whereas schooling used to be considered as a public service under the state’s responsibility until the ‘70s, a huge change occurred under general Pinochet’s military regime by 1981. The whole educational system was deeply restructured, which included the school system. It was believed that by organizing the school system as a market for educational services, and allowing families to freely choose their children’s school out of private and public offer, schools would have to compete for pupils and thus converge to offering the education which parents desire.

According to the political constitution (dating from 1981), families are granted the right to choose their children’s education. The so-called “freedom to teach” is also anchored in the constitution of Chile <sup>2</sup> and entitles virtually any adult person to open a school, with minimum requirements as for physical infrastructure and compliance to the national curriculum (which establishes minimum learning objectives and contents). The school system was divided into three parts: public schools, private schools with a public subsidy and private schools without subsidy, which has come to be called the Chilean voucher system.

Another novelty of the 1981 constitution was the “municipalization” of public education. Under this scheme, the central government defines minimum pedagogical standards in curriculum and hours. However, the budgets of public schools are administered by the municipalities, which receive a global budget from the government and channel it to schools in its area, according to their own criteria and priorities. It was argued that this way, each municipality would be able to have the schools that their inhabitants desire <sup>3</sup>. In practical terms for schools this means that a public school’s director does not manage his own budget; neither does he manage his personnel.

Public schools are free of charge for their users and receive about \$50 per pupil per month. Private subsidized schools charge fees (maximum around \$90 per month) to their “customers” and receive the monthly subsidy for each student who attends a minimum percentage of hours; in change, they are limited to a maximum applicable fee. Private schools without subsidy do not have this limitation and usually charge \$250 in provinces and between \$300 and \$600 in Santiago (the capital).

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<sup>2</sup> It is tempting to muse how much Friedman’s text has inspired this reform; however, it is not our aim here to establish how much this was the case.

<sup>3</sup> This shows that decentralization does not require privatization. Since in Chile the main difference between municipalities is their wealth, it is not too ironic to say that each municipality now could have the schools they can afford. In a country with huge income differences, such a federative organization opens the doors to concentration processes.

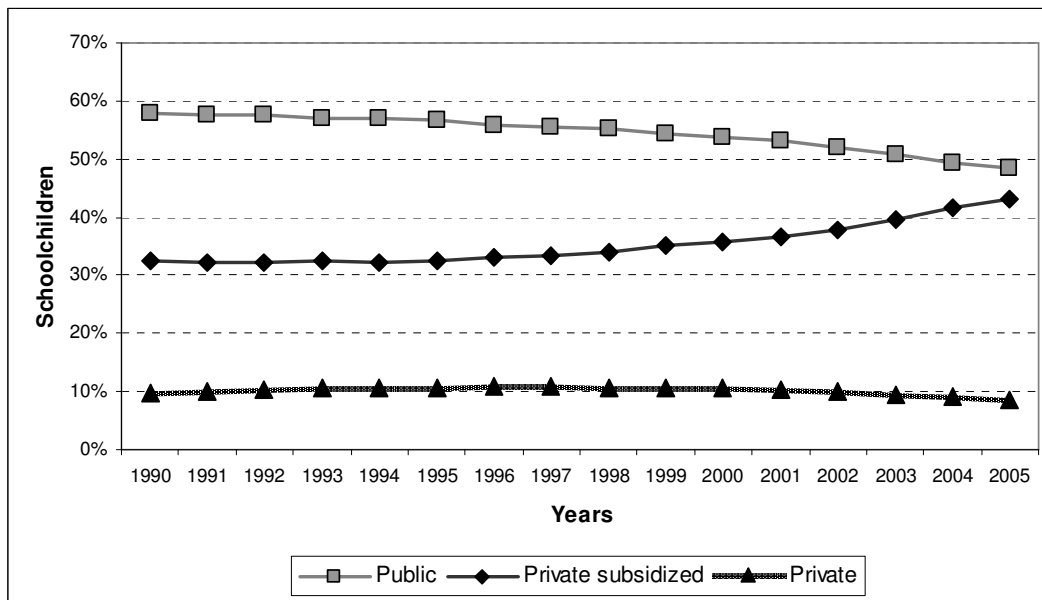
In pedagogical terms, the ministry of education supervises all schools as for compliance with curricular standards. However, there are fewer regulations for subsidized schools than for public schools, and even less for private schools. As an effect, supervision is much closer for the former. Even though the ministry only defines minimum learning goals and contents – leaving to each school the possibility to define additional items – not much use has been made of this over the 26 past years for school differentiation.

The 12 years of obligatory education in Chile are divided up into two parts: elementary school is for the first 8 school years, and middle school for years 9 – 12.

In 1990, a democratic government took over after 17 years of dictatorship. The Ministry of Education launched a huge educational reform with quality and equality as its major goals. There was an effort to improve elementary school coverage in the country and to help the poorest schools with a special programme. Later on, a nationwide effort to install computer labs and to train teachers was added. It can be said that Chile’s schooling coverage is very acceptable nowadays. However, there were quality and the equality issues that remained unsolved.

**Results so far: sorting and stratification**

As for 2006, 48% of the 3.6 million schoolchildren are in public schools, 43% in private subsidized schools and 9% in private schools. As illustrated in the following figure, since 1990, part of the population in public schools has moved to subsidized schools; during this period of time, even though total pupil population grew from 3 million to 3.5 millions, the share of private schools has not changed. The observed movement is commonly explained by the fact that public schools have low quality scores and a poor reputation; by consequence, those families who can afford something better move to the highest possible level.



**Figure 1: public schools have lost “market share” to subsidized schools, while private schools stayed stable. These data are publicly available at the website of the Ministry for Education ([www.mineduc.cl](http://www.mineduc.cl)).**

This “exodus” has been recognized by all the studies that have examined the “Chilean experience” (Tokman, 2003; Carnoy and McEwan, 2003; Mizala and Romaguera, 2001; McEwan, 2001; Hsieh and Urquiola, 2003; Bravo et al., 1999). It has been found to have changed the context under which both schools operate (the one that loses pupils and the one that wins them), as will be discussed below.

