Do Rural Districts Die When Their Schools Close? Evidence from Sweden around 2000

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ABSTRACT

At the beginning of the twenty-first century, the continued existence of many rural schools is being threatened. It has often been suggested that the closure of a rural school renders the area it serves less attractive, and can prejudice in-migration and encourage out-migration as the school is often expected to have more functions than the mere provision of basic education. In this paper, using, geographically detailed population data, no significant such effects on migration patterns can be demonstrated, either in the immediate surroundings of the school or in its wider catchment area. These results remain even if the migrants being considered are limited to families with children (a group expected to be particularly affected by school closures).

INTRODUCTION

At the turn of this century, the number of rural schools is decreasing in many countries. For politicians and other decision-makers, this is hardly an end in itself but rather the effect of these schools being squeezed between local societal demands and economic limitations. Thus, decisions to close rural schools are often disputed, and merely discussing the issue frequently triggers protests from the concerned population. However, apart from the fact that school closures are hardly welcomed anywhere, and that such a decision might make politicians responsible for it unpopular with their electorates, the effects of a school's closure depends on the school's functions. Technically, the concrete task of any elementary school is to educate children. However, a number of additional, *de facto* functions for schools have also been suggested and examined in the literature. Thus, given these insights, it would seem narrow-minded to confine school planning to just supplying children with basic education. One, but not the only, overriding argument against the closure of rural schools is that they have serious effects on local migration patterns, particularly among families with children. This is the argument to be examined here.

Consequences of migration on education have recently been discussed in this journal (Donmez 2009). Here the opposite relationship is focused and the attention is restricted to a rural setting. Our aim is to detect whether the closure of a rural school affects migration to and from its surrounding area. The study uses, geographically detailed Swedish full population data containing the geographical location of all built-up localities, schools and residential coordinates of the Swedish population for every year from 1990 to 2004. The first section presents the development of the Swedish school system from the nineteenth century to the present, primarily focusing on its rural localization. The second section consists of a literature review aimed at identifying the different functions of rural schools. The data and method is discussed in the third section, followed by the main results in the fourth section, and a short concluding section.

PRECONDITIONS FOR THE PROVISION OF BASIC EDUCATION IN\ RURAL AREAS

In Retrospect

During the nineteenth and twentieth centuries, most countries in the so-called developed regions of the world experienced a demographic transition. As a result, the large cohorts of children born 100 or so years ago have subsequently been replaced by smaller generations. Today, the fertility rate in most of these countries is below the 2.1 children per woman rate necessary for long-term population replacement (e.g., Lee, 2003). Consequently, the enrolment of pupils in elementary schools has been, and still is, diminishing. Although the dramatic changes in births (and deaths) have been balanced by immigration, most immigrants to these countries have urban destinations (e.g., Logan, 2007). Thus, the numbers of pupils in rural areas have often decreased faster than the average. The urbanization process that followed the demographic transition has contributed even more to this development. The typical

way of addressing the thinning rural pupil populations has been to close down the smallest schools and to bus the affected pupils to a neighbouring school.

In Sweden, every parish was required to organize schools in 1842, but this responsibility was soon transferred to the municipalities in 1862. Schooling became compulsory for children twenty years later. However, these local authorities and their (mostly) farming populations did not necessarily agree with the central authorities on the importance of schooling, and the preconditions for its organization varied significantly. As a result, the improvement of the school system took decades and varied considerably between different parts of the country. Nonetheless, the number of schools grew rapidly, and the demographic boom briefly mentioned above spurred this development even more. When birth rates subsequently fell and Sweden saw increasing urbanization around the turn of the twentieth century, the share of children (and soon, the absolute number of children) living in rural areas began to decrease. These changes in the rural population are reflected in statistics on the number of schools, which peaked in 1931 when the country had almost 15,000 schools (National Bureau of Statistics, 1950). During the middle of the twentieth century, many small schools were closed. In the early 1970s, the total number of remaining schools totalled fewer than 5,000 (National Bureau of Statistics, 1974).

However, the closing of small schools during the twentieth century cannot be explained solely by demography and urbanization; other factors can also be identified. In fact, there are reasons to believe that the processes of consolidating and rationalizing smaller schools were pursued irrespective of demographic developments. The common wisdom of this era was that small schools generated poor results and were inferior to larger schools (Bard *et al.*, 2005; Ribchester & Edwards, 1999; Meusburger, 2005). From the Swedish perspective at least, it has been suggested that this position might be explained in the context of urbanization and a period of urban dynamism, which meant, among other things, that resources for education were more plentiful in cities than in rural areas (Andrae-Thelin & Solstad, 2005). According to the works just referred to above, the economic argument was only added to the quality discussion later on. Moreover, developments in motorized transportation had made it possible to transport pupils on a daily basis from their homes to a school beyond walking distance. In a sparsely populated country such as Sweden, the possibility of arranging transportation to schools was already being considered in the first decade of the 1900s. In 1926, the government introduced subsidies to school carriages and buses. Since 1966, school transportation has been the responsibility of the local communities (Gummesson, 2003).

