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Teacher shortage and attrition: Why do they leave?

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This article examines the professional integration of beginning teachers in French-speaking Belgium and the factors predicting an exit from the profession during the first years of their careers. The analysis of four successive cohorts of new teachers indicates that exit rates are very high during the first year but show a gradual decline afterwards. The exit rates are also much higher in secondary education than at pre-school and primary levels. According to the international literature, this research also shows that teachers with training in education are much more stable than their peers without teacher qualification. Concerning the work environment, the data indicate that the school's socio-economic level is not linked to the risk of leaving the profession. Finally, one of the main results of this study is the demonstration that over and above the influence of teachers' and schools' characteristics, a very close relationship is observed between job conditions over the first year in the profession and exit rates. These results argue for paying greater attention to the institutional conditions of career management in future research on teacher attrition and migration.

Introduction

In many parts of the world, the teaching profession seems to have become less attractive and it is possible to observe teacher shortages, sometimes as a general trend but most often concerning specific posts. The classic economic approach to labour markets defines shortage as a situation of imbalance between demand (vacant teaching positions) and supply. In the case of a regulated labour market, where credentials are required in order to teach, the supply is generally equated with graduates likely to enter the teaching profession and the main potential source of the shortage is taken to be a lack of such graduates. Nonetheless, many empirical studies, carried out mainly in the USA (Ingersoll, 2001, 2002; Boyd *et al.*, 2006; Sass *et al.*, 2012), in Australia (Buchanan *et al.*, 2013) and in the UK (White *et al.*, 2006), have shown that in these countries a significant part of the problem does not lie in the lack of graduates but in the education systems' inability to retain the teachers hired.

There is abundant data in the international literature showing that a large proportion of beginning teachers leave the profession after a few months or a few years of work experience (Ingersoll, 2002; Borman & Dowling, 2008; Sass *et al.*, 2012; Struyven & Vanthournout, 2014). According to Ingersoll (2002), for example, 11% of US teachers leave the profession during the first year and 39% over the first five years.

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These studies have also attempted to identify characteristics of the teachers and their workplaces that can be associated with a risk of an early exit from the profession. Such research often singles out the following factors: the teachers' socio-demographic features, their preparation and the specific features of their work environment.

With regards to the teachers' socio-demographic characteristics, two variables in particular have been the subject of many empirical investigations: age and gender. In terms of age, a large number of studies observe a higher exit rate among the youngest and oldest teachers (Borman & Dowling, 2008; Boyd *et al.*, 2011). In terms of gender, the results vary in relation to the education systems studied. In the USA, Strunk and Robinson (2006), for example, find no significant influence of gender, either on migration rates (changing schools) or on professional attrition rates (changing occupations). In France, by contrast, Périer (2003) observes that more men than women leave the profession during their careers.

With regards to the teachers' qualifications, the overriding factor emerging from the literature is that the teachers who have completed the most advanced studies are the most mobile. Drawing on Norwegian data, Falch and Strom (2005), for example, bring out that the teachers who have studied for the longest periods show a greater tendency towards professional mobility. The authors explain this observation by the fact that individuals with the most 'advanced' diplomas have acquired competences that make them more attractive on other job markets and allow them to negotiate their remuneration more easily within other occupational sectors.

Certain studies, in the USA and England in particular, also bring out the increased stability of teachers with training in education (Boe *et al.*, 1997; Dolton & van der Klaauw, 1999). In secondary education, several studies have evaluated the exit rate in relation to the subjects taught. The results of this research vary. Some authors (e.g. Grissmer & Kirby, 1992) indicate, on the basis of data from the state of Indiana (USA), that exit rates are higher for science and mathematics teachers. More recently, however, Ingersoll (2003) carried out a study of science and mathematics teachers, also in the USA, and stressed that while the attrition and migration rates are slightly higher for these fields, the differences observed are not statistically significant.

The academic literature also emphasises the influence of the workplace and working conditions on teacher stability. In particular, many studies show that schools with a large proportion of students coming from disadvantaged backgrounds, belonging to ethnic minorities and/or facing learning difficulties have higher rates of staff turnover. On the basis of a sample from Texan primary and secondary public schools, Hanushek *et al.* (2004) thus brought out that, regardless of seniority, teacher migration and attrition rates are highly dependent on the students' average academic achievements and the percentage of Afro-Americans and Hispano-Americans in the student body. A high success rate has a significant positive effect on the teachers' stability but they are more inclined to leave the school, or even the profession, when there is a large proportion of students from ethnic minorities. Similar trends have also been observed in several European education systems (Léger, 1981; van Zanten & Grospiron, 2001; Falch & Strom, 2005). Beyond these parameters characterising the student body, Ingersoll (2001) in particular has stressed the importance of the organisational

characteristics of teachers' working environments (administrative support, decision-making power, etc.) as key predictors of teacher attrition.

This question of occupational attrition has hardly been studied in the case of the education system in French-speaking Belgium. One notable exception is the study by Vandenberghe (2000) dealing with secondary education. Drawing on administrative records for 50,000 individuals who started teaching between 1973 and 1996, this research brings out in particular the very high exit rates during the teachers' first years in the profession: the survival rate after five years of teaching, for example, was 60% for male teachers and 58% for their female counterparts. Among the factors predicting the probability of leaving, Vandenberghe observes that the rates are the same in rural and urban areas and across provinces with sharply varying unemployment rates. Nor has the relative deterioration of pay conditions had a significant impact on the risk of exit. For Vandenberghe, non-pecuniary employment conditions seem to have a greater impact; in particular, access to a full-time teaching post radically reduces the risk of exit.