Before entering into this discussion, we still need to state some important facts. Only a small fraction of Chilean households can pay a private school, as indicated by the following Table 1:

<i>Income quintile</i>	<i>School expenses (Chilean pesos)</i>	<i>Available income (Chilean pesos)</i>	<i>Percentage of expenses (%)</i>	<i>Quality</i>
I	17.934	119.000	15	222
II	20.992	180.000	12	235
III	32.447	331.000	10	269
IV	77.922	738.000	11	296
V	172.930	1.526.000	11	316
<i>National mean</i>				<i>250</i>

**Table 1: financial load of schooling per income quintiles (Sources: spending data from Eyzaguirre, 2005, p. 62; quality data from Informe de resultados SIMCE 2003, Ministry of Education, Santiago, p. 20)**

As becomes clear from the data concerning incomes, only the wealthiest quintile can afford to send their children to private schools. The differences in income distribution in Chile have not substantially changed over the past 40 years. So it appears that private schools are mainly reserved for the highest income quintile. This fact matters for the quality of the school experience. According to the Chilean system for measuring educational quality SIMCE, (Ministry of education, 2003), there are clear differences according to the family's socio-economical quintile: only the last two quintiles (the richest households) have SIMCE scores above the mean. Similar differences exist between the three types of schools.

<i>Type of school</i>	<i>Quality</i>
Public	236
Subsidized	254
Private	309
<i>National mean</i>	<i>250</i>

**Table 2: quality according to type of school (Source: Informe de resultados SIMCE 2003, Ministry of Education, Santiago, p. 23)**

It can be argued that the national quality measurement system only captures part of the important issues; however, we can safely assume that if private schools outperform the others in the measured aspects, it will be similar in the other aspects, too.

It should be noted here that test results like the SIMCE's are not only to be attributed to the schools internal quality: there is a wide consensus about the fact that they also depend on the pupil's family and his peers' qualities (Tokman, 2003; Mizala and Romaguera, 2001; McEwan, 2001; Hsieh and Urquiola, 2003; Bravo et al., 1999). So what these results say is "the schools where these children go achieved this result". Once test results are controlled for these effects, there remains little or no effect in favor of the private schools.

According to the OECD's PISA report on "School Factors related to quality and equity" (OECD, 2003), this has been detected not only in Chile, but is a general finding in countries that have pressed towards more autonomy and responsibility, although not all countries have opted for privatization. International tests like PISA indicate that Chile's schools do not obtain very "competitive" results: reading, math and science competences are rather low. This has motivated much attention for the quality problems; however equality is one important aspect of quality.

This is explicitly admitted in Chile: witness the Ministry's effort in form of the MECE programme ("Mejoramiento de Equidad y Calidad Educaional": Improvement of educational equality and quality). Two major problems have been identified (OECD, 2004): school management and teachers.

Under the current law, directors of public schools are nominated for lifetime; they are not being subject to evaluation. This, together with the impossibility to manage their own budget and personnel, has led to evident quality problems in school management. It also led to the directors being mainly political actors, very concentrated on maintaining good relationships with the municipality's educational director and with the respective mayor. It has taken the different democratic governments more than 15 years to formally recognize the problem and start to change the law for lifelong nomination.

The problem with teachers has its historical origin in the fact that under the military regime, it became a low-value profession. Teachers were no longer considered a honorable profession, their status as government "*funcionarios*" was replaced by one as regular employee and their salary went down (Mizala and Romaguera, 2001). Over the years, this led to a loss of quality and a considerable frustration. Many in the new generations of teachers had not chosen this profession out of vocation, but because they could not find a better job. Many of the older teachers became very frustrated with this development. From 1990 on, the democratic governments have managed to improve teachers' salary scheme, but there are few other advances. According to the OECD assessment report, the pedagogical departments in the universities are teaching future teachers with old methods, but since the faculty is about to retire, university authorities prefer waiting for personnel renewal rather than reform curricula. Also, the organization of teachers is a politically powerful actor: in 2003, a new law established that teachers have to be evaluated (!) but teachers were able to resist this law's application until 2005. It has become clear that the preparation and the self-esteem of this profession have to be improved on; however, this will take quite a number of years to be achieved. In the meantime, there are too few good teachers in Chile: *they are a scarce resource*.

This is a relevant restriction, since teachers are one of the most important internal school factors. In general terms, PISA found that school factors' relative importance depends on their proximity to pupils. Since teachers are supposed to understand what they teach, dominate the material used, diagnose the pupil's state and problems and determine the best course of action, their quality is essential for the schools' own contribution to schooling outcomes. If teachers are a scarce resource, and as long as they continue being so, there will be competition for "good" teachers amongst schools.

### ***The march of the penguins: a new hope?***

During the first semester of 2006, a clash between high school pupils and the ministry of education over the school transportation (in Chile, there are no special school buses, but bus companies negotiate a special fee with the ministry) escalated in a general strike in order to press the government towards a deep reform of the described schooling system. Over the whole country, pupils occupied their schools, in their vast majority supported by their teachers, claiming for a credible effort to reform the school law in the constitution and deeply redesign the current system (luckily without any vandalism or violence).

In response to this pressure, the government created an advisory commission, charged to devise a recommendation to the President. This commission consisted of researchers, representatives of the teachers, the parents, the pupils, the administration and the two dominant political blocks

of the country. Accordingly there were strong differences and strong opinions in many points and the final report of the commission has been received with mixed reactions. Despite these differences, a countrywide process of consultation and debate took place. As a result, many of the flaws in the current situation have now been formally recognized for the first time, even though there is no agreement concerning their respective causes and remedies. Also, the constitutional “freedom to teach” has for the first time been put in relation with the “right to get quality education”, however without defining what this “quality” shall be.

A topic that has *not* been touched upon is the profound differentiation between the public and the privately owned part of the school system. This may seem comprehensible, since the “freedom to teach” has been reconfirmed by the commission. Nevertheless, there are many ways to implement this freedom, and it must be suspected that they do not have the same consequences for the schooling system’s future development in terms of quality and equality improvements (in range and in speed). For example, it has been recognized that schools select their pupils and that this is not always compatible with the school system’s objectives. A school may select families for religious reasons or also for academic reasons (test scores), but it should not be for economic reasons (the ability to pay the fee). Also, it has been said now that it is important that the family selects the school, rather than the other way around. However, all the criticisms concerning selection have been explicitly confined to the public schools. This may seem coherent in a way: if private schools are private, why shouldn’t they have full autonomy? On the other hand, if selection by price is undesirable *per se*, why wouldn’t it be the case when the school is a private one?

