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Bachelor thesis

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The salary level of teachers in the Czech Republic and its impacts

Bachelor thesis

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Abstract

The aim of the present paper is to examine the salary level of teachers in the Czech Republic and its possible impacts on the teaching workforce.

It has been shown that teacher salaries are substantially lower than salaries of similarly educated workers in the Czech Republic and are among the lowest in the European Union. Because of the strong link between salary level and profession's attractiveness to young graduates, there have been concerns about low interest in the teaching profession and the high dropout rate for young teachers.

Using most up-to-date data available, the paper shows that there has been positive development in teacher salaries in recent years, but that the raise is of a similar scale as that in other areas. The paper builds up an analysis of the dropout rate for young teachers based on data on the teaching workforce.

The paper finds that the dropout rate is very significant and may result in teacher shortages in the near future. The current data on teacher salaries highlights the importance of their improvement as a major factor of change in order to increase the attractiveness of the teaching profession.

Abstrakt

Tato práce se věnuje výši platů učitelů v České republice a jejího možného dopadu na charakteristiku a složení pedagogického sboru.

Výše platů učitelů patří v posledních letech mezi často diskutované téma. Platy českých učitelů jsou v relativním srovnání podstatně nižší než platy obdobně vzdělaných pracovníků v České republice a patří mezi ty nejnižší v Evropské unii.

Vzhledem k silnému vztahu mezi výší platu a atraktivitě povolání zejména mezi mladými absolventy se vyskytly obavy z nízkého zájmu o učitelskou profesi a vysokého počtu mladých učitelů, kteří z profese odcházejí během prvních pár let.

S využitím nejaktuálnějších údajů práce ukazuje, že v posledních letech došlo k pozitivnímu vývoji platů učitelů, ale podobný růst byl zaznamenán i v ostatních oblastech pracovního trhu. Práce přináší analýzu míry dropoutu mladých učitelů tzn. počtu učitelů, kteří odchází z profese během několika prvních let po nastoupení.

Výsledky bakalářské práce ukazují, že míra dropoutu je velmi vysoká a v blízké budoucnosti může vést k nedostatku učitelů. Současné údaje o platovém ohodnocení českých učitelů upozorňují na nezbytnost jeho navýšení, které je považováno za nejdůležitější faktor ovlivňující atraktivitu učitelské profese.

Klíčová slova

Plat, školství, ekonomický status učitele, pedagogická pracovní síla, kariérní volba, dropout

Keywords

Salary, education system, economic status of teacher, teaching workforce, career choice, dropout rate

Declaration of Authorship

1. The author hereby declares that he compiled this thesis independently, using only the listed resources and literature.

2. The author hereby declares that all the sources and literature used have been properly cited.

3. The author hereby declares that the thesis has not been used to obtain a different or the same degree.

Prague, May 11, 2018 Kateřina Kinzlová

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Firstly, I am grateful to my supervisor Mgr. Barbara Pertold-Gebická for her guidance, constant supervision and kindly help without which it would not have been possible for me to write this thesis.

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Institute of Economic Studies
Bachelor thesis proposal

Research question and motivation

I am going to study the salary level of teachers in the Czech Republic in comparison with the national average salary level and the average salary level of Czech population with tertiary education. Because the salary level of teachers is considered inadequate, I am going to show some of the impacts such as decreasing numbers of teachers in our society, an increase in the average age of teachers, lack of teachers in the Czech Republic etc.

I will demonstrate the decision of an individual for not choosing this field as his career and offer solutions to this problem. It is very important to bring attention to this specific topic because education is one of the most important factors of social development as well as economic one. Decreasing numbers of teachers and their quality could have heavy impacts on the education in the Czech Republic.

Contribution

My thesis should shed more light on the problem of diminishing number of teachers and their quality in the Czech Republic. It should provide a different view on the problem focusing on the opportunity cost of being a teacher and compare the situation in the Czech Republic with other European countries. It should explain why the teaching profession is not considered as lucrative and therefore end up being chosen by increasingly smaller proportions of (smart) students.