In this article, dealing specifically with the teacher labour market in French-speaking Belgium, we begin by presenting bivariate analyses dealing with the probabilities of leaving the profession during the first years of work experience. We then carry out multivariate analyses aimed at appreciating the relative weight of each of the variables selected within models simultaneously considering all the variables together. In line with the international literature, we take into account the influence of the teachers' socio-demographic characteristics, their preparation and their work environment. Over and above these factors traditionally analysed by quantitative studies on school attrition, our intention is to also take into account teachers' job conditions. Since the beginning of the 1970s, sociology of work has shown the value of distinguishing working conditions from job (or employment) conditions. While working conditions refer to the work content (What do I teach?) and environment (Where do I teach?), job conditions refer to the social status of the job: flexibility, pay, full-time equivalent worked and career opportunities. The main goal is to study the social construction of labour markets and to shed light on labour market segmentation and specific forms of hierarchy between workers (Maruani & Reynaud, 1994; Cornfield & Hodson, 2002). In the present study, job conditions will be considered through two indicators of the employment situation during the first year of service: the number of months worked and the average rate of working time during the first year. Our hypothesis here is that, other things being equal, the quality of the job conditions is also a variable affecting teacher attrition and as such—should this hypothesis be confirmed—warrants greater attention from researchers and public authorities alike.

In order to help readers understand the conditions of access and stabilisation in the teaching profession in French-speaking Belgium, Appendix A provides a short description of the training pathways and methods of career management. In it, we pay particular attention to the regulations governing teaching staff, which systematically tend to protect those with seniority and consider beginners as an adjustment variable subject to more unstable job conditions. The consequence of this regime protecting senior teachers is that the posts that can be offered to beginning teachers by the school boards are often temporary (i.e. replacements of senior teachers during parental leave or during sick leave) and/or part-time.

Method

Data

The data employed mainly comes from an administrative database used to calculate the pay of educational personnel teaching in French-speaking Belgium. This database provides monthly information about the situation of all members of the teaching staff who were remunerated between September 2005 and December 2011 for a service provided at basic (pre-school and primary) level or secondary level, whether in mainstream or special education.[1] For the purposes of this article, which is the extension of a collective research report (Delvaux *et al.*, 2013), we consider only the new teaching staff, namely teachers entering a pre-school, primary or secondary establishment for the first time between September 2005 and June 2009. This choice means that we are dealing with four successive cohorts of beginning teachers whose data we have retrieved from the original database. It should also be noted that our analysis does not include individuals who have pursued a mixed career combining teaching and another activity, such as administration.

We define exiting teachers as beginners who disappear from the database at some point and do not subsequently reappear during the observation period, namely through December 2011. This definition has two consequences. On the one hand, temporary departures are not considered as exits, even when they extend over several years. On the other, when we assess the permanent or temporary nature of the exit, the amount of time elapsed is not the same for the different cohorts of beginners, given that the database does not go beyond December 2011. The later the teachers joined the profession within the period of the study, the greater the risk of overestimating the exit rate by declaring that certain individuals have left definitively when their departure is only temporary. That said (cf. Table 1), with the exception of the risk of exit during the fifth year for the 2006/07 cohort, we have an observation period of at least 18 months after the end of the school year for all the other cohorts, which limits the risk of an overestimation bias for the exit rates.

The analysis concerns a maximum of 19,196 teachers spread over four cohorts. As Table 1 indicates, the first two cohorts (2005/06 and 2006/07) are followed over five years, the third (2007/08) over three years and the last (2008/09) over two years. This also means, as the vertical reading of the table confirms, that the probabilities of exiting during the first and second years can be measured for the four cohorts, whereas

Table 1. Cohorts and school year analysed

	Duration since entry				
Cohort	1st year (N = 19,196)	2nd year (N = 19,196)	3rd year (N = 14,501)	4th year (N = 9618)	5th year (N = 9618)
2005–2006	2005–2006	2006–2007	2007–2008	2008–2009	2009–2010
2006–2007	2006–2007	2007–2008	2008–2009	2009–2010	2010–2011
2007–2008	2007–2008	2008–2009	2009–2010		
2008–2009	2008–2009	2009–2010			

the probabilities for three years will apply to three cohorts and those for four or five years, to two cohorts.

Variables

The dependent variables used in the models presented below are systematically dichotomous variables corresponding to the risk of exit at different points of the career, after one, two, three, four or five years as beginning teachers. In fact, these figures reflect the exits from the profession during or immediately following each of the years considered. In order to make the text more readable, we will generally use the expression 'exit during' the year concerned.

Among the independent variables, a first group includes the socio-demographic variables. In addition to gender, we take into consideration the age of the teachers at the time they enter their post. This continuous variable has been recoded in four categories (18–24 years, 25–29 years, 30–39 years and 40–65 years). In the case of the multivariate analyses of basic education, however, given the limited number of beginning teachers over 30 years of age, the last two categories have been grouped together.

The teacher training variable is constructed on the basis of the individual's qualification. According to the credentials required, different categories are used for basic and secondary education. For basic education, these are: 'pre-school teacher', 'primary school teacher', 'middle school teacher' and 'others'. The secondary education categories are 'middle school teacher', 'upper secondary teacher', 'others with a teaching certification' and 'others without a teaching certification'.

This variable corresponds to the qualification held by the individual in December 2011, which is to say, the end of the observation period. Since we do not know when it was obtained, it is possible that certain beginners entered the profession without prior teacher training and that they obtained the required certification between the date they assumed their post and that of the retrieval of the data (December 2011). As a result, we may credit some individuals with diplomas they did not actually have at the time they began teaching.

With regards to the work environment, we have a socio-economic index characterising student body composition for all the schools in the education system.[2] This index, constructed by the public authorities in order to assist the schools with the most precarious student populations, permits the schools to be ranked on a scale of 1–20 (where the value 1 characterises the most disadvantaged schools). For this study, however, we have grouped the schools into four categories (of five values each).