Another factor is of importance in the Swedish case: administrative reforms, driven by efforts to build a more rational and modern society, were typical for the time. The first of these was a uniform school system to replace the former patchwork of different school forms. Between 1949 and 1972, a nine-year compulsory ‘comprehensive school‘ was phased in. This also meant that the central government strengthened its influence over the school system at the expense of local authorities. Second, the administrative subdivision of the country was reformed during the same period. The roughly 2,500 municipalities responsible for (among other things) supplying their young inhabitants with basic education were merged into nearly 300 large units with an average size of 1,600 km^2 (i.e. equal to about 40 x 40 km). In sparsely populated areas they might be more than 10 times larger. Of course, this meant that both political power and school planning was concentrated in the main locality in each area. As such, control over school localization was centralized in two ways during this period, and facilitated the consolidation of rural schools in Sweden.

By the early 1970s, the administrative reforms were completed and the urbanization rate slowed down and even went in the opposite direction in some areas during the following decades. Families with children made up the backbone of this “counter-urban” migration (Hjort & Malmberg, 2006). The number of schools remained almost unchanged at around 4,700 during the 1970s and 1980s. In 1993, municipalities assumed some public school responsibilities that had been held by the state until then, particularly the economic responsibilities. At the same time, the government allowed activists, teachers, parents or even private companies to receive public financing to run schools. The establishment of this ’free school‘ reform meant that while the municipalities were still required to offer education for every child, parents had the right to send their child and his/her public school allowance to an alternate school of their choice. As Sweden is a high-tax society, non-public schools had been very uncommon until then; as a consequence of these second reforms the number of schools increased, to about 5,000. However,

most of the new 'free schools' that were established appeared in cities (Statistics Sweden, 2007). The first reforms (transferring responsibilities to the municipalities) paved the way for a new wave of rural school closures. A separate account of the changing numbers of *rural* schools showed that the numbers decreased rapidly during the 1990s, but that the trend flattened out by the early 2000s (Glesbygdsverket, 2008).

The economic crisis of the 1990s (which also affected municipalities) is one explanation for the many rural school closures that took place during these years. Many municipalities adopted economic action programs and no exceptions were necessarily made for their educational commitments. It is possible that this development was further augmented by the free school reform, likely diverting some funds from public (i.e., municipal) to 'free' schools. In any case, these developments were aligned with the demographic changes taking place, as birth rates in Sweden fell dramatically during the 1990s, particularly in small towns and rural areas. At the same time, the urbanization process accelerated again, after two decades of rather balanced geographical population redistribution.

Small Rural Schools – Still under Threat

Today, arguments supporting the superiority of large schools have been disputed in a number of countries, and there are even studies indicating that the results of small schools might even be better (for an overview of British studies see Ribchester & Edwards, 1999; an overview of American studies with similar conclusions can be found in Bard *et al.*, 2005; a review of Scandinavian studies can be found in Thelin & Solstad, 2005). On the other hand, Leonard *et al.* (2002) argue that, based on Canadian studies, the success of small schools is a matter of potential rather than necessity (cf. also Lee *et al.*, 2000). Moreover, it has long been clear that the correlation between school size and economic efficiency is at least not a given, particularly not in rural areas where consolidation of schools often implies costly transportation (Bard *et al.*, 2005) and given higher construction costs in urban settings (Howley 2008). Irrespective of these conclusions, the final and remaining issue about how to choose between costs and quality is not an empirical one (see Andrews *et al.*, 2002 for an overview).

Areas with low birth rates and thus fewer children (e.g., rural areas) are in a situation where the pupil population is decreasing and their schools are often threatened with closure, irrespective of their potentially good results. Rural areas are also particularly exposed to the consequences of school closings, since this means pupils have to be transported to another village sometimes far away, rather than to the neighbouring township, as has been noticed in, for example, remote valleys of the Alps (Meusburger, 2005), parts of Eastern Europe (Budde, 2007; Kučerová and Kučera 2009), or the rural United States (Beeson & Strange, 2003). Cedering (2012) has studied consequences of rural school closures on the everyday life of affected families in Sweden and Talen (2001) has specifically drawn attention to the consequences of long distances to schools (and thus, long times spent on school buses) and the achievement of pupils (cf. also Trnková 2009). However, outcomes of school closures often tend to be evaluated at an aggregated level and, at least in Sweden, the depopulation of already sparsely populated areas means that although many rural schools are closed down every year, the share of pupils with distances to their nearest school of longer than ten kilometers is diminishing (Glesbygdsverket, 2008). Nevertheless, this is of course not much comfort to the individual families and pupils concerned.