The thesis should bring attention to this problem and bring the subject matter to the public.

Methodology

Figures and statistics published by the Czech Statistical Office are going to show the decreasing trend in the number of teachers, the pay gap between women and men, the gender and the age structure of teachers, etc. Publications by OECD and Eurostat will be used in order to compare other European countries with the Czech Republic.

Literature focusing on the issue of occupational choice allow for demonstrating the occupational choice of an individual in the Czech Republic. Even though the salary is considered as a primary deciding factor for most young adults, there are also other

factors such as social status, job outlook, future prospect and many others that are taken in consideration while deciding on the future career.
Possible solutions to the problem of this thesis would be shown by looking at the characteristics of the most successful education systems and defining the changes that have been made in order to improve those education systems.

Outline

1. Introduction
2. Current situation
(a) The salary level of teachers
(b) The number of teachers
(c) Teacher sex imbalance ratio
(d) The age structure of teachers
3. Comparison of the situation in the Czech Republic with other European countries
4. Occupational choice
(a) Salary comparison of being a teacher with the rest of the population with tertiary education
(b) Gender pay gap
(c) Teacher's social status relative to other professions
5. Discussion and possible solutions
6. Conclusion

Main literature

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Contents

Introduction

„Let us remember: One book, one pen, one child, and one teacher can change the world. "

Malala Yousafzai

Teachers are a very important part of our lives. Apart from parents, they are the main source of knowledge and values for children. Teachers shape the future of students, and their impact makes them one of the most influential and powerful forces for quality in education. Declining prestige of the profession and resulting staff shortages constitute a challenge in many EU countries, holding back the quality of school education. The issue of the quality of the Czech compulsory education system and the quality of educational outcomes is often discussed by the public in the Czech Republic. This bachelor thesis adds a voice to this discussion by analysing the consequences of teacher salary levels in the Czech Republic.

Even though a considerable amount of literature has been published on the salary level of teachers, this bachelor thesis approaches the topic from a different perspective. This thesis focuses on the salary level of Czech teachers and its impacts on the composition of the teaching workforce in the Czech Republic. Secondly, the thesis examines the dropout rate for young teachers defined as the percentage or proportion of young teachers leaving the teaching profession within the first years of being a teacher.

Currently, there are no data available on the dropout rate for young teachers in the Czech Republic, and therefore, the thesis seeks to introduce the dropout rate analysis to obtain data which will help to address these research gaps.

The importance of teachers of all educational levels is recognised by a growing body of literature, but a special focus is put on teachers in basic and in secondary schools because of their unique role in education systems. Also, the scope of this thesis does not allow to analyse the status of teachers at all levels of the educational system, nor to address all issues relating to the performance of the teaching profession. For these reasons, this thesis focuses on the position of teachers in basic schools (primary and lower secondary level education) and secondary schools. The work is based on quantitative research. The salary level and the dropout rate are examined using the

quantitative methods, such as the method of quantitative data analysis, the method of descriptive statistic and the comparative method.

The thesis is organised in the following way. The first part of the paper provides the literature review on the teaching profession. Whilst many studies focusing on the teaching profession have been published in English speaking countries, a systematic understanding of how the salary level and other factors contribute to attracting and retaining teachers is still lacking in Czech literature. Little is known about teacher dropout in the Czech Republic, and it is not clear what factors play a crucial role in leaving the profession. However, the salary level is considered one of the major predictors of why young graduates leave their first job within the first years.

The second part presents an overview of the salary level of teachers and then focuses on salary comparisons of Czech teachers to other professions within the domestic market. Additionally, this part of the paper is devoted to a profile of the teaching workforce in the Czech Republic and to selected problems related to the composition of the teaching workforce in the Czech Republic. Comparison with OECD countries is provided to provide a better understanding of the presented issues.