Two variables related to job conditions are considered here: on the one hand, the number of months worked by each teacher during the first year of activity, and on the other, the average workload. To calculate the number of months of service, we include all the months when the teacher worked at least one day. For the second variable—the average workload during the first year of teaching, expressed as a percentage of full-time equivalent (FTE) employment—the percentage is established for each month worked and an average index is then calculated over all the months worked during the first year. In order to facilitate the reading of the results, these two numerical variables have been recoded into multichotomic variables.

The different variables just enumerated can all have an impact on the careers of beginning teachers but it is not certain that they exert an identical influence in the different teacher labour markets. All the schools and teachers in French-speaking Belgium cannot be considered to participate in the same labour market. There are clearly 'sub-markets'. These are essentially defined in terms of two dimensions: first, the type of post (since, for example, there is no competition between an individual with a diploma for primary school teaching and someone who has a Masters in chemistry because of their respective qualifications and the criteria for access to the different posts), and second, the geographical location (since, despite the fairly limited surface area of French-speaking Belgium, teachers living in the province of Luxembourg and in Brussels, for example, are not really in competition with each other). In our study, these two fundamental dimensions of the markets are approached through two variables: teaching level and province. We have defined two categories for the first variable: basic (pre-school and primary) level, including special education; secondary level, including special and work-linked education. The province variable includes four categories: the region of Brussels, the Belgian capital, which is highly urban; Hainaut and Liège, the two most populated provinces, which form the country's industrial heartland, and the three adjacent provinces (taken as a whole), Walloon Brabant, Namur and Luxembourg, which are less populated and more rural. However, we have not given these two dimensions the same status. Rather, we have considered the first (teaching level) as a market and systematically duplicated each of our bivariate and multivariate analyses in relation to the level concerned. In the case of the second (geographical location of the markets), we limit ourselves here to considering it as an additional independent variable.

Analyses

Methodological options have also been taken with regards to the grouping of years and cohorts. These choices are based on several findings brought to light in Table 2. This table shows the exit rates for four successive cohorts of beginning teachers during their first years in the profession. The data presented in the table clearly brings out three phenomena. First, there are significant differences between the two markets of basic and secondary education. Regardless of the cohort and the year of service, the exit rates are higher in secondary education.[3] If we consider all the first five years of teaching, the global exit rate is clearly higher in secondary education. In this market, 44.9% of the teachers in the first two cohorts leave the profession within five years, against 24.7% of their colleagues who are working in basic education.[4] This is especially the case during the first year, when the secondary education rates are more than twice as high as those of basic education. Second, in basic and secondary education alike, the exits from the profession mainly occur during the first year. Thus, 25.1% of the teachers beginning in secondary education during the 2005/06 school year, for example, had left permanently by the end of that year. The annual exit rates subsequently show a sharp decrease. At secondary level, the total proportion of leavers over the second through fifth years is thus lower than that of the first year. This is not the case in basic education, however, where the exit rate between the second and fifth years is slightly higher than that during the first year.

Table 2. Annual exit rates of beginning teachers

	1st year	2nd year	3rd year	4th year	5th year	*N*
Pre-school and primary schools						
2005–2006	9.7%	5.6%	3.3%	1.9%	1.9%	1603
2006–2007	11.8%	4.8%	3.4%	2.9%	*4.2%*	1572
2007–2008	11.0%	4.0%	3.2%			1666
2008–2009	11.3%	*5.7%*				1570
Secondary schools						
2005–2006	25.1%	7.6%	4.7%	3.5%	2.3%	2716
2006–2007	28.9%	7.1%	3.8%	3.3%	*3.5%*	2636
2007–2008	25.4%	8.4%	*5.7%*			2679
2008–2009	27.6%	*9.7%*				2663

We also observe that the rates vary little by cohort. This relative stability of the rates, like the slight fluctuation in the number of teachers from one cohort to another and the sharp distinction between exit rates for the first year and subsequent years, led us to carry out all the bivariate analyses with three different exit rates (first year, second–fifth years, first–fifth years) and calculate these rates for all the cohorts concerned (four cohorts for the first-year exit rates; the first two cohorts for the second and third rates).

After conducting a series of bivariate analyses of teacher exit rates on this basis, we used logistic regression analyses in order to bring out the relationships between the independent variables as a whole and the exit rates.

Results

Bivariate analyses

The profile of the professional trajectories does not only vary in relation to teaching levels. As we will now show, it is also sensitive to several of the independent variables introduced into our analyses. In order to demonstrate this, we will successively examine each of them for the two teaching levels (basic and secondary).

The two individual variables (age and gender) both have a certain impact. When we consider the variations in relation to the teachers' age at the time they entered the profession, we observe (cf. Figure 1) that the youngest teachers are by far the most stable and that this is the case during the first year and the following years alike. The differences between the other three age groups are less clear-cut and the order between them varies depending on the two teaching levels.

The differences in relation to gender (cf. Figure 2) are less pronounced but female teachers systematically tend to be more stable than the males, in terms of the exit rate calculated after the first year or after five years, whether at basic or secondary level.

