

# Do Teacher Strikes Harm Educational Attainment of Students?

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Michèle Belot — Dinand Webbink

*Abstract.* This paper investigates the effects of a teacher strike on student achievement. From May 1990 until November 1990 teachers in the French community of Belgium stroked to obtain a salary increase. We exploit the political division of Belgium in a French community and a Flemish community, with similar educational institutions, for estimating the long-term effects of the strikes. Based on a difference-in-differences approach, using data from two different surveys, we find some evidence that the strikes reduced educational attainment and increased class repetition. We also find that the strikes led to a significant reallocation of students to a lower level of higher education. Overall, the results suggest that teacher strikes can lead to substantial costs for those not involved in the conflict.

## 1. Introduction

The ‘right to strike’ for teachers is the object of a controversial debate in many countries. Countries like Germany, Spain, and Portugal do not legally permit strikes and in the USA, only 13 states do not legally ban teacher strikes. In countries or states that do not ban teacher strikes, there is usually a fierce debate about whether this right should be restricted, by imposing limits to the duration or extent of strikes. For example, in May 2008, President Sarkozy provoked a huge public outcry by threatening to introduce a bill imposing schools to maintain a minimum service during strikes. Some feared that this was a step in the direction of the Thatcher ‘radical’ practices in the 1980s, in sharp contrast with the French traditions of industrial action. In the UK, teachers did also make a come back in industrial action in April 2008, organizing the first strike after more than 20 years. The debate is fierce in the USA as well — in 2007 the ‘Hayward teacher strikes’ in the San Francisco Bay area — which lasted for 20 days — captured enormous media attention. The State laws are not always clear about the legality of teacher strikes. Washington State for example has had many court rulings over the years declaring the illegality of strikes and forcing teachers back to school. The most recent example was in the school district of Marysville, where a court injunction forced teachers back to the classroom after a 49-day schooling interruption.

One of the most common motives for teacher strikes relates to teacher pay. The best argument to defend the right to strike in that context is that better teacher pay might be beneficial not only to the teachers themselves but also to the quality of the school environment. Teacher pay might affect the selection of teachers into the profession; better teachers

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Michèle Belot (author for correspondence) — Dinand Webbink, Nuffield College, New Road, Oxford OX1 1NF, UK. Tel.: (+44) 1865 278 548; E-mail: [michèle.belot@nuffield.ox.ac.uk](mailto:michèle.belot@nuffield.ox.ac.uk).

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might be attracted by better pay and better pay might also serve as a motivational device, thereby improve schooling quality. Although appealing, the argument that better pay improve the quality of teachers has only limited empirical support (Ballou and Podgursky, 1997 find little evidence using national labor market information and Figlio, 1997 finds some evidence using local labor market information), and even if there is such an effect, it is unclear whether this is a direct effect of pay or other aspects of the schooling environment that may be correlated with pay and drive teacher mobility. For example, Hanushek *et al.* (2004) provide evidence that teacher mobility is mainly driven by the characteristics of the student population rather than contractual aspects of working conditions.

On the other hand, the argument for limiting the right to strike is that it might be detrimental to the pupils. Very little is known about the consequences of strikes for the educational achievements of students. A number of studies investigate the effects of teacher unionization on school organization and student achievements (Carini, 2008; Eberts and Stone, 1986, 1987; Kleiner and Petree, 1988; Peltzman, 1996; Register and Grimes, 1991; see Carini, 2002 for a recent survey). The challenge of this literature is that differences in unionization across schools may be correlated with other differences in the education production function. Using an instrumental variable approach, Hoxby (1996) finds that increases in teacher unionism leads to significant increases in two key areas — teacher salaries and teacher–student ratio — but have a negative effect on student performance.

To our knowledge, there are no studies evaluating the long-term effect of teacher strikes on educational achievements of students. The challenges in assessing their effect are similar to those mentioned above. Strikes do not occur randomly and are likely to be correlated with other factors affecting educational outcomes, thereby compromising the identification of a causal effect. A before–after comparison might be biased by other unobserved factors that changed after the strikes.

This paper investigates the long-term consequences of a severe case of schooling disruption due to teacher strikes that took place in Belgium almost two decades ago. In 1990, the teachers in the French community of Belgium led a long and fierce battle against the government to obtain guarantees regarding future salary increases. Schools experienced severe disruptions from May 1990 until November 1990. The political division of Belgium in two communities (French and Flemish) and the context of the strikes provide an opportunity for a difference-in-differences (DD) approach. The schooling system was very similar in both communities, and the education budget was determined at a central level (according to a rule depending on the population below 18 in each community). The reason why a strike occurred in the French community and not in the Flemish community was due to an institutional reform that transferred the Education Department from the Federal authorities to the communities. The overall public budget was in somewhat better shape in the Flemish community than in the French community and the strikes occurred after the teachers of the French community were denied a salary increase. The outcome of the strikes for teachers in the French community was exactly the same as the increase obtained by teachers in the Flanders community at the start of the strikes (a salary increase of 2 per cent). Obviously, this was a relatively minor increase that only provided mild satisfaction in the teaching profession. The strikes introduced a severe disruption in schooling and turned this period into some sort of improvised vacation for students. Nobody knew when the strikes would end, and the news about whether children could come back to school was revealed on a day-by-day basis. This made it very difficult for parents and children to organize a form of substitution for schools.