The third part of the thesis investigates attrition among beginning teachers. No studies have been found which investigate the dropout rate and therefore, the objective of the third chapter is to at least partly amend this situation and to shed more light on the dropout rate issue by presenting the teacher dropout analysis- Surprisingly, reasons for decision for leaving the teaching profession career have not been closely examined in the Czech literature. Therefore, this chapter additionally presents information about employee turnover in teaching from other countries in order to address possible reasons for the dropout rate for young teachers in the Czech Republic.

In the last part of this thesis, conclusions are drawn, and recommendations are made based on the findings of this study. Limitations of the current analysis are discussed, and their implications for future research are also presented.

1. Literature Overview

This chapter introduces the background and states the research problem of the thesis.

1.1 Literature on the Teaching Profession

Worldwide, a large and growing body of literature has investigated the teaching profession from different perspectives. In recent decades, studies in other countries have focused on teachers in terms of various characteristics (e.g., teacher effectiveness, teacher quality, teacher education, teacher recruitment and retention, teacher shortages). However, there is a relatively small body of literature that is concerned with the teaching profession in the Czech Republic. During the last years, many media articles have been written about insufficient teacher salaries and the shortage of teachers, but few writers have been able to draw on any systematic research into the complex situation of teachers. At present, the main organisation focusing on the situation in the Czech Republic is the Institute for Democracy and Economic Analysis (IDEA). IDEA has published several studies analysing the salary level of Czech teachers, mainly at primary schools. Münich, an author of many IDEA studies, mainly provides statistics about salary levels of Czech primary school teachers, but he also discusses the attractivity of the teaching profession. His study (Münich, 2017) also mentions the age structure of teachers in the Czech Republic and the fact that many young teachers quickly leave the profession.

It should be the goal of a compulsory system to provide high-quality education to every student. Teachers form the core of a school system, and the impact of teacher's quality on the results of students is highlighted in a great number of significant studies. According to Hanushek (1992), in a single academic year the difference between student performance led by a good teacher and student performance led by a bad one might be more than one full year of standardized achievement. His findings also support the role of excellent teachers and their permanent benefits to students. Sanders and Rivers (1996) found that fifth-grade pupils' performance and their achievements are influenced by the quality of teaching they experienced in the third grade. Schools and therefore teachers are considered the most important factor in students' achievement by many other authors (Rowan, Correnti and Miller, 2002; Rockoff, 2004; Rivkin, Hanushek and Kain, 2005). Even one of the largest pieces of evidence-based research

on the key factors in improving learning, an extensive synthesis of over 800 meta-analyses relating to achievement by Hattie (2009), supports the finding that teachers are the most important school-related factor affecting student achievement.

Nevertheless, the social importance of the teaching occupation is not a sufficient incentive for attracting high-quality graduates in the Czech Republic. It has been widely disclosed that adolescents have lost interest in choosing teaching as a profession. According to Cedefop (2016), Czech secondary school graduates who did not succeed in entry exams for their chosen university, consider studying at a pedagogical faculty as a rescue choice. Moreover, the majority of high school students thinking about becoming a teacher are among below-median-performing students (Münich, 2017).

Choosing to become a teacher is the result of a series of integrated decisions rather than the result of a single decision. Worldwide, there have been attempts to identify the factors influencing individuals in choosing this career path. In studies on the motivations for becoming a teacher, it has been pointed out that many teachers chose the teaching profession because they wished to work with children or teaching was their passion (Hayes, 1990; Stiegelbauer, 1992; OECD, 2005; Charalambos, 2017). So far, very little attention has been paid to the reasons for becoming a teacher in the Czech literature.