Concerning the teachers' formal preparation, our analyses bring out major differences in relation to the qualifications they hold. A first distinction operates between those with a teaching certificate and those who do not have this professional training. The data in Figure 3 shows that the difference between the two groups appears

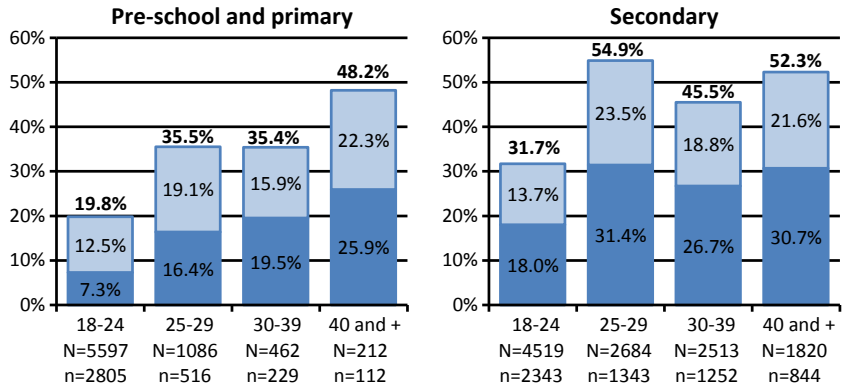

Figure 1. Exit rates depending on the age of beginning teachers
Note: The percentages refers to exit rates during the first year, during years 2–5 and during all 5 years. N is the size of the four cohorts used to calculate the exit rates during the first year; n is the size of the two cohorts used to calculate the other two exit rates.

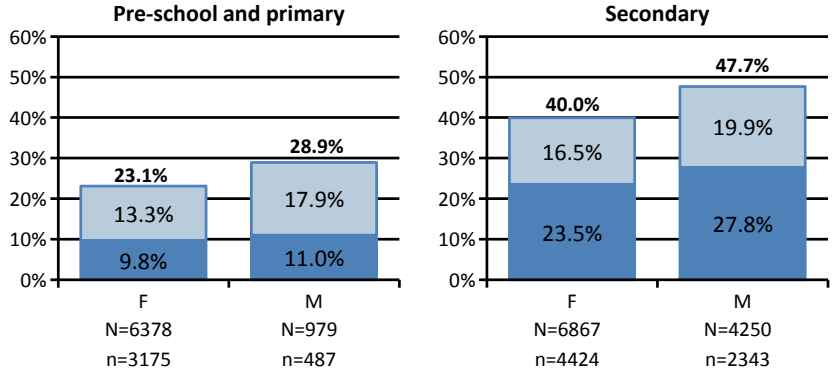

Figure 2. Exit rates depending on the gender of beginning teachers
Note: As per Figure 1.

throughout the observation period and on both teaching levels, to the disadvantage of those without a teaching certificate. The sharpest differences concern the first year and are more pronounced at primary level than secondary, but they are also visible during the following years (and more unevenly in secondary education). More in-depth analyses have shown that there are also substantial differences among those holding a teaching certificate as well: primary school teachers are the most stable (exit rate of 4.5% after one year and 13.9% after five years) while those with university diplomas—i.e. upper secondary teachers—are the most unstable (exit rate of 14% after one year and 31.5% after five years).

The following analyses bear on exit-rate variations in relation to the teachers' workplace. The study of the relationship between the school's socio-economic index (at the time of entry into the profession) and the probabilities of leaving is particularly revealing in this respect (Figure 4). The analysis demonstrates that beginners who started teaching in a very disadvantaged school (1st quartile) do not show greater

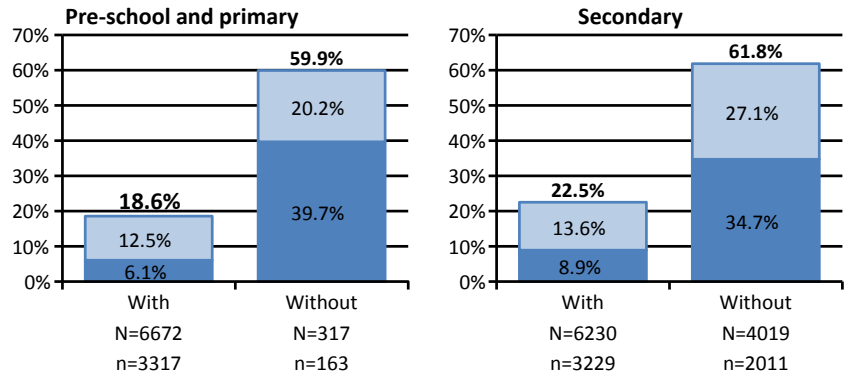

Figure 3. Exit rates depending on the teaching or non-teaching nature of the qualification
Note: As per Figure 1.

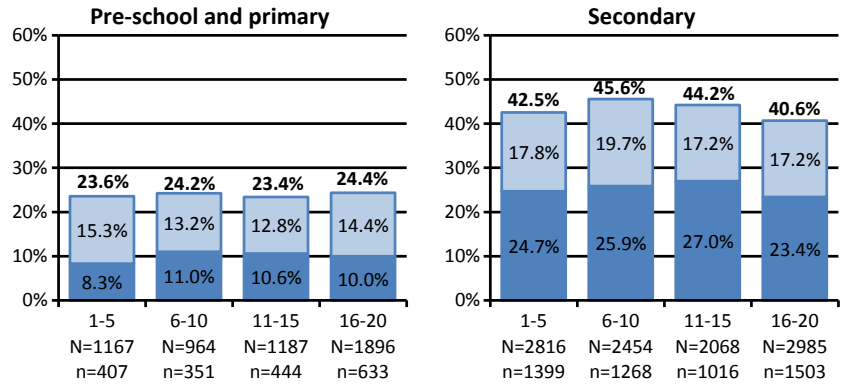

Figure 4. Exit rates depending on the first school's socio-economic index
Note: As per Figure 1.

probabilities of leaving than their colleagues teaching in more well-to-do schools. On the contrary, their probability of leaving is slightly lower, in particular with regards to the first-year data.

We have also observed the teachers' exit rates in relation to their job conditions at the time they entered the profession. As Figure 5 shows, considerable differences appear in relation to the number of months worked during the first year. Teachers who have worked less than seven months in the first year and even more so teachers who have worked less than four months during this year show a much greater probability of leaving. These differences can be observed for both basic and secondary education.