In some personal discussions, it has been said that this is not necessarily a problem. For instance, in France (a highly ranked school system according to PISA) there have always been private schools that select; their selecting did not conduce to inequality or a lower quality in the public schools. So why should it be bad then in Chile? But the French do not see education as a lucrative business (most of the few private schools correspond to religious groups), they have relatively equal income distribution which gives a rather equal socio-cultural level for the vast and the professional training of teachers is not in a comparable state, so they do not lack good teachers. They have good public schools and few private schools that do not attract families for reasons of quality but for ideological or vocational reasons.

Not so Chile. This country has a highly concentrated income distribution, assuring that most families cannot pay much for education. Even though there is some discussion about profit orientation, no conclusive point has been made to show that profit orientation leads to worse quality of equality (neither the contrary); unless this issue is settled, there will be for-profit schools. Its private schools’ main differentiation factor is the schooling outcome (regardless if it can be attributed to the school’s internal processes, due to the information asymmetry). Finally, there are not sufficient good teachers (and there will not be so soon).

## **The logic of self-interest in the school system**

### ***The suspicion***

Here it will be argued that in a country with strong inequalities in income distribution and a lack of good teachers, the right for some schools to freely charge fees to families and to freely offer salary to teachers, leads to two self-reinforcing concentration processes: socio-culturally favored families and good teachers become concentrated in private schools, causing a kind of “desertification” mainly in the public schools. This means that the majority of pupils are in schools that are worse than they could be, to the perceived benefit of an economically potent minority. As indicated by Brunner and Elacqua (2005), schools can do more for pupils from less favored families than for more favored pupils; there seems to be something like a law of decreasing marginal contribution. If so, redirecting good peers and good teachers towards the more favored is socially undesirable, since the winners win more than the losers lose.

There are certainly many other factors that influence the development of quality and equality in education; for instance, the information asymmetry. Far from being able to offer a comprehensive analysis of all these aspects, we will focus on how the current institutional arrangement leads to “sorting” and “skimming” of favored pupils and good teachers. Then we will ask how would it be that – from the status quo on – and with the current restrictions on purchasing power and teachers, the quality and equality would improve the fastest possible?

We will now elaborate a qualitative model consisting of variables, causal links and causal loops. As will be shown, the causal links between the variables build several reinforcing feedback loops which bring about the mentioned concentration process. In a system where schools cannot acquire self-reinforcing advantages by rising their prices, the families’ income would not limit their freedom of choice (in other ways than the neighborhood where they are living, which makes them be close to one school and far from an other one; this closeness is an important decision criterion in Chile); also, the teachers would be able to select their working place according to criteria other than their salary. Both changes would press schools to compete by other differentiation factors.

This probably will not warrant a general movement towards higher quality and equality; it will only remove one barrier. Even so, it would be an important contribution to the improvement of the schooling system. In a longer time perspective, this will allow Chile’s next generation of young adults to be better educated, improve their opportunity to ascend to university and a professional title, generate more value wherever they will work or undertake later on and help the country to transform itself into what it aspires to become: part of the developed world.

***A qualitative explanation of the processes***

We will now introduce the detailed argumentation step by step. We will reflect upon a case with only two schools – A and B. These shall stand for the general case, since what is going on between them only needs to be extended to *n* schools (instead of *two*).

We start defining the actors of the game, who are:

- *families*, trying to find the highest ranked school in their budget and in their reach;
- *teachers*, trying to find the highest possible salary (while working in a minimum number of schools at the same time);
- *schools*, trying to attract the most favored families and the best possible teachers (their budget can afford).

We then have two markets, one between the families (buyers) and the school (seller), the other between the school (buyer) and the teachers (seller).

In the first part of the model, the following variables will be used:

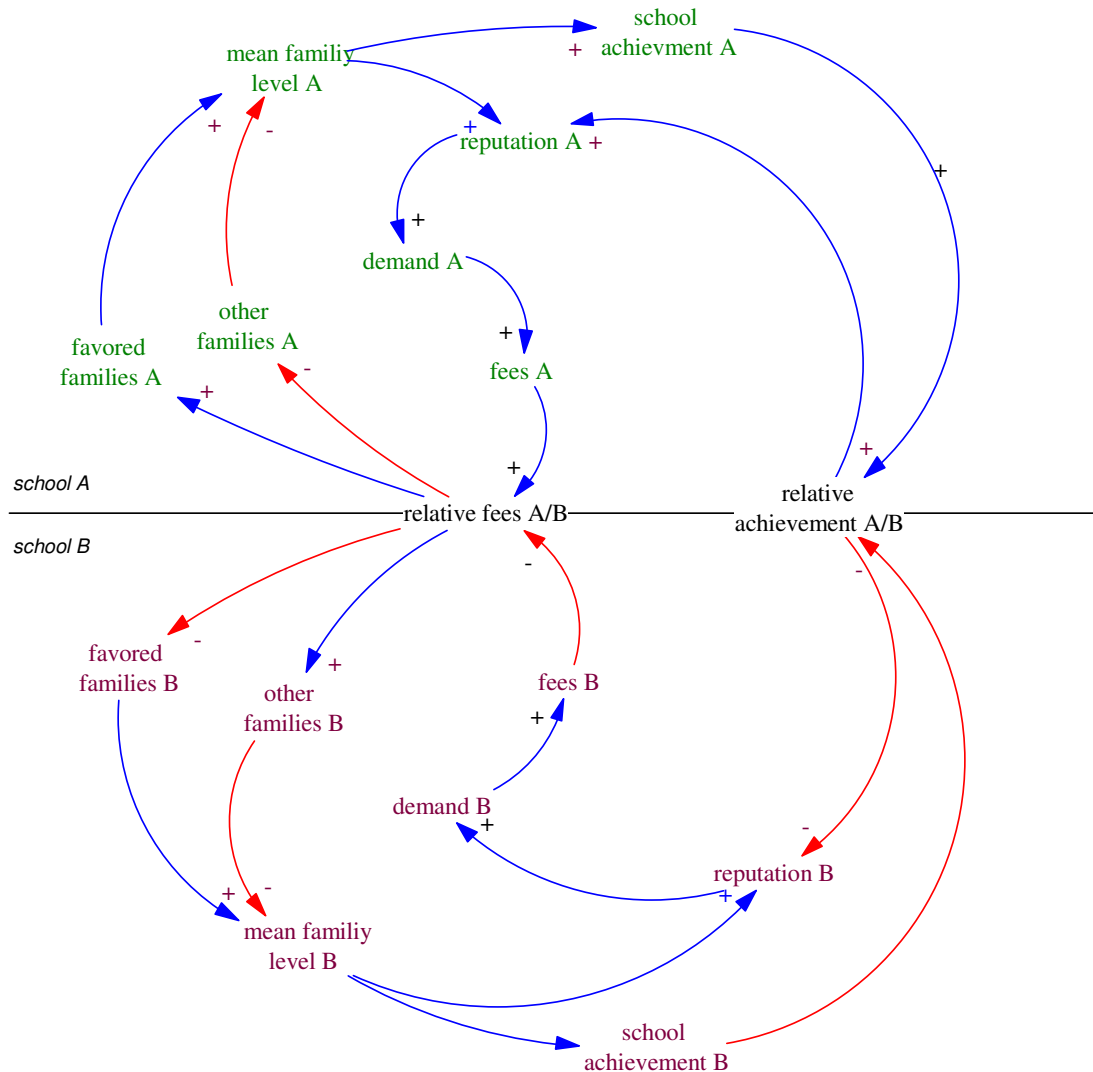
<i>Variable</i>	<i>Meaning</i>	<i>Type</i>
Reputation	How good families think of a school	Stock
Demand	Amount of pupils who would like to be in a school	Stock
Fees	Amount to be paid for being in a school for a year	Stock
Relative fees	One school’s fee as compared to another one’s	Converter
School achievement	Score obtained in the SIMCE test	Flow
Relative achievement	One school’s achievement as compared to another one’s	Converter
Favored families	Number of families with a favorable socio-cultural level (in a school)	Stock