Ideally, we would like to have detailed information on the short-run and medium-run effects of these strikes. There is no such information available at the school or pupil level in

Belgium. However, the aggregate data at the level of the communities will show some interesting trends and shed light on what seems to have happened in the short run. For example, we see a significant increase in the proportion of students failing their first year at university, and a relative increase of registrations in higher professional education in comparison to university. The focus of the study, however, is on the evaluation of the *long-term* effects of the strikes. We use data from two surveys — a household survey [Panel Study on Belgian Households (PSBH)] and the Labour Force Survey of 2001, enabling us to assess the educational attainment of pupils 10 years after the strikes. Our empirical strategy relies on the comparison of educational outcomes across cohorts and regions with a DD approach. The main challenge of the study is, of course, to separate the effects of the strikes from other effects, for example an overall deterioration of the schooling environment. We will come back to this issue in detail throughout the analysis.

## 2. The Belgian education system and the context of strikes

To understand the context of the strikes, it is helpful to mention a few facts about the history of the federalism in Belgium. Belgium became a federal state in 1970. The federalization of 1970 created new political entities, which are called *regions* and *communities*. There are three regions, corresponding to economic entities (Flanders, Wallonia, and Brussels) and three communities, each of them associated with one of the official languages (French, Flemish, and German). Over time several departments have been transferred from the federal state to the communities or regions. Hence, the department of education was transferred to the communities in 1988. The Flemish and French communities are roughly equivalent in size. The Flemish community is somewhat larger than the French community (*about 5.5 millions against 3.9 millions in 2005*). The German community, on the other hand, is much smaller (less than 100,000 people in 2005).

### 2.1 The teacher strikes

The crisis of 1990 had longstanding roots, probably starting around 1986, when the Belgian federal government decided to reduce the budget deficit substantially. The plan implied substantial cuts in public expenditures, and namely in education, more specifically in the schooling infrastructure and the labor costs in secondary schools. The situation in the French community deteriorated with the constitutional reform of 1988, transferring the education department from the federal government to each community. Each community would receive a budget from the federal government, according to a rule determined in the so-called ‘Loi de financement’ of 1989. The allocation rule was based on the respective ‘needs’, defined as a function of the population under 18. One major issue in this law was that it did not encompass the possibility of revalorization of the salary scales in the education system. Any salary increase would have to be financed by the own means of the communities. In those times, the French community had large deficits and could therefore not cope with extra costs in education. The Flemish community, on the other hand, had recently merged with the other political entity (the Flemish region), and could therefore more easily transfer financial means to the education department. Nevertheless, the financing of teacher salary increases was a hot issue both in the North and South of the country. Although the Flemish region was able to guarantee moderate salary increases, the French community was not. The French teaching staff felt they needed to take action and a great disagreement followed. The months of May

and June were marked by repeated days of strikes, with school periods in between. The summer vacation (July and August) followed, whereas the conflict between teachers and public authorities remained unsolved. The strikes started again in September with the beginning of the new schooling year. The period of turbulence reached a peak in October and ended after a full 6 weeks of uninterrupted strikes from mid-October up to the end of November 1990, when the parties finally settled (the teachers obtained a salary increase of 2 per cent, which is equal to the increase obtained by teachers in the Flanders community at the start of the strike). The strike was spread widely: all the secondary schools and 90 per cent of the primary schools were closed. Schools decided more or less on their own how they would cope with the loss associated with the perturbation of the schooling year. In many schools, the amount of material covered has been significantly reduced. The exam period, taking place in June, was severely disturbed in many schools. Some schools cut substantially the number of exams. The strikes lead to an unprecedented period of turbulence in schooling, particularly for those enrolled in secondary schools. There was a great uncertainty about when the strikes would end and, for most pupils, this period turned out to be some sort of 'improvised vacation'. It is hard to obtain more than anecdotic information about what the students did during that period of time. One Belgian news magazine, *Le Vif L'Express*,<sup>1</sup> reports the results of a small-scale study undertaken by two insiders of the movement (a director of a school and one of the teachers) on a sample of 400 students attached to different schools in the region of South-Luxembourg. They find that the most popular activities during this 'forced vacation' were watching TV, listening to the radio and meeting with friends. A large majority did use the time to review the material already covered in class. No matter how the students coped with the period of turbulence, it is clear that the period of strikes seriously perturbed 5 months of schooling in total. Although the first 2 months mainly coincided with the exam period, the last 3 months truly sacrificed teaching time.