Similar results emerge when we consider another variable related to job conditions: the average percentage of working time (compared with a full-time post) during the first year (weighted by the number of months worked). The more the working time approaches that of a full-time post, the lower the exit rates, and this is the case not only for the first year but in most cases, during the next four years (cf. Figure 6).

The bivariate analyses we have just presented show that, with rare exceptions, the linkages between independent variables and exit rates are of the same nature in basic

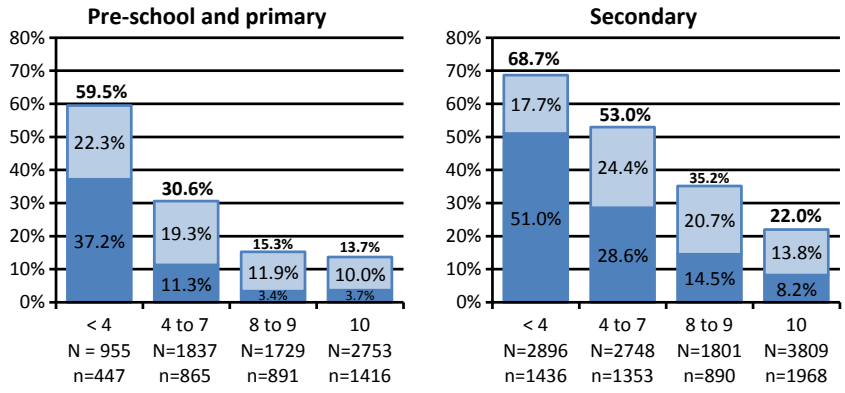

Figure 5. Exit rates depending on the number of months worked during the first year
Note: As per Figure 1.

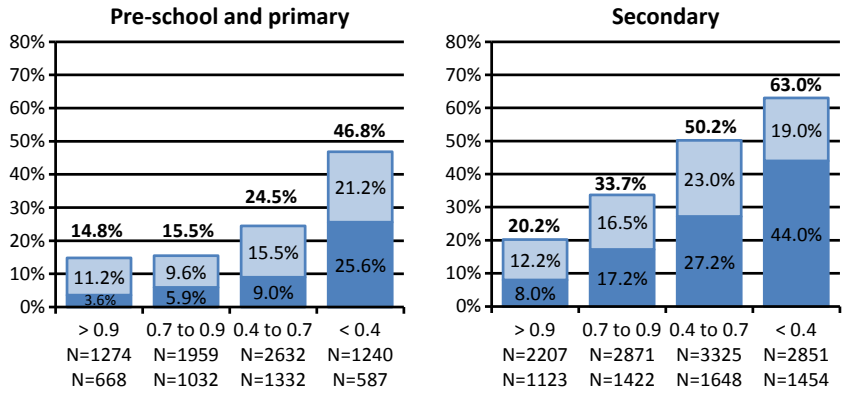

Figure 6. Exit rates depending on the percentage of FTE during the working months of the first year
Note: As per Figure 1.

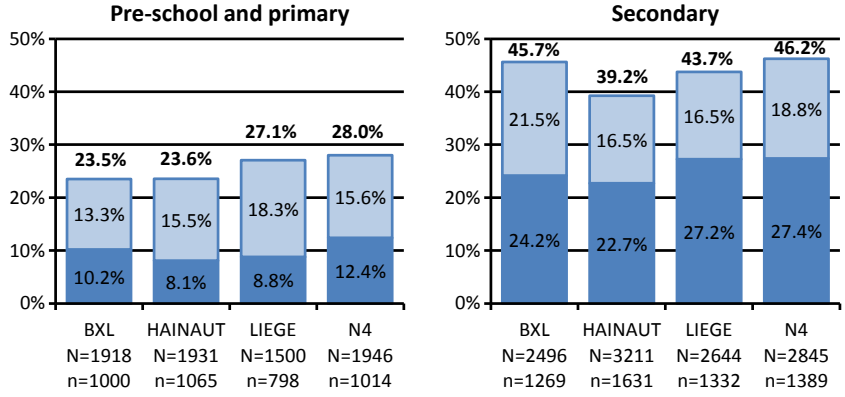

Figure 7. Exit rates depending on the province related to the teacher's first job
Note: As per Figure 1.

and secondary education markets, even if the intensity of the relationship sometimes varies from one market to the other. It is likely that the findings would be similar if, instead of carrying out the analysis for two markets, we dealt with eight (by considering that each of the two markets studied is divided into four provincial territories). As indicated above, we have not carried out such an analysis but have treated these territories as a complementary independent variable. Cross-tabulating territories and exit rates brings out variations in relation to the provinces (cf. Figure 7) but these territorial variations are smaller than several of those previously observed in function of the other variables.

Multivariate analyses

In this section we propose a simultaneous treatment of the influence of each of the variables analysed on the exit risk for beginning teachers. Once again, these analyses will be presented separately in relation to the two labour markets distinguished above: basic and secondary education. Since we are attempting to predict the probability of the occurrence of one event (leaving the profession) rather than another (remaining in the profession), we will use a logistical regression model. Given the high exit rate during the first year in the profession, we have systematically presented a first model aimed at predicting the risk of exit during the first year and a second model intended to predict the potential exit between the second and fifth years. This second model therefore does not include the teachers who left the profession during the first year and only deals with the two cohorts, which allows us to conduct an analysis over five years. For each model, we consider three groups of variables: (1) three individual variables (qualification, gender and age); (2) two variables related to job conditions in the first year of work (number of months of service and average working time over the months worked); and (3) one variable concerning the labour market in which they began their careers (the province of the school where they entered the profession). In fact, these models initially included a variable related to the socio-economic status of the school but we subsequently eliminated it after observing a non-significant relationship with the probability of leaving. We decided to remove this variable because the high level of missing data for this indicator caused us to exclude many individuals. It should also be noted that because of the greater ease of interpretation with an odds ratio greater than 1, we have, wherever possible, chosen as our reference category (for the predictive variables) the categories corresponding to the most stable group.