Other families	Number of families without a favorable socio-cultural level (in a school)	Stock
Mean family level	The mean socio-cultural level of all the families in a given school	Converter

**Table 3: variables of the first part of the model**

The following Figure 2 illustrates how both schools' achievements interact with the families' variables.



**Figure 2: sorting and skimming favored families**

Let us go through the model starting with the schools' reputation.

1. The *reputation of A* depends on its *achievements relative to B*. When this *relative achievement* rises, then:

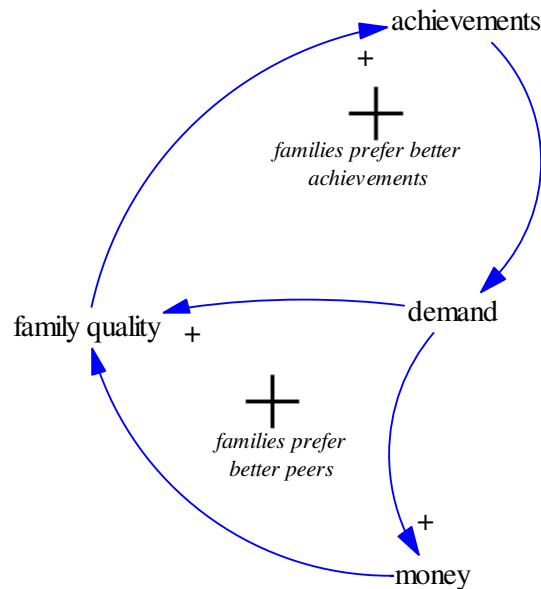
- *A's reputation* gains
- *B's reputation* loses

In a symmetric manner, the *reputation of B* depends on its *achievements relative to A*. When this *relative achievement* falls, then:

- *A's reputation* loses
- *B's reputation* gains

- 2a. Each school's *reputation* influences its *demand*: a better reputation leads to more demand.
- 2b. Each school's *mean family level* influences its *demand*: families prefer having their children in schools with "better" peers.
3. Schools cannot easily adjust their capacity; so a rising *demand* leads to increased *fees*. On the other hand, a declining *demand* may be counteracted by lowering the *fees*. The *relative fee* of each school depends of both of their *fees*: for example, when A rises its *fee* (or B lowers its *fee*), the *relative fee* rises.
4. Families react to *fee* changes. If, for instance, the *relative fee A/B* rises, then *favoured families* are attracted away from B and towards A (because A is giving signals of exclusivity). At the same time, *other families* with a smaller education budget, become attracted away from A towards B.
5. The socio-economic *mean level* of families changes: A's rises and B's falls.
6. With pupils from more favored families, it is easier to obtain high schooling outcomes. This is not only directly so, but there is also the so-called "peer-effect" – a positive network externality. All studies about Chile's school system, as well as the PISA study (chapter 5) signal both effects. (According to UNESCO estimates, the family's socio-cultural level accounts for at least half of the schooling achievement in Latin America.)

We can simplify the model by hiding away the "other" school and collapsing some of the more detailed variables into placeholders. We then obtain the following pair of feedback loops:



**Figure 3: two positive feedback loops generate pupil sorting**

The "families prefer better achievements" loop expresses the natural desire to have one's kids in a school where good achievements are offered. The "families prefer better peers" loop may have different reasons: if better peers help to improve achievements, it is straightforward to put your kids there; but then this loop would not add something new to the previous one's logic. However, for many families, it is also important to have their children "where the right people are".