When the strikes ended, there was only a limited flexibility for schools to adapt their programs, as those are established at a centralized level. There was no official change in school programs after the strikes. Hence, pupils had to 'catch up' somehow with the material after the strikes. A good metaphor of the effect of strikes is that if schooling was a ladder, all pupils hit by the strikes had to miss one step on the ladder, and were therefore in a more difficult position to climb the next one. It might be expected that the strikes induced more class repetition in the subsequent years than would have otherwise happened.

### 3. Data

For the reasons we have mentioned earlier, the evaluation of the effects of strikes is challenging. It will never be the case that strikes occur at random. Nevertheless, the Belgian case presents one key advantage: all schools in one community were affected at the same time, and as we described in the previous section, the motives for the strikes were not directly related to the schooling environment. The latter claim should be made with care though, and we will carry out an analysis to indeed identify a possible spurious correlation between the strikes and the schooling environment. The analysis is conducted to bring together different pieces of information, which should shed light on how and whether the effects we find can be attributed to the strikes.

We use data from two different surveys. The first survey is the PSBH. This is a panel study undertaken by a consortium of Belgian universities over the period 1991–2002. The panel includes all individuals of the selected households who are above 16. The total samples

includes 5,361 individuals. The survey includes detailed information about the type and year of studies for those who are full-time enrolled in education. One drawback is the relatively small sample of the 'treated' group, in particular to study participation in higher education. For this purpose, we use data from a second survey, the Labour Force Survey, carried out in 2001 by the Belgian Statistical Office (INS). The data include 115,738 individuals. The Labour Force Survey contains basic demographic information (age, gender, place of residence) and information on employment status and education.

### 3.1 Identification of treatment and control groups

The political organization of the country is such that almost everyone (more than 95 per cent of the people) attend schooling in their own mother language. The linguistic regime in schools is determined by law and is part of the very delicate question of linguistic division in Belgium. The current linguistic border dates from 1962, when a 'language status' was attributed to each Belgian municipality (Flemish, French, German, or Bilingual as in the region of Brussels capital). The language of the municipality determines the language of schooling and administration. The labeling of each community as 'French-speaking' or 'Flemish-speaking' was based on official census data on the most frequently spoken language. The division has large implications for schooling, as the school language is the administrative language of the municipality. Only in the region of Brussels capital or in one of 16 local municipalities with a special status<sup>2</sup> we can find schools teaching in both languages in the same municipality. Hence, with the exception of a minority of people in a small number of municipalities, most Belgians attend schooling in their own mother language. As all schools in the French-speaking community have been affected by the strikes, we can identify the treated group with the mother language and date of birth to identify the treated group in the PSBH sample, and the region and age in the Labour Force Survey. In theory, Belgian students should finish secondary school in the year in which they turn 18.<sup>3</sup> This means that those who were born in 1972 and after have been affected by the strikes with certainty. However, we should be careful in identifying those who were not affected by the strikes. A substantial part of students lag behind in practice, such that it may be wrong to assume that those born in 1971 and before have not been affected by the strikes. Aggregate statistics from the French community show that more than a third of students enrolled in *general* education (which includes around 60 per cent of the population of students) lag behind by at least one schooling year. Around 10 per cent of the students lag behind by two schooling years or more, and 5 per cent by three schooling years or more. Those shares are substantially higher in technical and professional schools, where more than two-thirds lag behind by at least a schooling year. Therefore, we eliminated those born in 1971 from the sample, to avoid problems of misclassification.

The panel covers the period of 1992 up to 2002. In 1992, those who have been affected by the strikes would still be very young (20 or 21 years old maximum) and would therefore be in the early stages of their career or still enrolled in education. In our sample, the average age of first entry into the labor market is 20 years old, so the later years of the panel should be more informative about the educational outcomes of those who have been affected by the strikes. We restrict the sample to those individuals who have either French or Flemish as their mother tongue, excluding 161 individuals.

In the Labour Force Survey, we use information about the current region of residence and age. To avoid misclassification problems, we excluded individuals living in Brussels from the sample.<sup>4</sup> The variable age can be problematic because we do not know the precise date (in the year) at which the questionnaire was filled. However, recall that our treated group should be

**Table 1.** Summary statistics for two surveys — means (standard deviations)

	Young French-speaking (born after 1972) (= treated)	Young Flemish-speaking (born after 1972)	Old French-speaking (born between 1960 and 1971)	Old Flemish-speaking (born between 1960 and 1971)
<b>PSBH</b>	(1)	(2)	(3)	(4)
Living in Flanders (%)	2.72	99.69	3.76	98.66
Age	26.4 (3.1)	26.1 (2.9)	37.5 (3.1)	37.6 (3.1)
Years of schooling	12.68 (3.6)	13.18 (3.6)	13.10 (2.8)	12.96 (3.3)
Observations	184	319	319	745
<b>Labour Force Survey</b>	(1)	(2)	(3)	(4)
Age	25.5 (1.7)	25.5 (1.7)	36.3 (3.1)	36.2 (3.1)
No higher education (%)	59.0	55.2	66.5	63.7
Higher vocational (%)	30.2	32.5	23.6	27.5
University education (%)	10.8	12.3	9.9	8.8
Observations	1,708	2,260	3,800	5,238

born in 1972 and after, which means that the eldest will turn 29 in 2001. Some people could be of age 29 and turn 30 in 2001, such that they would belong to the ambiguous group and could have not been affected by the strikes. For these reasons we exclude people who are 29 and 30 from the sample, as it is not clear whether they have been treated or not.