Basic (pre-school and primary) education. The results for basic education are presented in Table 3. For the first model, the odds ratio values show that in terms of qualifications, only one category stands out significantly from primary school teachers: that of 'Others', which includes individuals with disparate training backgrounds recruited in local contexts of teacher shortages.

This result should be kept in perspective, however, to the extent that the 'Others' category is limited to 557 individuals in the first model (8% of the population) and 212 individuals in the second (6.7% of the population). Furthermore, men leave the profession slightly more often than women but this difference is modest and non-sig-

Table 3. Multivariate analyses for pre-school and primary schools

	Exits the 1st year (4 cohorts, $N = 6908$)		Exits between 2nd and 5th year (2 cohorts, $N = 3174$)	
Individual variables	*N*	Odd ratio	*N*	Odd ratio
Qualification (reference = Primary school teacher)	3901		1899	
Pre-school teacher	1933	0.93	844	1.59***
Middle school teacher	517	1.22	219	0.96
Others	557	4.05***	212	2.13***
Gender (reference = woman)	6005		2770	
Man	903	1.06	404	1.54**
Age (reference = 18–24 years old)	5347		2515	
25–29 years old	991	1.27	408	1.29
30–65 years old	570	0.86	251	1.20
Variables related to job conditions (first year)				
Number of months (reference = 10 months)	2661		1326	
8 or 9 months	1683	0.94	841	1.07
Between 4 and 7 months	1741	2.75***	742	1.89***
Maximum 3 months	823	8.49***	265	2.88***
FTE (reference = full time)	1260		618	
0.71–0.90 FTE	2000	1.41	947	0.78
0.41–0.70 FTE	2511	1.66*	1180	1.18
0–0.40 FTE	1137	2.95***	429	1.68**
Variable related to the market (entry)				
Province (reference = Hainaut)	1847		853	
Walloon Brabant–Namur–Luxembourg (N4)	1848	1.29	831	1.45**
Brussels	1770	1.02	817	1.00
Liege	1443	0.75	673	1.22
R^2 of Nagelkerke		0.256		0.106

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

nificant in the first model. Similarly, the differences between age groups are reduced and non-significant.

The major result of this analysis concerns the relationship between job conditions and the probability of leaving the profession during the first year. The 'number of months of work' variable has considerable influence on the risk of leaving, which is e.g. 8.5 times higher for those who worked a maximum of three months during the school year compared with those who worked during the ten months of the school year ($p < 0.001$). New teachers who have, on the average, worked less than 40% of full time during their first months of employment have a probability of leaving that is 2.95 times higher ($p < 0.001$) than those who worked full time during their period of service. These results confirm the importance of the variables related to job conditions, which remain quite influential in this multivariate model.

The second model brings out the relationship between the same predictive variables and the probability of leaving the profession between the second and fifth years inclusive. It should be noted first of all that, for most variables, the 'influence' is weaker than in the first model. This observation is clearly confirmed if we look at the

Table 4. Multivariate analyses for secondary schools

	Exits the 1st year (4 cohorts, $N = 9905$)		Exits between 2nd and 5th year (2 cohorts, $N = 4041$)	
Individual variables	*N*	Odd ratio	*N*	Odd ratio
Qualification (reference = Middle school teachers)	2491		1161	
Upper secondary school teachers	1868	1.70***	880	1.59***
Others with teaching certification	1645	1.19	797	1.05
Others without teaching certification	3901	5.16***	1203	3.42***
Gender (reference = woman)	6103		2470	
Man	3802	1.02	1571	1.17
Age (reference = 30–39 years old)	2115		867	
18–24 years old	4065	1.31*	1823	1.00
25–29 years old	2286	1.50*	832	1.47***
40–65 years old	1439	1.02	519	1.04
Variables related to the job conditions (first year)				
Number of months (reference = 10 months)	3584		1743	
8 or 9 months	1646	1.29*	729	1.31*
Between 4 and 7 months	2397	2.56***	905	1.68***
Maximum 3 months	2278	4.85***	664	1.73***
FTE (référence = full time)	2072		996	
0.71–0.90 FTE	2605	1.46***	1126	1.41**
0.41–0.70 FTE	2913	1.78***	1143	2.13***
0–0.40 FTE	2315	2.69***	776	2.14***
Variables related to the market (entry)				
Province (reference = Hainaut)	2823		1224	
Walloon Brabant–Namur–Luxembourg (N4)	2489	1.27**	963	1.18
Brussels	2235	1.24**	914	1.45***
Liège	2358	1.13	940	1.06
R^2 of Nagelkerke		0.285		0.161

Note: *$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

values of the Nagelkerke R^2, which indicates the model's explanatory value: it goes from 0.256 in the first model to 0.106. This decrease leads us to conclude that the variables used in the model are much less associated with the probability of leaving the profession between the second and fifth years than that of leaving during the first year. If we take a closer look at the predictive variables, we observe that, irrespective of gender, the values and categories that stand out the most are again the 'Other' credential-holders and the teachers whose job conditions are the most unfavourable during the first year. This last result highlights the fact that poor job conditions during the first year have an influence not only on teacher attrition during that year but also, albeit more modestly, on the subsequent risk of leaving the profession.

In the two models presented in Table 3, the territorial dimension is also taken into account through the 'Provinces' variable. What emerges in particular is that, other things being equal, the exit rates between the second and fifth year are highest in the three rural provinces (Walloon Brabant, Namur and Luxembourg). We will attempt to provide an interpretation of this difference in the discussion below.