The mere public consideration of closing a local school often triggers worries, protests and opposition from the people directly affected (parents of the pupils in the school), as well as from whole communities (Post & Stambach, 1999; Ward & Rink, 1992; Berger, 1983; and set in a wider and more theoretical context by Mormont, 1983). It has often been argued that defending a rural school that is under threat involves addressing many more issues than simply supplying children with the best possible education and quality of life. A number of additional functions have been suggested or identified.

THE WIDER FUNCTIONS OF A RURAL SCHOOL

According to Lyson (2002), his studies in New York State showed that compared to villages without a school, villages with a school tended to have better population development, higher house prices, fewer poor people, and a less polarized socio-economic profile. The differences were more apparent in the smallest villages studied. However, as pointed out by Dean as far back as 1983, identifying the casual connections in these kinds of studies is complicated—does, for example, the presence of a school lead to positive development or is it the other way around? He also drew attention to the fact that studies of this type tend to highlight cases rather than results that can be generalized.

Nonetheless, a number of previous studies have focused directly on consequences. Andrews (1983) reports various outcomes, in a number of respects, of three different strategies in school planning based on six cases. Voth & Danforth (1981) show co-variation between school closures and the prosperity of local business, but are unclear about the causal direction. Sederberg (1987) explicitly focuses on the secondary effects of rural schools—effects that are at stake if the school is closed. Sell *et al.* (1996) are not able to show that retail turnover diminishes as a consequence of a village school closure, but note how overall engagement in the community becomes weaker (cf. also Smithers *et al.*, 2004). According to Post & Stambach (1999, p. 106), the debates about school closings "reflect a struggle to maintain community—and to define "community"—more than a disagreement about the school's technical ability to promote the success of individual students". Meusberger (2005) points to the key role of school employees (cf. also Trnková 2009) in this process and argues that, from a wider perspective, the survival of a rural school might have consequences for such diverse issues as the sustainability of nature and the maintenance of minority cultures. Mormont (1983) pointed to the symbolic meaning of the village school, something also underlined in later studies (e.g. Magnusson & Berg, 2007; Thelin & Solstad, 2005; Kearns et al 2009; Witten et al 2003). Thus, based on these studies, school planning should not be reduced to merely a technical issue of providing education, since it also has many other implications.

However, a more concrete concern expressed by several authors is that the closing of a school will trigger out-migration and have a negative effect on potential in-migration (see, for example, Woods, 2005; Magnusson & Berg, 2007; Lyson 2002). As exemplified in Thelin & Solstad (2005), this is also a concern embraced by the rural population in villages whose schools are threatened. Thus, a school is seen as a necessary attribute for an attractive village. In the long run, this is a key issue that will have implications for all of the other abovementioned functions of rural schools. A vigorous community and prosperous businesses presumes decent population development at a minimum.

Obviously, if these worries can be proven correct, decisions to close rural schools have much more far-reaching consequences than just supplying pupils residing in rural areas with education in a more effective way. Thus, this is an issue of great importance to local governmental planning of education. The present study monitors the development of in- and out-migration to and from rural areas whose school has closed. The migration patterns in rural areas hosting a school continuously during the period studied (1990 to 2004) are monitored for comparative reasons. The results and conclusions are as general as allowed by a total investigation in an entire country over 15 years. The country studied is Sweden.

DATA AND METHOD

The idea of this study is basically to monitor in- and out-migration to and from the surroundings of a rural area which has had a school close during the period 1990 to 2004, and to compare migration after the closing year with migration before that year. If the migration patterns are affected by school closure, we would – ceteris paribus – expect to see a decrease in in-migration and/or an increase in out-migration in the years immediately following the closing year.

The Construction of Geographical Areas

As the 290 (large) municipalities in Sweden are ultimately responsible for basic education (although operating just a share of the roughly 5,000 schools in the country), and since parents can choose any school for their children, there are no straightforward subdivisions of the country into school districts or other geographical units suitable for analysis. Beside that, rural Sweden does not generally consist of cohesive villages, but rather quiet solitude farms and dwellings. Therefore, a set of approximate

catchment areas has been constructed around each and every school[1] by employing Voronoi polygons. The construction of Voronoi polygons means that every single geographical coordinate in the country is attached to its nearest school.