### 3.2 Summary statistics

Summary statistics for both surveys are shown in Table 1. The top panel shows statistics for the panel study (PSBH), and the bottom panel shows statistics for the Labour Force Survey. The table contains columns for cohorts of students before and after the strikes and for each language community. The first row in the top panel shows the distribution of the population across mother languages. The geographical clustering is striking: almost all French-speaking people are located in Wallonia and Brussels, whereas almost all Flemish-speaking people are located in Flanders. This shows that Belgium has very little cultural mixing and shows that identifying the treated group by the mother language or region of residence is almost equivalent. The educational attainment of the young French generation is on average lower than the educational attainment of the Flemish. This is in contrast with the older generations, where the French-speaking are slightly ahead of their Flemish counterparts.

The sample of the Labour Force Survey is much larger than the PSBH sample. The summary statistics show a similar pattern: the young French cohort tends to be less well educated than the young Flemish cohort. The increase in the proportion of higher education diplomas has been captured by an increase in higher vocational education in Wallonia, whereas it has been more equally spread in the Flemish community.

## 4. Empirical analysis

The main approach in our empirical analysis is to estimate DD models in which we exploit the division of Belgium in two separate (language) areas with similar educational institutions. As mentioned before, only the French-speaking area was affected by the strikes.



#### 4.1 The effect of the strikes on educational attainment and class repetition

First, we analyse the effect of the strikes on educational attainment using data from the panel study. From the information on the highest diploma obtained by the respondents we derive the years of schooling. We restrict the sample to those who are not enrolled in full-time education anymore, and use the last wave for which we have information about the respondent (75 per cent of the sample is observed in the last wave of the panel). For estimating the effect of the strikes we estimate the following DD model:

$$\text{Yearsschooling}_i = \beta_0 + \beta_1 \text{After1972}_i + \beta_2 \text{French}_i + \beta_3 \text{After1972}_i \times \text{French}_i + \beta_4 X_i + \varepsilon_i,$$

where ‘*After1972*’ is a dummy for birth dates in 1972 and after, ‘*French*’ is a dummy for French mother language, and  $X$  is a set of individual characteristics (age, gender, and dummies for the highest diploma of mother and father). The crucial parameter is  $\beta_3$ , which is the DD estimate of the effect of the strike.

The results of the DD estimates are shown in Table 2. Column (1) shows the estimates of a model that does not include controls, column (2) shows the estimates while controlling for age, gender, and parental education. We find that the young French-speaking generation lags behind by approximately 0.7 years of education. Including additional controls slightly increases the size of the estimate of the effect of the strike (column (2)). However the estimates are somewhat imprecise (the effect is only significant at the 10 per cent level) such that we cannot rule out a small effect. The inclusion of people living in Brussels yields very similar results.<sup>5</sup>

One crucial question is whether this lower educational attainment can be attributed to the strikes or whether this reflects a negative trend that was already present for the cohorts before 1972. We address this question by comparing successive cohorts. We know that only those

**Table 2.** DD estimates of the effect of the strikes on years of schooling

	(1)	(2)	(3)	(4)
Dummy French-speaking	0.15 (0.23)	0.13 (0.23)	-0.14 (0.29)	-0.10 (0.30)
Dummy after 1972	0.44 (0.23)*	0.00 (0.41)		
Dummy after 1972 × French-speaking	-0.67 (0.40)*	-0.73 (0.41)*		
Dummy 1966–70			0.55 (0.27)**	1.10 (0.37)***
Dummy 1972–80			0.67 (0.25)***	2.07 (0.68)***
Dummy 1966–1970 × French-speaking (1)			0.69 (0.49)	0.58 (0.50)
Dummy 1972–1980 × French-speaking (2)			-0.38 (0.44)	-0.55 (0.45)
<i>F</i> -test (1) = (2) ( <i>p</i> -value)			0.04	0.03
Controls for individual characteristics	No	Yes	No	Yes
N. observations	1,457	1,426	1,403	1,375
<i>R</i> -squared	0.002	0.018	0.012	0.028

Ordinary least squares estimates, standard errors in brackets. Individual characteristics include: age, gender, and highest diploma of father and mother. Sample is restricted to those who are not enrolled in full-time education and have the Belgian nationality. We use the most recent observation for each individual respondent.

\* Significant at 10 per cent; \*\* significant at 5 per cent; \*\*\* significant at 1 per cent.

born after 1972 have been affected by the strikes. Those born just a few years before probably faced a similar situation in schools as those born just after 1972, but were not confronted with the strikes. We argue that if there is a significant difference in educational achievements between the generation hit by the strikes and the generation relatively close in age, it is much more likely that the difference comes from the strikes. Therefore, we construct a variable with three age categories: (1) born between 1960 and 1965; (2) born between 1966 and 1970; and (3) born between 1972 and 1980. We introduce interaction dummies between each of these categories and the mother language. Columns (3) and (4) in Table 2 show the estimates when we include these interaction in the model. The main finding from this exercise is that the estimates in columns (3) and (4) show no negative trend. On the contrary, the French-speaking cohort born just before 1972 seems to have a higher educational attainment than the Flemish-speaking cohort, although the effect is not significant.