Secondary education. The results for secondary education are presented in Table 4. If we look at the overall pattern of the first model, it is fairly similar to that of basic education. Three variables are primarily associated with the risk of leaving during the first year: the qualification, the number of months worked and the monthly working time. With regards to the qualification held, in comparison with the middle school teachers, we find that the upper secondary teachers are more unstable (OR = 1.7; $p < 0.001$), but the most pronounced difference applies to teachers with no formal preparation, whose risk of leaving is more than five times greater (OR = 5.16; $p < 0.001$). Unlike basic education, these teachers without training in education are especially numerous in secondary education (39% of beginning teachers).

The results also show that, even when we take the differences in qualifications into account, the two job conditions variables remain heavily correlated with exit rates: the odds ratios increase as job conditions become more unfavourable. The predictive power of this first model is once again fairly high, with a Nagelkerke R^2 of 0.285.

When we consider the second model, one variable remains highly predictive (albeit less so than in the previous model): the qualification. Once again, there is a high risk of exit for upper secondary teachers (OR = 1.59; $p < 0.001$), and especially teachers without specific training in education (OR = 3.42; $p < 0.001$). Job conditions during the first year also remain associated with the risk of leaving between the second and fifth years, although the influence is somewhat less. As is the case with basic education, the explanatory capacity of this second model is much less satisfactory than with regards to the risk of leaving during the first year.

In the two secondary education models, we also observe differences in relation to the provinces. The three most rural provinces (Walloon Brabant, Namur and Luxembourg) and Brussels show the highest exit rates.

Discussion

The analysis of the attrition of beginning teachers has been the subject of recent studies in several countries worldwide (Ingersoll, 2001, 2002; Boyd *et al.*, 2006; Sass *et al.*, 2012; Buchanan *et al.*, 2013; Lindqvist *et al.*, 2014). What emerges most often is that the exit rates of the teachers are very high during the first years of their activity and that they are tied in particular to the teachers' qualifications and the characteristics of the schools where they work.

With regards to the qualification, our analyses show that in French-speaking Belgium, as it has also been observed in the USA (Borman & Dowling, 2008), the credential is a key variable associated with the risk of leaving the profession. On the one hand, it is quite clear that the teachers with accredited teacher preparation are much more stable than their peers who do not have this preparation. On the other hand, among the teachers with this training, we have also found that those with a Masters degree are on the average the least stable, which can probably be explained by the fact that it is easier for them to obtain recognition for their diplomas in other labour markets.

In terms of the work environment, we have analysed the relationship between the socio-economic level of the student population in the school where the teacher began his or her career and the exit probability. Both the bivariate and multivariate analyses

show that, overall, the school's socio-economic level is not linked to the risk of leaving the profession. Although this unexpected result, which contrasts with findings in the international literature (cf. Hanushek *et al.*, 2004; Guarino *et al.*, 2006), calls for additional analyses, we can already advance certain interpretations. We would suggest, for one thing, that it is necessary to consider the fact that a majority of the schools with disadvantaged student populations are located in geographic areas with high demographic growth (and thus more likely to offer new teachers stable jobs). For another, it is also necessary to take into account the regulations governing school systems in Belgium as compared with those in other parts of the world. The French-speaking Belgian education system was historically very decentralised (Dupriez & Maroy, 2003), and the recourse to a 'national' curriculum, formal standards and standardised external exams is quite recent (over the last ten years). The concept of accountability is just emerging in this system and has nothing to do with the high-stakes accountability tests found in several states in the USA (Carnoy & Loeb, 2002). This decentralised environment, where pressure on the performances of students and schools remains modest (albeit increasing) encourages the development of diverse ways of conceiving and applying the schools' educational programmes (Dupriez & Cornet, 2005; Ball & Maroy, 2009). In this context, we can advance the hypothesis of varied professional identities, which can flourish in such a variety of schools. Working in a socially precarious context can thus represent a positive choice for some teachers, in the same way that others would prefer schools that are more privileged in academic and/or social terms. Working in a more disadvantaged environment perhaps permits the development of a conception of the profession where the interpersonal and social aspects assume greater importance than in schools that are more socially and culturally privileged and where the learning issues predominate. Such a hypothesis calls for further research based notably on interviews with teachers.

An important finding of this study, moreover, has to do with the influence of job conditions rather than working conditions on the exit rates. Here, the first results of the bivariate analysis speak for themselves: the exit rates, during the first year, for example, are nearly six to ten times higher for teachers working less than four months in the course of their first year compared with those who worked during the ten months of the school year. It might be thought that these poor job conditions were faced above all by teachers without specific teacher training and the required certification, and that these conditions ultimately represented a mediating variable between the qualification and the exit risk. The multivariate analyses carried out indicate quite clearly, however, that this is not the case: in all the models tested, for basic and secondary education alike, both the qualification and job conditions emerge as predictive variables for the probability of leaving the profession. In other words, the teachers without a teaching certification are in fact the most vulnerable to the risk of an early exit, but with equal qualifications, the influence of job conditions on the probability of leaving remains quite important.

Last of all, by repeating our analyses for basic and secondary education, we have been able to grasp different situations and relationships between variables that sometimes differ across these two markets. In particular, the diploma has a greater influence on exit rates in secondary education, which can largely be explained by the much greater presence of teachers lacking the required certification and recruited in a con-

text of personnel shortages. Such teachers present the greatest risk of leaving, even when their working conditions are controlled. In a more basic way, our analyses have also brought to light differences in exit rates in relation to the provinces concerned. These differences are not easily interpreted, however; they could potentially depend as much on the relative characteristics of the teacher labour market (e.g. given the demographic growth, there are more stable jobs for beginning teachers in Brussels) than on other features distinguishing the provinces (e.g. lower unemployment rates in the more rural provinces), but it is above all the theoretical status of this variable that merits further exploration. In our study, we have considered it as one explanatory variable among others, but in fact we believe that it deserves the same status as the 'teaching level' variable. Cross-tabulating the two would lead us to study eight distinct markets. This is probably the only way of understanding the way particular situations are combined within each province and the effects these have on the teachers' integration into the profession. It is likely, for example, that the very atypical situation of Brussels, which simultaneously combines better job conditions and the greatest concentration of socio-economically disadvantaged schools, can only be understood by distinguishing this unique market from the other provinces. Such an analysis has not yet been carried out and would represent a profitable extension of the present study.