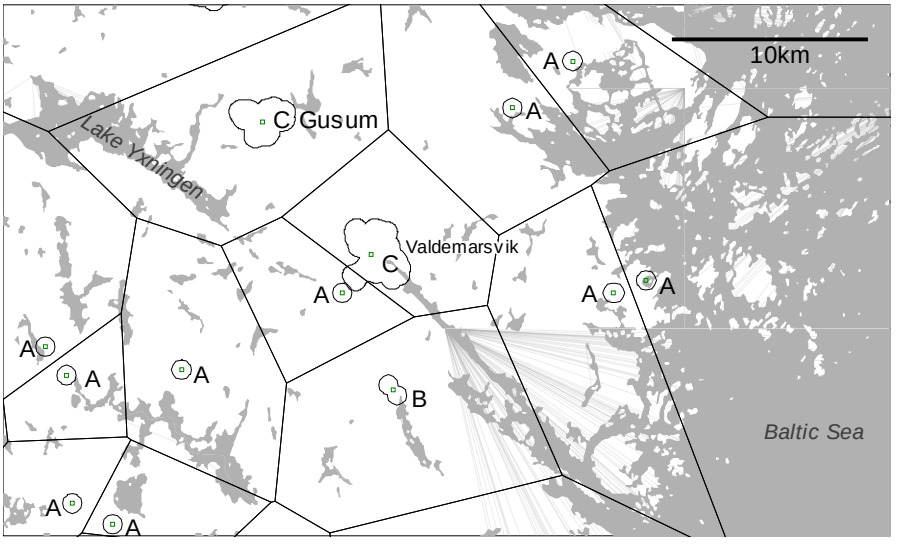
Nonetheless, the nearest school might be many kilometers away and many pupils have to ride a bus to get there while others are within walking or biking distance. To recognize this difference, the Voronoi polygons have been complemented with a second set of polygons that are buffers of 500 meters radius around each and every school (occasionally merged)[1]. These buffers are intended to approximately represent areas within walking distance of the schools.[2] GIS support has been essential in the construction of the two sets of polygons.

While the variation of size between the buffers is rather modest, the size of the Voronoi polygons varies considerably. The smallest are just a few square kilometers, while the largest ones, situated in the very sparsely populated northern parts of Sweden, might be 10,000 to 12,000 km^2 each. Figure 1 illustrates what the divisions in the southeastern part of Östergötland on the Swedish east coast looks like. The small squares represent the centroids of the polygons (usually equal to locations of schools). The rounded areas represent different kinds of buffer polygons centred on them. Finally, the borderlines of the Voronoi polygons are indicated by straight lines. The shaded areas represent water.

[1] Primary schools have been identified in the business registry of Statistics Sweden through their ISIC code and then supplied with geographical coordinates from the Swedish registry on real estate. Schools within one kilometer of each other and schools within built-up urban localities (as defined by Statistics Sweden 2002) are treated as one when the polygons are constructed. The reason for these measures are that the effects of a school closing where an alternative is available or established just a few hundred meters away cannot be expected to have the same consequences as in areas long distances between the schools.

[2] According to the Swedish school act, municipalities are obligated to arrange school buses for pupils who need it for some (not further specified) reason. Based on questionnaire-based studies, the most common interpretation of this paragraph means that among the youngest pupils those with more than two kilometers to their school or with severe danger traffic along the way are entitled to a school bus (Wallberg & Peterson 2006). The stipulated distances for older pupils tend to be longer. Nonetheless, as the application of the law varies between municipalities, no universal distance can be established. However, 500 meters should be short enough to exclude most of the pupils who ride school buses. According to another survey study, which was focused on parents of school children, less than five percent of pupils who ride a school bus have a shorter distance than one kilometer to their school (Sörensen *et al.*, 2002).

Figure 1: Buffers, Voronois and their centroids (indicating the presence of at least one school active for at least one year during the period 1990 to 2004) in the southeastern part of Östergötland, Sweden



Key: "A" indicates "ordinary" 500-meter radius buffers; "B" merged buffers; and "C" urban localities.

As the map illustrates, these areas cannot be expected to fully represent exact catchment areas. Of course, the use of Voronoi polygons does not account for either natural obstacles (e.g., lakes) or built infrastructure (e.g., roads). Thus, the message of Figure 1 is that the polygons and, thereby, the results of this study should be seen as approximations of reality.

Analyzing the Data

Finally, the migration to and from rural polygons which have lost their school have been compared to rural polygons with a continuously open school. This meant that yearly (anonymized) data on the residence coordinates of every single inhabitant in Sweden was examined. Thus, people changing their buffer and/or Voronoi polygon of residence between two years (i.e., migrants) can be identified. These individual data also include information on whether a migrant belongs to a family with or without children. For descriptive purposes, the resulting data have been arranged to highlight the year of school closures (whichever it is).