From this analysis we conclude that there is some evidence that the cohort affected by the strikes has a lower educational attainment, and this does not seem to reflect an overall negative trend.<sup>6</sup>

*4.1.1 Class repetition.* The next question is whether we can shed more light on how the strikes could have led to lower educational attainment. Our presumption is that the strikes mainly had an effect on class repetition because pupils entered the next level of studies less well prepared and consequently were more likely to fail and repeat a year. To investigate this, we use information on the younger respondents in the sample. We have information on the level of education and the grade (year) of studies for respondents enrolled in full-time education. For the analysis, we focus on students during the age range of compulsory education (not older than 18). Including students who are older than the minimum school leaving age might bias the results because the strikes might have an effect on enrolment after compulsory education. We calculated the number of nominal years of schooling achieved at the age of 18 ( $S_{it}^{18}$ ), based on the type and grade of studies in which respondents are enrolled. Differences between French- and Flemish-speaking pupils should tell us whether they differ in terms of class repetition. We can compare the cohorts born just after 1972 and those born a few years later, as one may expect that the oldest cohort may have been more affected by the strikes. We estimate the following equation:

$$S_{it}^{18} = \beta_0 + \beta_1 \text{French}_i + \beta_2 X_{it} + \varepsilon_{it}.$$

The results are reported in Table 3. We find that at the age of 18, the French-speaking people already lag behind by a third of a year. If the strikes really caused this delay in schooling, we would maybe expect those born just after 1972 to have been most affected by the strikes, and we would expect the younger cohorts to have had time to ‘catch up’. We split the sample in two groups and run a separate regression on each sample. We find that the cohort aged 18 and born between 1974 and 1978 (columns (3) and (4)) has been more severely delayed than the cohort born between 1979 and 1984. There is a positive and significant difference in delays in both groups, but the delay is 0.60 of a year for the first group and 0.30 of a year for the second group. These results confirm again that the effects do not reflect a difference in trends between the French- and Flemish-speaking parts. The cohort that was enrolled in secondary education at the time of the strikes shows the most negative results in terms of schooling delay. The long period of strikes in the nineties seems a plausible explanation for this finding.

Next, we investigate whether we can establish a link between class repetition and educational attainment. Class repetition seems a plausible mechanism to explain the fall in educational



**Table 3.** The effect of the strikes on nominal years of schooling at the age of 18

	(1)	(2)	(3)	(4)	(5)	(6)
	All students enrolled at age 18 and born between 1974 and 1984		Students enrolled at age 18 and born between 1974 and 1978		Students enrolled at age 18 and born before 1979 and 1984	
Dummy French-speaking	-0.319 (0.091)***	-0.373 (0.090)***				
Dummy French-speaking and born before 1977			-0.507 (0.172)***	-0.579 (0.188)***		
Dummy French-speaking and born after 1977					-0.252 (0.107)***	-0.301 (0.109)***
Controls for individual characteristics	No	Yes	No	Yes	No	Yes
N. observations	454	442	134	133	320	309
Adjusted <i>R</i> -squared	0.03	0.07	0.06	0.13	0.02	0.07
Hausman test of equality ( <i>p</i> -value)						
(3) = (5)			0.01			
(4) = (6)				0.00	0.01	0.00

Ordinary least squares estimates, standard errors between brackets. Individual characteristics include: gender and highest diploma of father and mother. Sample restricted to individuals aged 18 and enrolled in education.

\* Significant at 10 per cent; \*\* significant at 5 per cent; \*\*\* significant at 1 per cent.

**Table 4.** Class repetition and final educational outcomes  
Dependent variable: Years of studies (final educational achievement)

	(1)	(2)
Dummy French-speaking	-0.33 (0.15)**	-0.16 (0.14)
Nominal years of schooling at 18		0.61 (0.14)***
Adjusted <i>R</i> -squared	0.01	0.218
N. observations	359	405

\* Significant at 10 per cent; \*\* significant at 5 per cent; \*\*\* significant at 1 per cent.