Apart from the patterns governing the entry of individuals into teaching, studies have established that the majority of students or teachers think that the teaching profession is not adequately paid (Hayes, 1990). Existing research recognises the critical role played by the salary level. Dolton and Gutierrez (2011) found that student outcomes rise significantly as the salary level of teacher raises. Thus, the quality of teachers is likely to be higher if their salary level is higher as higher pay attracts more talented graduates into the teaching profession. Santiago (2004) pointed out that incentives, including salaries and alternative employment opportunities, strongly influence the attractiveness of the teaching profession. He stated that remuneration influences who becomes a teacher, who stays in teaching, and who returns to teaching after a career interruption. In a study published by the European Commission (2013), 50.7% respondents from the Czech Republic selected “higher salary” as the major factor that would make the teaching profession more attractive.

According to a recent international survey of students and graduates published by Deloitte (2018), 13 % of respondents see the salary level as the most attractive factor when choosing a career. In 2013, a European Commission study questioned what would

be the main reason for looking for a new job. The Czech respondents agreed that the main motivation for looking for a new job would be looking for a higher salary. Even though the importance of pay is undisputable, Czech teachers' pay was being reported as one of the lowest already in 1998 (OECD, 1998). Many foreign studies questioned young teachers for their reasons for leaving teaching, and they often cited low salaries as an important reason for job dissatisfaction (Guarino et al., 2004). This situation raised a question whether and how many young teachers in the Czech Republic leave the teaching profession not very long after entering it.

And while the international literature focused on teacher attrition is plentiful (Manuel, 2003; Guarino et al., 2004; Borman and Dowling, 2008; Buchanan et al, 2013), no study in the Czech Republic has focused on early career teachers' decisions to leave the profession. Foreign literature also seeks to understand the reasons why young teachers leave the profession and draws attention to the rates of teacher attrition. Despite the lack of national data on the dropout rate for young teachers, many authors strongly believe that there is a high rate of young teacher attrition in the Czech Republic (Münich, 2017) and consider low teacher salaries major cause of it. Thus, the goal of this bachelor thesis is to shed more light on teacher attrition in the Czech Republic.

2. Descriptive Evidence on the Status of Teachers in the Czech Republic

This chapter provides some descriptive evidence on the status of teachers in the Czech Republic by summarizing characteristics of the teaching workforce and teacher salaries in the Czech Republic utilizing data between 2008 and 2017. The purpose of the descriptive statistics performed in this chapter is twofold.

First, it begins by presenting current data and trends on the salary level of teachers in basic and in secondary education. Comparisons of the salary level of teachers in the Czech Republic versus the national average salary and versus the pay of university graduates in all other occupations are presented, providing the detailed descriptive evidence on insufficient teacher compensation. The documented low pay level could have a significant effect on overall interest in the teaching profession and therefore, its composition and on the teacher dropout rate itself.

Secondly, using data on the teaching workforce for the last ten years, this chapter provides useful insights into the composition and developments of the teaching

workforce and initial support for a prediction that there is high dropout rate among young teachers.