A few pooled regression models (where cross-sectional and time series data were combined) were then run to statistically estimate any effects of the school closures on migration patterns in the area concerned. The yearly migration in and out of the polygons (representing the area within walking distance and catchment area of each school, respectively,) act as dependent variables in the models. As the most probable point in time to close a school is between two school years (i.e., during the summer) we would expect the effects of a closure to appear during the same year. However, moving is a major event for most families and involves more factors than just schooling. As such, it can be assumed that the effect of a school closure might be lagged in time. Therefore the closing year and the two following years appear as an independent variable in the models (CLOSE+2Y). In these models it is also possible to consider some factors other than school closures that might influence the migration patterns. Those factors include the distance to the nearest bigger city[3] (DIST REGC) (as most of the rural population in Sweden commutes to a city for jobs or services), the population size of the area concerned (POP97). More variables (such as changes in unemployment rate or housing stock) might have been added, but

[3] A bigger city is operationalized as the dominating city in an e-zone categorized as a regional centre in the semi-official taxonomy presented in English by Carlsson *et al*., 1996.

unfortunately these are not available for the tailored regions employed in this study. However, dummy variables for each year of the study period (DUMMY XXXX) have been included in the models. These are intended to capture any time-specific effects (including the ones just mentioned). The independent variables are presented in Table 1.

Table 1: Independent variables

Variable	Definition	Polygons with closed school		Polygons with continuously open school	
		Mean value	Std dev.	Mean value	Std dev.
DIST REGC	Distance in km to nearest regional centre	65	54	52	46
POP97	Number of inhabitants in the catchment area (Voronoi) 1997	603	434	1238	771
DUMMY XXXX	Dummies for each year in the analysis, 1991 is base				
CLOSE+2Y	Dummy, 1 for areas whose school closed the last 3 years				

Source: Data computed from Statistics Sweden

RESULTS

Resulting Geography

The generation of polygons resulted in 2,780 buffers, usually 500 meters in radius, and an equal number of larger Voronoi polygons. However, most of them are of less interest for the aims of this study as they consist of larger urban areas[4] (which usually provide many alternatives to a closed school), or are centred on a school open for several short parts of the study period (and thus missing one defined, unambiguous closing year). The kinds of Voronoi and buffer polygons of interest are primarily 236 rural areas that initially hosted a school in 1990, but lost it at one particular point in time between 1990 and 2004—thus defining areas with an unmistakable period before the school closing and another after it. For comparative reasons, 567 rural areas continuously hosting a school during this period are also considered. The median and average population sizes between 1990 and 2004 in these two types of areas is accounted for in Table 2.

Table 2: Median and average population sizes in rural Voronoi and buffer polygons with a closed (at a certain year)

		Median		Average		
		1990	2004	1990	2004	Difference
School closed (at a certain point in time)	Voronoi	514	451	610	591	-3,0%
	thereof in 500m buffer	41	38	169	160	-5,6%
School continuously open 1990-2004	Voronoi	1 047	1 011	1 240	1 214	-2,1%
	thereof in 500m buffer	430	404	632	606	-4,1%

Source: Data computed from Statistics Sweden

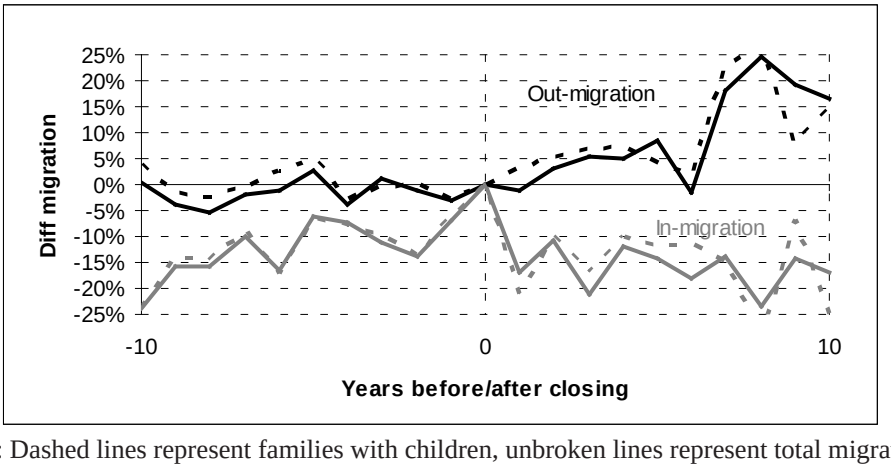
[4] Basically, the definitions used by Statistics Sweden (2002) are also employed here, but as their criteria are very generous (e.g., they consider villages as small as 200 inhabitants as “urban”) a further criteria has been added: only localities hosting more than one shop in 2004 are considered urban here.