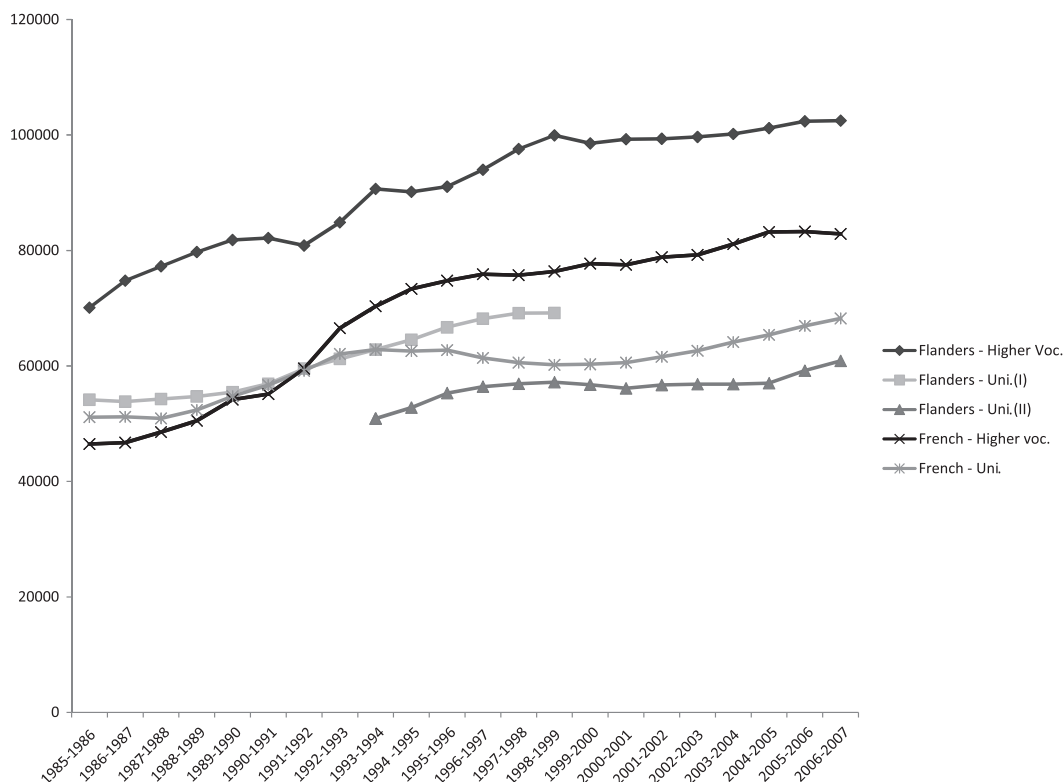
achievements of the young French-speaking cohort. We now estimate the relationship between final years of education and the number of nominal years completed at age 18, using the sample of pupils we observe in the panel at age 18 and later on when having completed their education. We find a positive relationship: all else equal, the higher the number of nominal years completed at age 18, the higher the final number of years of schooling (Table 4). Thus, those who experience a delay will have a lower educational attainment. Obviously, this coefficient does not capture a *causal* effect. But it is interesting to see whether controlling for achievements at age 18 helps explaining differences between the French and the Flemish community. The answer is clearly yes: once we control for the achievements at age 18, the language dummy is substantially reduced and becomes insignificant.

#### 4.2 *The effect of the strike on participation in higher education*

Higher education in Belgium consists of two levels: university education and higher vocational education. University education is considered to be the highest level of higher education. In this section we further investigate whether the strikes had an effect on participation in higher education. First, we look at some aggregate statistics on participation in higher education. Next, we estimate multinomial logit models using data from the Labour Force Survey.

*4.2.1 Trends in participation in higher education in both parts of Belgium.* Figure 1 shows the number of students enrolled in higher education across communities. Student participation in higher education followed an upward trend over time in both higher vocational education and at university, in both communities. But although they evolved closely together until 1990, their evolution seemed to have diverged since then in the French community. The growth rate of the population in higher vocational education increased substantially in 1991 (by 8 per cent) and 1992 (by 12 per cent), and fell afterwards. Although the university population was growing at a relatively high rate in these years too (around 4 per cent), there is clear break around these years. Student numbers remained quite steady after that. In the second half of the 1990s and early 2000, student growth rates varied between -2 and 2 per cent. We observe no such break in the Flemish community. Student enrollments increased steadily both at university and in higher vocational education.

We show the numbers of the college freshmen in the French-speaking community (Figure 2), which should give a better idea of why we observe these changes in growth rates around 1990.

**Figure 1.** Total number of students enrolled in higher education

Source: French and Flemish Community Statistics (Ministries of Education).

Note: There is a break in the series for university students in Flanders in 1999, because of a change in the way some students were recorded (who before were recorded twice).

The number of first-year university students was following an upward trend until the beginning of the nineties, and then fell during the first half of the 1990s and then increased again towards the beginning of the year 2000. Again, the break we observe seems to coincide with the timing of the strikes. The fact that we observe such a break (rather than a trend) puts the strikes as most likely candidate explanation (rather than a deterioration of schooling conditions).

Finally, we report the success rates of freshmen enrolled at one of the universities of the French community, according to the academic year of enrollment (Figure 3). We observe a substantial drop in the success rates of first-year university students in the academic year following the strikes (1991–92). The success rate in 1991 is around 4 percentage points lower than the success rate in 1989 (which was then around 40 per cent). The success rates seem to recover slightly after that, but remain substantially lower than their pre-1990 levels. The fact that we observe a break in the series, coinciding with the timing of the strikes (rather than a trend) provides additional support for the strikes as likely explanation.