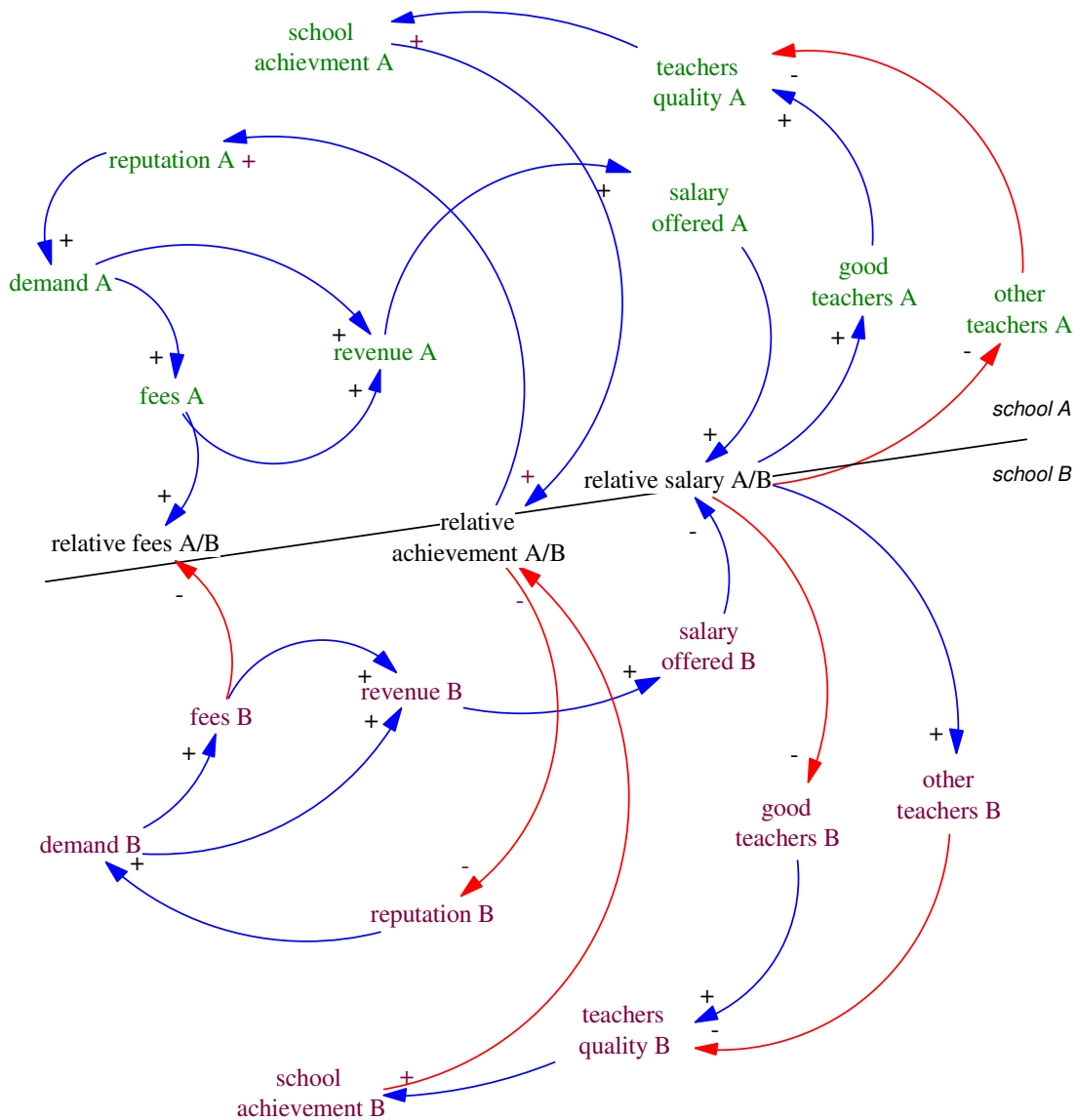
So far, our model retraces what diverse studies have found; it thus can be used as explanation of what has been going on in Chile (and in other countries where decentralization policies have been employed). However, nothing has been said about teachers. As remarked above, they are an essential factor of schools, and they also are one (self-interested) type of actors of the school system.

In this part of the mode, we introduce the following variables:

<i>Variable</i>	<i>Meaning</i>	<i>Type</i>
Reputation	How good families think of a school	Stock
Demand	Amount of pupils who would like to be in a school	Stock
Fees	Amount to be paid for being in a school for a year	Stock
Relative fees	One school's fee as compared to another one's	Converter
School achievement	Score obtained in the SIMCE test	Flow
Relative achievement	One school's achievement as compared to another one's	Converter
Revenue	Sum of the fees paid by the pupils during a given year	Flow
Salary offered	One school's salary offer	Flow
Relative salary	One school's salary offer as compared to another one's	Converter
Good teachers	Number of teachers that schools are trying to "win"	Stock
Other teachers	Number of teachers that schools are not eager to recruit	Stock
Teachers' quality	The mean socio-cultural level of all the families in a given school	Converter

**Table 4: the variables of the second part of the model**

The following Figure 4 depicts the logic of their interaction with schools.



**Figure 4: sorting and skimming good teachers**

We will read out the cyclic process starting from the *fees*.

1. Higher *fees* yield more *revenue* (per pupil). This allows school A to pick desired teachers and offer them a higher *salary*.

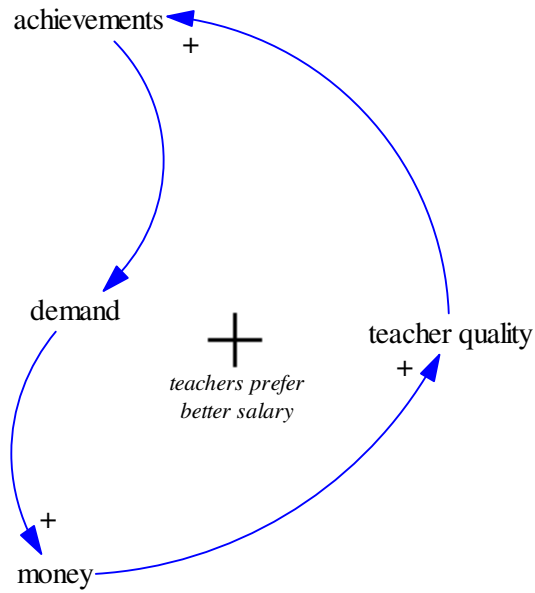
At the same time, B has fewer *revenue* and thus loses good teachers to A (fewer budget usually means losing teachers, since it is illegal to lower their salary without their explicit consent). They may be replaced by teachers fired from A and willing to accept lower salaries.

2. The mean *quality* of teachers follows the available money:

- improves in A
- worsens in B

3. *Achievement* depends on *teacher quality*: the relative achievement of A/B rises.