First, it is immediately clear from Table 1 that population is diminishing faster in rural areas that have lost their schools, although it is also decreasing in areas with continuously opened schools. Nevertheless, what remains in question is the contribution of migration to these numbers, and separating the time before the closure from the period that follows. Second, the population base in the Voronoi polygons (i.e., the approximate catchment areas) whose school has been closed is, on average, just half the size of its equivalent with a continuously open school for the period 1990 to 2004. As far as the buffers (i.e., the immediate surroundings of the school) are concerned, the difference is even larger. Thus, the closed schools have a smaller base of pupils than the surviving ones. Third, the median populations indicate that many polygons have very small populations. In fact, the least populated ones have well below 100 inhabitants. However, this is in line with the facts that the rural population is sparse and that the smallest schools in the country (e.g. at tiny islands in the archipelago or in the remote parts of the north) enrol just a handful of pupils each. The most populated rural Voronoi polygon with a surviving school had 6 700 inhabitants in 2004 and the most populated one which has lost its school had 2 800 inhabitants at that point in time (not accounted for in the table).

Descriptive Results

As should be clear from section 3 above, it has been argued that rural schools fulfil a number of functions in addition to their formal task of educating their pupils. By extension, this argument means that a school might be expected to influence the general migration patterns to and from the community it serves. However, it can still be argued that a principal group affected by the closure of a school should consist of families with school-age children. This sub-group accounts for about half of the migration to and from the 236 areas presented above. As the data also account for families with children separately, their in- and out-migration is represented by the dashed lines in the following figures. The unbroken lines represent the total number of migrations (including families). Figure 2 illustrates the in- and out-migration ten years before and after school closure in the 236 rural areas of 500 meter radius which definitively lost their school during the study period; the share of migrants shown in the figure has been calculated as a percentage of the number of migrants in the closing year. An effect of the school closing on migration should appear as a break in the lines at year 0 (closing year) or immediately after it.

Figure 2: In- and out-migration in buffer polygons around rural schools definitively closed during a certain year between 1990 and 2004, as a percentage of their in- and out-migration during the closing year



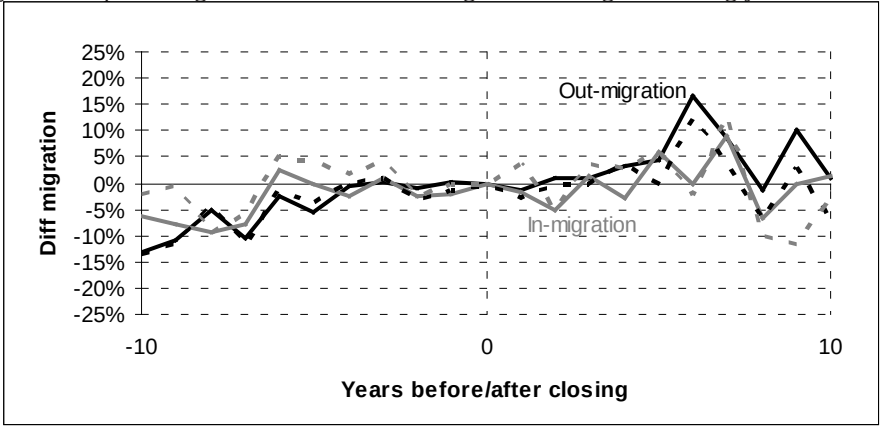
Note: Dashed lines represent families with children, unbroken lines represent total migration.
Source: Data computed from Statistics Sweden

First, it can be seen that the migration tendencies of families with children is very similar to the general tendencies. Second, the figure informs us that out-migration from a 500-meter buffer is

increasing over the years following the closure of its school. While it is rather stable during the ten years preceding the closure, it is considerably higher in the years after it. Third, in-migration shows a tendency to increase during the period of time preceding the closure, but then shows the opposite tendency afterwards. Thus, based on the association between the variables presented so far, a closing of a rural school might perhaps affect the migration patterns in its immediate surroundings in an injurious way. However, the dramatic increase in out-migration does not happen until seven to eight years after the closing, making its relationship to the closure questionable. Moreover, in-migration peaks in the closing year (this single observation might, of course, be a coincidence) and none of all other factors usually thought to affect migration patterns have been considered so far. Therefore, there are reasons to elaborate the hints revealed in the figure.