**4.2.2 DD models for the choice of the level of higher education.** Next, we estimate DD models of the effect of the strikes on the level of higher education. The treatment group is identified with the variable ‘age’ and ‘region’.

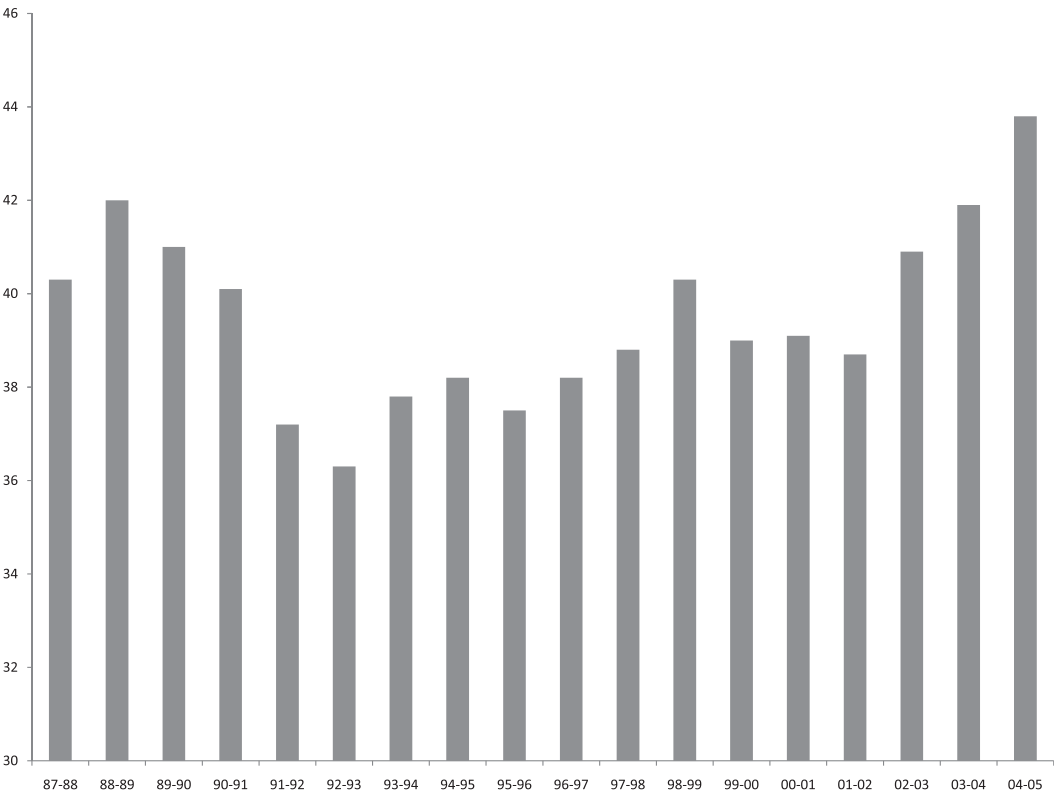
**Figure 2.** Number of first-year students enrolled at university (first generation)

Source: Cref (Conseil des Recteurs des Universités Francophones de Belgique).

We follow the same strategy as in the previous section and estimate a DD specification. However, in this section we focus on the choice of the level of higher education and use a multinomial logit model that distinguishes three alternatives: no higher education, higher vocational education, and university education. The multinomial model is based on the assumption of Independence of Irrelevant Alternatives: the odds ratios corresponding to two alternatives in the choice set do not depend on the presence of other alternatives in the choice set. This assumption is likely to be a problem if two alternatives are close substitutes. However, in our context the alternatives seem quite different.

Table 5 shows DD estimates of the effect of the strikes on the type of diploma obtained. The reference category is higher vocational education and the two alternative categories are no higher education and university education. We estimated the model for three samples depending on the age of the individuals (columns (1), (2), and (3)). The overall picture is that the generation affected by the strikes seems to be less likely to have a university diploma and seems to be more likely to graduate from higher vocational education, which is exactly in line with the aggregate statistics. Furthermore, this does not seem to reflect a general trend, as this reallocation seems to be present among the youngest generation of Walloons only. The interaction dummy with the other age group (31–36 years old) is never significant and is close to zero.

**Figure 3.** Success rates (per cent) of first-year students enrolled at university



Source: Cref (Conseil des Recteurs des Universités Francophones de Belgique).

We calculated the marginal effects corresponding to the last column and find that the probability of having a university diploma fell by a bit more than 2 percentage points for the cohort affected by the strikes. The story seems to be that the generation affected by the strikes has been less successful in university studies and probably reallocated to higher professional studies. One explanation could be that this generation was less prepared for university studies, which would explain the substantial drop in aggregate success rates and the large relative increase in the number of students in higher professional education in the years 1992 and 1993.