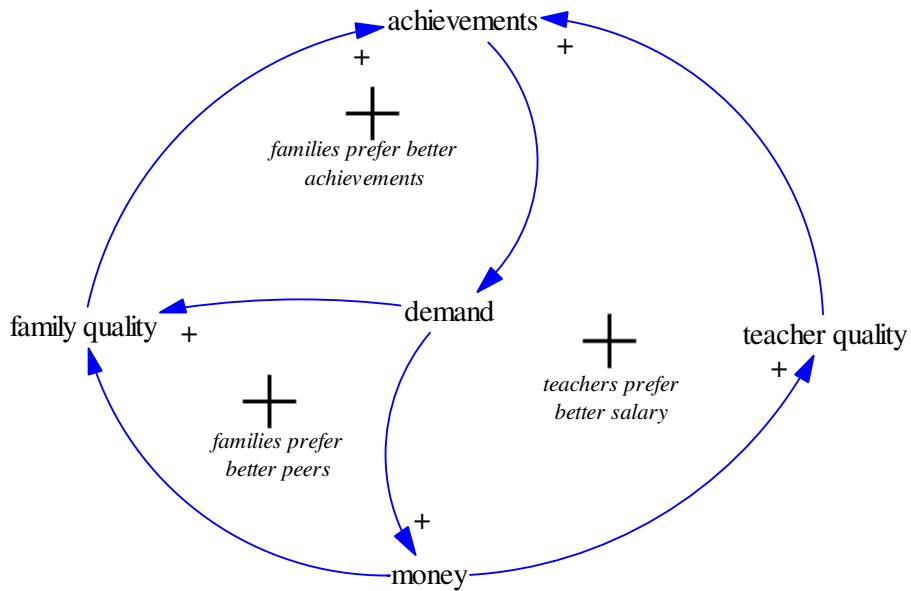
Again, we can obtain a simpler view of the logic by hiding the second school and the details; then the second part of the model loops like the following figure:



**Figure 5: a feedback loop generates teacher sorting**

***Individual quality versus equality: who will be on Noah’s Ark?***

Now we can assemble the two simplified partial models and look at the complete structure of the logic of what is going on:



**Figure 6: simplified version of each school’s qualitative model**

Since there are only reinforcing feedback loops, there cannot be any doubt concerning the general quality of this system's behavior over time: there will always be a tendency to concentrate favored pupils and good teachers. Doubts can only arise about the speed of these processes. In this sense, we can safely use our understanding about this qualitative model in order to reflect upon the represented system (without simulation).

We see that according to what we assume for the three types of actors, there are very good reasons to believe that once one school's reputation becomes higher, families and teachers will migrate towards this school, and the other school will tend to accumulate less favored pupils and the remaining teachers.

This has been called "sorting" and "cream-skimming", and it can hardly be doubted that this process occurs with teachers as well, furthering some schools' advantage. This is why many studies signal that public schools' internal quality may indeed have improved over the years but has been offset by the negative peer effect. Recall that as long as there is scarcity of good teachers and thus of high-reputation schools, this is a zero-sum game.

Once this starts, it will continue year after year until the income distribution of the country's families appears as a limiting factor. There is of course only a limited number of families that are favored in socio-cultural terms and able to pay a A-type school. So there is only a limited "territory" to be occupied by these schools, and accordingly only they need only a limited number of teachers. This is what halts the concentration process. It seems then that the school system will tend to reflect the socio-economical layers of the society, rather than acting as a means for changing them.

Up to now, our thought-experiment dealt with an equal-initial-situation setting. And "A" and "B" schools. We can roughly assimilate "A" type schools to private schools and "B" type schools to public ones. Then, Chile is currently similar to a situation with several thousand schools of type B and about 100 of type A (in Chile we now have roughly 1.500 public, 1500 subsidized and 100 private schools). So what should be expected?

The starting conditions are unequal: type A schools (mostly private ones) start with favored families and better teachers. The number of teachers is constant in the short term, just like the number of schools (since 1990, virtually no new public and no new private schools have been founded; the number of subsidized schools has doubled).

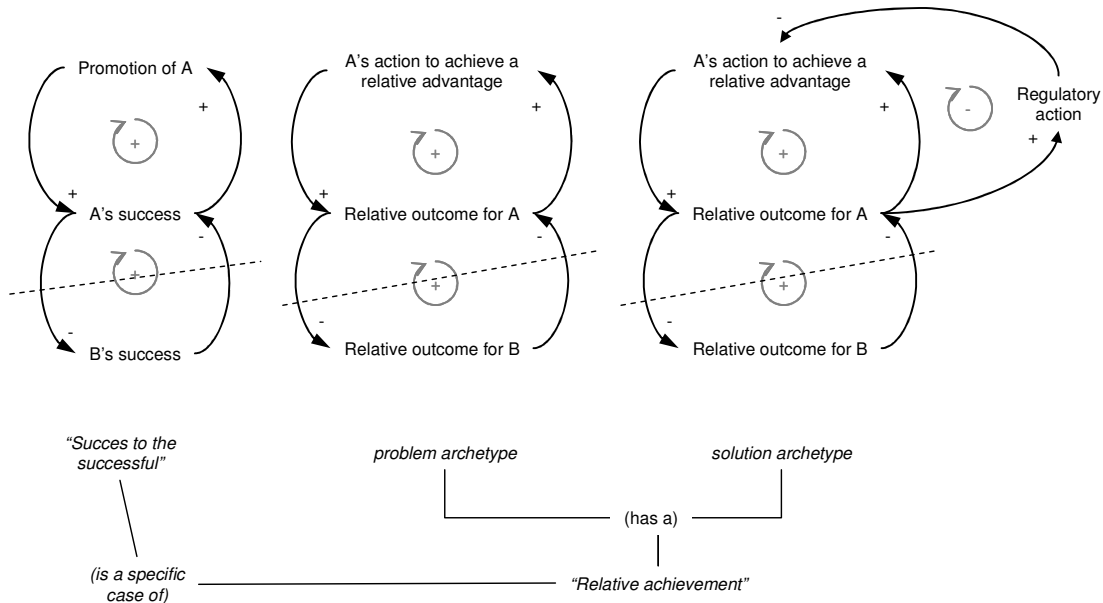
Families would like not to be in school B; as soon as there is a chance, they will try to be in A. However, they do not have the money to be in A. What happens next is that someone opens a subsidized school in their neighborhood. Immediately, those who can pay a little, run. However, these subsidized schools often are masked "B" schools, with 40 or more pupils in a classroom (where "A" schools have 20-25), a rather poor infrastructure and high teacher turnover they cannot afford what a private school can because they may not charge more than \$90, less than half of a typical private school; and public funds privilege private schools). Virtually no family would consider moving from A to B, and the same holds for teachers.