However, first attention should be drawn to the migration patterns in the outer parts of the Voronoi polygons — that is, on areas intended to represent locations in the wider catchment area of the closed schools, but not within walking distance from them. It can be assumed that these areas are served by school buses. Again, the dashed lines represent families with children while the unbroken lines symbolize total migration. It is worth noticing that the base of data is diminishing with the distance from year 0 in the diagram.

Figure 3: In- and out-migration in rural Voronois (buffer polygons excluded) that lost their school a certain year, as a percentage of their in- and out-migration during the closing year



Note: Dashed lines represent families with children, unbroken lines represent total migration.
Source: Data computed from Statistics Sweden

Once again, it is clear that families with children show migration patterns similar to the general population. However, the message from Figure 3 deviates from Figure 2 in some respects. As far as out-migration is concerned, it definitely increases in the years following the closure of the school. On the other hand, once again, the dramatic increase does not occur until six to seven years after the closure. It should also be noted that the tendency toward increased out-migration was already established ten years before the closure. In-migration to these parts of the Voronoi polygons is rather stable. At the very least, there are no clear signs of decreasing in-migration in the years following the closure. The conclusion that Figure 3 suggests is that beyond walking distance from the school, migration is not affected by its closure in any considerable way.

Results of Statistical Modelling

The results of the regression models are compiled in Values below 0 means that the variable in question reduces the propensity to migrate and vice versa. Stars are used conventionally to indicate results that are significant. Table 3. In- and out-migration are accounted for separately, as are the two different kinds of polygons.

Table 3: Regression results (all migrants)

Variable	In-migration to Voronoi		In-migration to Buffer		Out-migration fr Voronoi		Out-migration fr Buffer	
	B	*t*	B	*t*	B	*t*	B	*t*
DISTREGC	-0,06***	-7,40	0,04***	4,52	-0,06***	-9,750	0,03***	4,03
POP97	0,05***	105,65	0,04***	82,23	0,05***	130,204	0,04***	81,26
DUMMY 1992	-12,10***	-14,43	-6,69***	-9,39	-6,89***	-9,855	-4,30***	-7,74
DUMMY 1993	-13,41***	-12,96	-7,49***	-8,24	-6,38***	-7,426	-4,05***	-5,53
DUMMY 1994	-12,53***	-11,16	-6,55***	-6,48	-1,35	-1,458	-0,81	-0,96
DUMMY 1995	-11,75***	-10,08	-5,64***	-5,28	-1,86	-1,932	-1,78**	-1,97
DUMMY 1996	-9,13***	-7,69	-4,78***	-4,35	-0,92	-0,938	0,19	0,19
DUMMY 1997	-7,16***	-5,98	-3,49***	-3,12	-1,94*	-1,975	0,29	0,30
DUMMY 1998	-4,43***	-3,70	-2,59**	-2,31	-5,23***	-5,295	1,00	1,02
DUMMY 1999	-6,05***	-5,06	-2,776**	-2,48	-3,63***	-3,685	0,54	0,56
DUMMY 2000	-7,03***	-5,91	-3,25***	-2,95	-2,56***	-2,611	-0,61	-0,64
DUMMY 2001	-6,65***	-5,69	-3,20***	-2,99	-1,16	-1,203	-1,10*	-1,21
DUMMY 2002	-6,57***	-5,81	-3,26***	-3,21	-0,20	-0,212	-1,58*	-1,87
DUMMY 2003	-4,10***	-3,94	-1,74*	-1,91	-2,36***	-2,730	-0,82	-1,12
DUMMY 2004	-2,90***	-3,44	-0,73	-1,02	-3,04***	-4,309	-0,34	-0,61
CLOSE+2Y	1,64	1,53	0,79	0,83	1,25	1,394	0,76	1,00
Constant	11,75		-14,10		6,65		-14,32	
R^2	0,53		0,39		0,63		0,38	
Adj. R^2	0,53		0,39		0,63		0,38	

*Key: *p<0,1; **p<0,05; ***p<0,01*

All four migration streams analyzed increases (by definition) with population size. The migration to and from Voronois (but not the smaller buffer regions) decreases with the distance to the nearest bigger city. This is in line with the fact that the Swedish population (and house stock) is more geographically concentrated in remote areas. In 1992 and 1993 Sweden was hardly hit by a deep economic recession and the general internal migration in the country dipped as a consequence. As is clear from Table 3, the rural areas scrutinized here do not make any exceptions. It is also clear that the in-migration to the rural areas studied here has not recovered from that hit while the out-migration from them has (cf. Amcoff 2006 on general rural population decrease in Sweden during the 1990s). However, the variable of primary interest to this study is the one indicating school closure (CLOSE+2Y). It indicates that both in- and out-migration increase as the school closes down, but is not significant in any of the four cases. Thus, there

are no signs of a significant effect of a rural school closure on the migration patterns in its catchment area or immediate surroundings. This conclusion is not affected by a limitation of the analysis to the proper closing year only (not accounted for in the Table). Table 4 is equivalent to Table 3, but considers only families with children.