Beyond the analyses presented in this article, we would also point out that our findings on teachers' job conditions argue for paying greater attention to the institutional conditions of career management in future national and international research on teacher attrition and migration. Most existing studies on this theme have dealt with a single educational system, or at least a single country, and it is probably the limited variations observed in the methods of career management that have led researchers to accord little importance to this issue. It nonetheless remains a gap to be filled, both empirically and theoretically. Indeed, the question of teacher attrition cannot be analysed solely through the prism of individuals' characteristics and those of their workplaces. It is clear that the policies of recruiting and posting teachers and their possible job security (prospects for a full-time and permanent position) have an influence on their professional trajectories and, more broadly, on the status and attractiveness of the profession. Comparing the prospects of experienced teachers and beginners is quite instructive in this respect (Delvaux *et al.*, 2013). In our view, it is a source of particularly fruitful research, notably in terms of a comparative approach to educational policies.

One limitation of the research presented in this article is obviously the exclusive reliance on quantitative material stemming from administrative databases. This has meant that many aspects of the individuals' teaching experiences and their perceptions of the profession, as well as the representations and practices of their employers, could not be addressed. However, it is certain that attrition is also tied to the teaching experience (cf. in particular Cochran-Smith *et al.*, 2012) and the way beginners derive satisfaction from their work and manage, or not, by themselves or with support from their peers (Devos *et al.*, 2012), to overcome the difficulties inherent in entering the profession.

That said, it should be noted, in terms of intervention strategies, that this administrative data leads us to draw the attention of decision-makers and educational system officials to approaches other than those that are generally proposed. In response to

the problems of teacher attrition and shortages, the existing literature most often suggests the need for greater attentiveness to the beginning teachers' entry into the profession (Hobson *et al*., 2009; Avalos, 2011) through, for example, mentoring arrangements and supportive feedback for newcomers in their school environment (Beltman *et al*., 2011). Without contesting the relevance of such arguments, our data encourages us to indicate, on the one hand, that such mentoring arrangements are probably most important for teachers who are not prepared for the profession (given their lack of formal training and their much higher propensity to leave) and on the other, that an in-depth analysis of the initial job conditions of the new teachers is just as important, even if it raises questions which are much more sensitive in political terms.

NOTES

[1] This administrative database has the great advantage of including longitudinal data on all teachers who began their career between 2005 and 2009 and the characteristics of the latter during this period. By contrast, this database does not include more qualitative information such as conditions of teachers' recruitment, conditions of their professional insertion or their relationships with students and colleagues.

[2] For a certain number of teachers, the database did not indicate the first school where they taught and this did not allow us to assign them the socio-economic index corresponding to that school.

[3] With one exception, since the fifth-year exit rate for the 2006/07 cohort is higher in basic education.

[4] The exit rate calculated in secondary education is a little higher than the average rate of 41% calculated by Vandenberghe (2000) on the cohorts 1973–1996.

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Appendix A

The preparation and management of teaching careers in French-speaking Belgium

In French-speaking Belgium, two main training pathways coexist: colleges of higher education (Hautes Écoles) and universities. The former offer different programmes, called Bachelors, leading to teacher certification at pre-school, primary school and middle school levels. These post-secondary educational programmes, which last three years, lead directly to teaching posts in basic (pre-school or primary) or lower secondary education. They combine theory courses aimed at transmitting subject-based and pedagogical competences with practice teaching in the schools. The universities train certified upper secondary school teachers. In order to obtain the certification required for teaching at that level (upper secondary), candidates must have a Masters degree, usually obtained after five years of university studies in a specific field and a complementary, university-level preparation for teaching (the secondary school *agrégation*, or qualification). A third training pathway concerns a minority of teachers: it permits individuals who have already completed studies in a given subject area to pursue teacher preparation at night school in order to obtain their teaching certification.

Persons holding one of these three teaching certificates benefit from priority access and greater stability, as well as pay-scale advantages, but given the scarcity of teachers for certain posts, individuals without educational diplomas can also enter the profession.

In order to work as teachers, candidates have to apply to the school board of their choice. These boards correspond to either the central political authority (the Wallonia–Brussels Federation) or a legal entity under public law (municipalities or provinces) or private law (organisations or religious congregations for the most part). These boards, which administer one or more schools, are relatively independent with regards to the recruitment of teachers and the choice of teaching methods and curricula, as well as their own internal organisation. The schools run by boards with the same legal status are brought together in a single teaching network, which means that the education system is composed of three networks: the public network, organised by the Wallonia–Brussels Federation and composed of a single board; the public grant-aided network and the private grant-aided network. Each network has its own regulatory framework for the career management of teaching staff; this covers both recruitment procedures and job stabilisation processes leading to permanent appointment. The three networks are quite similar, however, and systematically protect the most senior teachers and their job status. Regardless of their network or school board, moreover, all teachers are paid directly by the public authority—the Wallonia–Brussels Federation—according to a single pay scale. Remunerations vary in relation to the number of years of seniority and the certification required for the post occupied (i.e. secondary school teachers with a Masters degree receive higher salaries than Bachelors or individuals without formal teaching preparation).