Good schools are like Noah's Ark: everyone wants to get in, but there is not enough space. So there is a fierce competition going on amongst families in order to obtain a place. In this, the purchasing power of the family is a weapon well adapted to the fact that due to over-demand, prices are high.

### ***An interpretation based on systemic archetypes***

In qualitative system dynamics, "systemic archetypes" became widely known thanks to the "Fifth Discipline" books (Senge, 1990; Senge et al., 1994). An "archetype" is a generic feedback structure that can be found in many situations. Some years after these books were

published, Eric Wolstenholme proposed a “core set of archetypal structures in system dynamics” (2003; 2005) which consists of the four possible combinations of two interacting feedback loops.



**Figure 7: the “relative achievement” archetype (adapted from Wolstenholme, 2003, p. 19)**

It is easy to recognize that in essence, the positive feedback loops described above are an example of the “success to the successful” archetype: school “A” strives to be better than school “B”, and if this works once, it becomes ever easier to continue. “A” does not mind that for “B”, it is the other way around. This is, in turn, a specific case of the “relative achievement” problem archetype. As compared to the original in Wolstenholme (2003, p. 19), there is no delay in the hidden effect of “A” on “B”. Nevertheless, one can try to apply the solution archetype which consists in some kind of “regulatory action” that counteracts the self-reinforcing loop in favor of “A”.

What could this regulatory action be in our case? The following section attempts to suggest some directions for answering this question.

***Revisiting the role of government in education***

*What can make Chile’s educational quality improve?* In A type schools, schooling results look good. Due to the information asymmetry proper to this market, parents do not perceive if these results are due to their own children and the peer-effect or to the school’s own performance. So there are few incentives to develop truly effective innovations; it’s sufficient to realize innovation projects that look good to parents.

B type schools are hard pressed by adverse conditions: they have comparatively few favored pupils and highly ranked teachers. Those “good” teachers have to spend their entire working time on giving classes and do not have time or energy to develop effective innovations. Other teachers do not strive for innovation, since they have to struggle to make ends meet each month, in most cases going back and forth between 2 or more schools.

And even if some schools invest in this kind of improvement, being a private investment they will try to protect it from being copied or shared. (Before sending a teacher to a training course, it is common use to make him sign an agreement that commits him not to leave this school afterwards. Good practices are kept privately or – at most – used to sell promotional events.)

Quality improvement will come from more good teachers: recall that according to the OECD assessment, this is one of the causes of poor quality and it will be slow to change. The other aspect is school management with attributions for budget and personnel and accountability for directors. Neither of these subjects is to be resolved at the school's level.

*What can make Chile's educational equality improve?* As we have seen, there is no incentive for favored members of the community to become more equally distributed over schools. From the favored schools' families' point of view, it would not seem rational to promote more equality if this means putting their children into an inferior situation. From the favored schools' teachers' point of view, the same has to be said. Under these conditions, "bad" schools that might start with innovative methods but with initially precarious finance rapidly would see their teachers be drawn away by bigger schools; adopting a subsidized status has a bad reputation in the family population of A type schools and will trigger partial exodus.

The time to adjust the teacher population is very long, so they will continue to be a scarce resource for quite some years. The time to adjust poorly performing schools is likely to be long, too. Also, there are several questions to be posed to this "selective pressure" argument. If teachers are bad, what is the point in firing them if the schools cannot hire better ones? What is the fate of such a school's pupils: since they come from a "bad" school, they will have a hard time getting into a better school (which will prefer other pupils). So it seems little convincing to imagine that bad schools would be replaced by better ones; rather, one may expect them to be replaced by *new* schools that later on (remember the information asymmetry) will turn out to be bad, too. The "search" process will leave entire cohorts of pupils in a situation where they might have had reached university but they just didn't get a chance. In a country that believes it should develop towards the knowledge economy, this may be a high price for maintaining the current version of "freedom to teach".

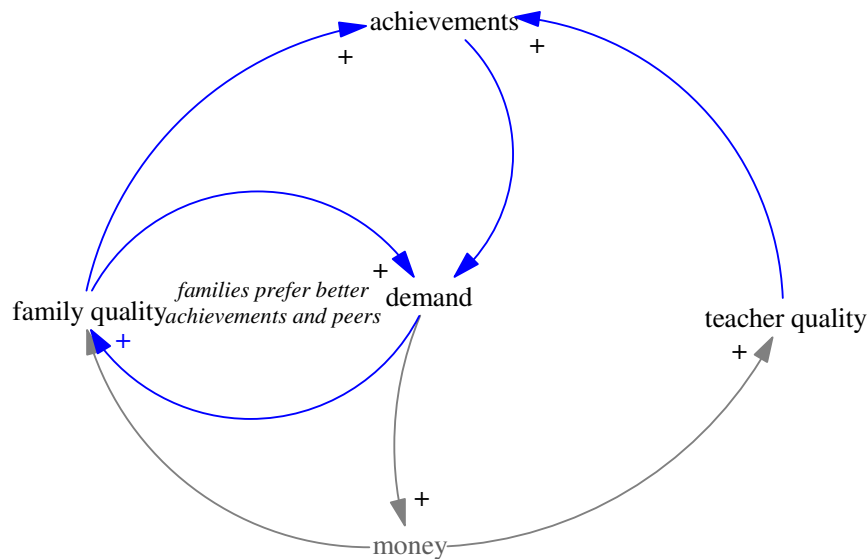
It seems that the individual actors' incentive run counter to the societal objective of equity. It is hard to see how, under the current conditions, schools that are not already A type, should be able to improve. Stated somewhat more sharply: as long as different schools can charge different fees and thus "skim" teachers (and pupils), any initiative to improve B-type schools are unlikely to succeed. Consequently, type B schools will not bring competitive pressure to A-type schools, which will then stay comfortably on their advantage due to the information asymmetry.

Since this equity has to be seen in the light of the "neighborhood effect", government action appears to be justified. Currently, it is planned that each pupil's subsidy shall be adapted to his or her needs: children from less favored families will be assigned a higher subsidy. This is meant to give each school the financial resources it *really* takes to give this pupil the required education. While this may seem plausible at first sight (and would certainly be a step in the right direction), this will not allow B-type schools to compete for good teachers and favored pupils. Also, it is by no means evident that A-type schools would not charge fees higher than what the *real* costs of their pupils are, and consequently pupils who depend on the subsidy would not be able to maintain themselves in these schools: sorting and skimming would continue.