Table 4: Regression results (migrants in families with children only)

Variable	In-migration to Voronoi		In-migration to Buffer		Out-migration fr Voronoi		Out-migration fr Buffer	
	B	*t*	B	*t*	B	*t*	B	*t*
DIST	-0,02***	-8,66	0,01***	1,39	-0,03***	-11,53	0,01**	1,99
REGC	0,19***	9 3,80	0,02***	7 8,08	0,03***	1 37,6	0,21***	8 1,90
POP97								
DUMMY 1992	-5,28***	-13,87	-2,72***	-9,07	-4,02***	-11,06	-2,60***	-9,17
DUMMY 1993	-5,73***	-12,54	-2,92***	-7,82	-3,68***	-8,46	-2,47***	-6,65
DUMMY 1994	-5,49***	-11,30	-2,57***	-6,31	0,25	0 ,54	-0,61	-1,45
DUMMY 1995	-5,28***	-10,61	-2,32***	-5,47	0,89	1,88	-0,87*	-1,92
DUMMY 1996	-4,25***	-8,45	-1,88***	-4,34	0,32	0 ,66	-0,12	-0,26
DUMMY 1997	-3,64***	-7,21	-1,41***	-3,22	0,23*	0 ,48	-0,27	-0,56
DUMMY 1998	-2,62***	-5,19	-1,18***	-2,70	0,30***	2 ,78	-0,31	4 -0,645
DUMMY 1999	-3,61***	-7,15	-1,38***	-3,16	0,13***	1 ,36	-0,19	2 -0,39
DUMMY 2000	-4,03***	-8,00	-1,52***	-3,51	0,73***	0 ,53	-0,70	1 -1,48
DUMMY 2001	-4,09***	-8,19	-1,68***	-3,95	0,45	0,95	-1,17***	-2,59
DUMMY 2002	-3,69***	-7,53	-1,58***	-3,85	0,66	1,42	-1,49***	-3,52
DUMMY 2003	-2,44***	-5,33	-0,99***	-2,64	0,48***	1,11	-1,29***	-3,47
DUMMY 2004	-1,86***	-4,86	-0,47	1,64	0,25***	0 ,69	-1,06***	0 -3,69
CLOSE+2Y	0,55	1 ,19	0,33	0 ,85	0,69	1 ,55	-0,45	1 -0,17
Constant	5,19		-4,36		2,97		-6,52	
R^2	0,48		0,37		0,66		0,39	
Adj. R^2	0,48		0,37		0,66		0,39	

Key: *p<0,1; **p<0,05; ***p<0,01

Overall, the results shown in Table 4 are quite similar to those in Table 3. Of particular importance to this study is the fact that any significant effects of a school closure (CLOSE+2Y) are still missing. Although only a group of migrants expected to be among the most affected are considered here, there are still no signs of effects on the migration patterns, either in the immediate surroundings of the school or in its larger catchment area. Once again, it could be added that the main results do not change if the estimated effects are limited to just the closing year.

CONCLUSIONS

Although the descriptive results suggest that there might be some harmful effects on migration patterns in the immediate surroundings of a rural school that is closed, these effects cannot be confirmed in the statistical analysis where a few background variables are controlled for. As far as the wider catchment areas are concerned, effects are not even hinted at in the descriptive analysis. The results do not change in any way worth mentioning when only families with children (who can be expected to be among those primary affected) are considered.

An obvious way of explaining the lack of effects is that the presence of a school is just one among many factors migrants to or from rural areas has to consider. It is clear from studies that people who move into the countryside do not expect many services anyway (e.g., Stenbacka, 2001). In addition, the children do not simply lose their right to education; they will be transported to schools by bus, which is very common in rural areas and in the catchment areas of the closed schools.

Thus, the general conclusion of this study is that no statistically significant effects of the closing of rural schools can be established on the migration patterns in the schools' surroundings. Based on this study, the rural districts whose schools are closed will, at the very least, not die due to a sub-sequent net out-migration of people. This is well in line with previous qualitative (Egelund and Laustsen 2006) and case (Johnson 1978) studies of the issue. As these results oppose a common way to argue against rural school closures, they might be of use to local governments considering closures of rural schools. On the other hand, the results cannot be taken as a justification for concluding that nothing in particular will happen to the local society when it loses its school. As should be clear from the review above, a number of other important functions of rural schools have been identified and established in the literature.

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