**5. Conclusion**

This paper provides unique evidence on the effect of teacher strikes on final educational attainments. Any attempt to evaluate the effects of strikes will always be subject to the concern of endogeneity of strikes. The Belgian case is interesting because the motive for the strikes was not related to the schooling environment, but was driven by a political reform that was uncorrelated with schooling conditions. Both communities were confronted at the same time by similar budgetary concerns, but the Flemish community succeeded in avoiding strikes by granting an immediate 2 per cent salary increase, whereas the French-speaking community did

**Table 5.** The effect of the strike on the choice of the level of higher education — multinomial logit estimates

	(1a) No higher education		(1b) University	(2a) No higher education		(2b) University	(3a) No higher education		(3b) University
Dummy age 23–28	0.032 (0.56)		0.250 (2.78)***	–0.187 (1.41)		0.332 (1.59)	0.055 (0.31)		0.446 (1.55)
Dummy age 31–36							0.049 (0.53)		0.140 (0.92)
Dummy Wallonia	–0.003 (0.11)		0.377 (7.92)***	0.203 (2.87)***		0.278 (2.47)**	0.202 (2.81)***		0.268 (2.26)**
Age 23–28 × Wallonia	0.148 (1.92)*		–0.431 (3.55)***	–0.059 (0.58)		–0.327 (2.07)**	–0.057 (0.56)		–0.318 (0.16)**
Age 31–36 × Wallonia							–0.000 (0.00)		0.010 (0.06)
Female	–0.266 (10.13)***		–0.832 (18.66)***	–0.573 (11.51)***		–0.397 (5.08)***	–0.544 (13.32)***		–0.476 (7.30)***
Age	0.037 (33.30)***		0.004 (2.31)**	0.009 (0.64)		0.023 (1.03)	0.033 (2.63)***		0.020 (1.02)
Constant	–0.309 (5.23)***		–0.961 (9.69)***	0.774 (1.60)		–1.686 (2.21)**	–0.083 (0.17)		–1.689 (2.17)**
Observations	40,443		40,443	8,509		8,509	13,006		13,006

The sample includes individuals who obtained their last diploma in Belgium and who are not living in the region of Brussels and in (1) all individuals with ages between 23 and 28 and over 31; (2) all individuals with ages between 23 and 28 and between 31 and 36; and (3) all individuals with ages between 23 and 28 and between 31 and 41.

Reference category is higher professional education.

Absolute value of z statistics in parentheses.

\* Significant at 10 per cent; \*\* significant at 5 per cent; \*\*\* significant at 1 per cent.



not. Eventually, the French community granted a 2 per cent salary increase as well, but this was only after a long battle between teachers and the government, and a long period of perturbation in all schools of the community.

We find some evidence that the strikes decreased the educational attainment of students, although the estimated effect is somewhat imprecise. A plausible mechanism for this lower investment in human capital seems to be an increase in grade repetition. We find that the young French-speaking cohort graduated half a year later on average. Furthermore, we find that the strikes led to a reallocation of students from university studies to higher vocational education. Hence, students do not seem to have succeeded in compensating for the losses in terms of schooling due to the strikes. Also, the results we find breaks in the evolution of achievement and attainment, breaks that seem to coincide with the timing of the strikes. Thus, it seems that these results are more consistent with a causal effect of strikes rather than a causal effect of a deterioration in schooling environment.

Of course, this study could be seen as a specific 'case-study', and the question is whether we can draw more general conclusions and lessons from this analysis. We would argue that the results provide a benchmark for a scenario that is not too unrealistic. There are a number of examples of long strikes in schools (Hayward teacher strikes and Marysville to name a few) and most strikes are driven by wage disputes. Higher wages might not only be beneficial for teachers themselves but also for students as higher wages might attract better teachers. However, the empirical literature provides little support for the latter argument. This paper suggests that long-term strikes might bear high costs in terms of detrimental effects on educational achievement of students. These costs should be taken into account in discussions on the right to strike for teachers.

## Notes

<sup>1</sup> We are very grateful to Dorothée Klein, journalist at Le Vif L'Express who was in charge of the coverage of the strikes in the French community. She provided us a large number of her own articles, one of them reporting on the study of Gauché and Lefin mentioned here.

<sup>2</sup> The borders of the communities were defined in 1962, and each local municipality received an official language status. Sixteen municipalities with a large presence of the other language group received special rights, in particular the rights to access administrative and educational services in their own language.

<sup>3</sup> The legal rule regarding the age of schooling is such that all children should enroll in the first year of primary school in the year in which they turn 6. Schooling is compulsory until the age of 18 and the traditional scheme (primary and secondary levels) consists of 12 years of schooling.

<sup>4</sup> As a sensitivity test we included people living in Brussels. The results were quite similar suggesting that the problem of misclassification is limited (see also Section 4.1).

<sup>5</sup> Results can be obtained from the authors on request.

<sup>6</sup> The results remain unchanged whether we include Brussels in the sample or not. This is worth mentioning given that the population of Brussels differs from Wallonia and Flanders in terms of its share of immigrants. As immigration has increased over the last two decades mainly in Brussels and in the French-speaking municipalities, this might also have affected the schooling environment in French-speaking schools.

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