Since the incentive structure will not change, it is necessary to revise the institutional arrangement. The government needs to redesign the general rules concerning fees and teachers' salary for all schools. This may appear to be a rather drastic limitation to schools' autonomy – especially for private schools. Also it would confer a rather special status to teachers as employees, strongly restricting the usual adjustment mechanism for labor markets. However, it may be the only way to achieve a well-functioning decentralized school system.

In order to reflect upon this possibility, let us briefly examine one hypothetical possibility: what if the government establishes a law that defines the school fees for all schools and another law that defines a unique salary scheme for teachers. This would resemble the following figure:





**Figure 8: reduced money-related effects**

In this reformed structure, the self-reinforcing feedback loops related to the fees and the salaries are blocked. This means that fees will no longer cause sorting amongst families and salaries will no longer cause sorting between teachers. However, families will still prefer schools with more favored peers and higher achievements: the tendency to sort cannot be undone. All one can hope for is not to boost it.

This is, of course, only a thought experiment. It shows that indeed, if our representation of the situation is accurate, then regulatory action (in the sense of the previous section) is called for. However, beyond running counter to the predominant opinion that there must be free (unregulated) competition amongst schools, and that the free market will generate the best overall solution, such regulatory action will be expensive for the government. So there are several good reasons to ask for a more rigorous justification and specification of this regulatory action. The following – and last- section will elaborate on this.

## In guise of a conclusion

### *What we have found so far*

This paper set out to show that the school system is a dynamic system, where it is not obvious how government can achieve a desired development of quality and equality. We have taken the case of Chile, which has been the only country to attempt a radical reorganization according to Friedman's ideas. In this country, there are three types of schools with different modes of financing: public schools receive an amount per pupil from the municipality; private subsidized schools receive a certain subsidy and are allowed to charge a certain fee. Private schools can freely charge fees. In Chile, after more than 20 years of having a decentralized school system with huge private participation, there is no conclusive evidence for an improved quality, and the migration of favored families towards private schools have created an equality problem.

There are several restrictions: scarcity of good teachers, less money per pupil in the public sector and an unequal income distribution. We have shown that under these conditions and good teacher scarcity, and assuming that the participating actors try to obtain the individually most preferred outcome:

1. starting from an equal initial condition, the system tends towards concentration;
2. starting from the current situation (concentrated), the system will resist attempts to lower the concentration and improve equality.

Even though the processes were only represented by a qualitative model, the existence of 4 self-reinforcing feedback loops leaves no doubt.

We have concluded that currently, the rules under which schools are supposed to operate (and compete) in Chile are unequal. In this sense, the government will have to recognize the challenge of reviewing these rules. Otherwise, any attempts to bring about improvements to equality are deemed to fail.

### ***Towards a robust design strategy for robust government policies***

These are only intuitions inspired by the overlaying positive feedback loops. Any serious intent to reflect upon different institutional arrangements and their likelihood to bring about a more favorable dynamic must be based upon a design strategy that allows to try out possible policies in a “laboratory” where such ideas can be played out safely and rapidly (as compared to historical time).

Such a laboratory can take on various forms. Economists have now been conducting experimental work since several decades. Also, approaches like system dynamics allow to compress the relevant aspects of complex systems into simulation models that allow for policy experiments at a comparatively low cost.

At the current time, a stock-and-flow model starts to be developed; it will contain many more details, since it has to incorporate that way the demand reacts to fee changes, the way families react to achievement changes and the peer situation, the way teachers chose between improving their “goodness” and exploiting it. This simulation study shall allow to derive laboratory experiments, of which a brief outline is presented in the appendix of the paper. Both model and experiments will be continuously available at [dinamicasistemas.utalca.cl/school-dynamics.html](http://dinamicasistemas.utalca.cl/school-dynamics.html) as a permanent invitation to dialogue.

## **References**

- Bravo, D., Contreras, D. and Sanhueza, C. 1999. Rendimiento Educativo, Desigualdad, y Brecha De Desempeño Privado/Público: Chile 1982-1997
- Brunner, J. and Elacqua, G. 2005. Factores que inciden en una educación efectiva - Evidencia Internacional
- Carnoy, M. and McEwan, P. J. 2003. Does privatization improve education? The case of Chile’s national voucher plan. Stanford university working paper
- Eyzaguirre, N. 2005. Exposición sobre el estado de la hacienda pública, Presentación del Ministro de Hacienda Sr. Nicolás Guzmán, September 2005, Santiago (Chile)
- Friedman, M. 1955, The role of government in education, in R. A. Solo (Ed.), *Economics and the public interest* (pp. 123-144), New Brunswick, NJ: Rutgers University Press
- Hsieh, Ch-T. and Urquiola, M. 2003. When schools compete, how do they compete? An assessment of chile’s nationwide school voucher program, Working Paper 10008 <http://www.nber.org/papers/w10008>
- McEwan, P. J. 2001, The Effectiveness of Public, Catholic, and Non-Religious Private Schools in Chile’s Voucher System, *Education Economics*, Vol. 9, No. 2, 2001
- Mizala, A. and Romaguera, P. 2001. School Performance and Choice: The Chilean Experience, *The Journal of Human Resources*, Vol. 35, No. 2. (Spring, 2000), pp. 392-417.
- Ministry of Education, 2003. Informe de resultados SIMCE 2003, Ministry of Education, Santiago
- OECD, 2003. School Factors related to quality and equity – results from PISA 2000, OECD
- OECD, 2004. Reviews of National Policies for Education: Chile, OECD Publishing

- Senge, P. M. 1990. *The Fifth Discipline: The Art and Practice of the Learning Organization*. New York: Doubleday Currency.
- Senge, P., Kleiner, A., Roberts, Ch. Ross, R. and Smith, B. 1994. *The Fifth Discipline Fieldbook*, New York: Doubleday Currency.
- Tokman, A. P. 2003. Is Private Education Better? Evidence from Chile, Gerencia de Investigación Económica, Banco Central de Chile
- Wolstenholme, E., 2003. Towards the definition and use of a core set of archetypal structures in system dynamics, *System Dynamics Review* **19**(1), (Spring 2003): 7–26
- Wolstenholme, E., 2005. Using Generic System Archetypes to support thinking and modelling, *System Dynamics Review* **20**(4), (Winter 2004): 341–356