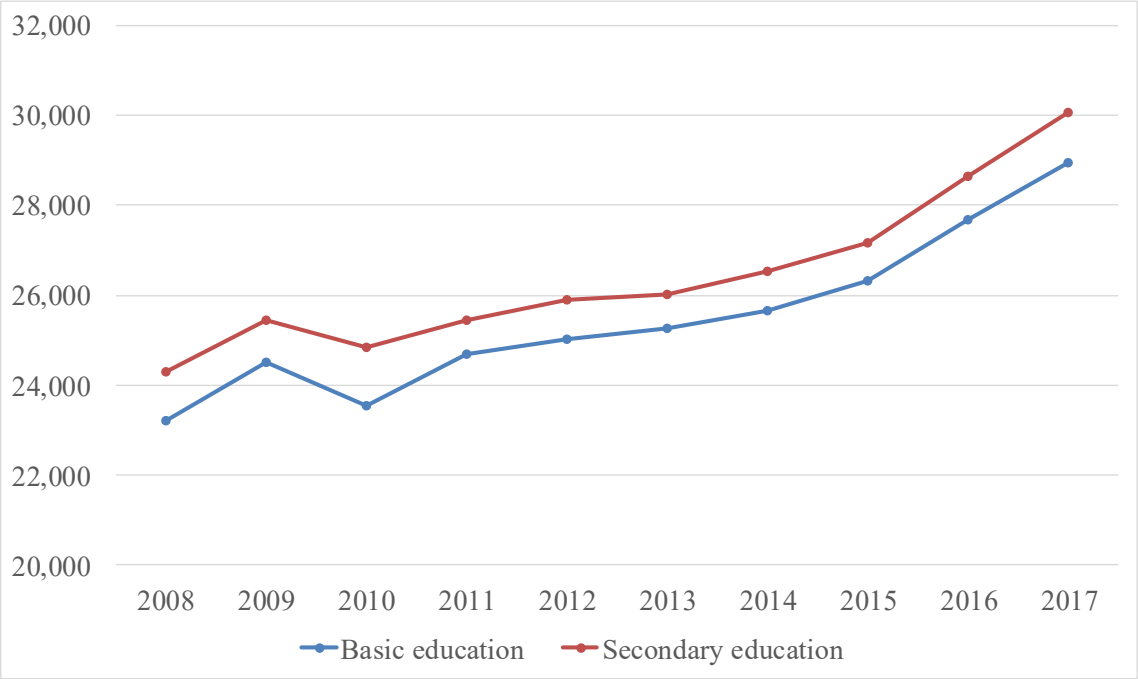
2.1 The Salary Level of Teachers in the Czech Republic

When choosing or leaving a career, there are many factors that influence a person's decision. However, salary is an important motivator for most people (Rynes et al., 2004). Teacher salaries in the Czech Republic are a combination of a fixed salary and bonuses, which depend partly on specific working conditions and seniority but not on measures of quality or achievement. Nevertheless, a full discussion of the salary structure lies beyond the scope of this study.

A figure representing an average teacher salary in the Czech Republic varies according to the source, as a consequence of what exactly is being measured and the instruments being used. The majority of articles relies on data found in reports published by the Ministry of Education, Youth and Sports (further referred to as MEYS). However, the quantity and diversity of data found in these reports is the reason for different values of average teacher salaries reported in the literature. The topic of the salary level of teachers appears in the media very frequently. However, a large proportion of information is either inaccurate or distorted not only in the professional literature but also in the media. Many writers do not distinguish between figures that include salaries of school principals, and other executives from those figures that do not. It is important to point out that these figures differ in thousands of Czech crowns which is a considerable difference when it comes to monthly average earnings. The evidence for the distinction can be clearly seen in series of reports on teacher salaries published by MEYS. The term "average teacher salary" used in this thesis refers to a figure representing nominal monthly salary of a teacher where salaries of school heads and deputy heads are excluded.

A rise in teacher salaries was announced by MEYS several times in the past, but it is difficult to find a clear evidence of an overall trend towards improvement on teachers' economic status in the last ten years. Figure 1 shows the trends on the average nominal teacher salary in basic and in secondary education between 2008 and 2017. Indeed, the average pay rose gradually through the years except for a slight decrease in 2009 caused by the economic downturn.

Figure 1: National average nominal teacher salary in CZK in basic education and in secondary education between 2008 and 2017



Source: Author's illustration based on statistical data of MYES (2018)

Although teacher salaries have often increased in both nominal and real terms, the increases have generally been the same as the increases in the national average salary. Table 1 below illustrates the trend comparison between teacher salaries and the national average salary. Exploring the relationship between salary changes in the teaching profession and in the national workforce, no growth in teacher's economic welfare in the last decade was observed. Table 1 illustrates that the increase in the national average salary between 2008 and 2017 was slightly higher than the increases observed in the salary level of teachers. In 2017, the average teacher salary in basic education was about 98% of the national average salary and the average teacher salary in secondary education was about 102% of the national average salary (against 98% and 103%, respectively in 2008). Despite the long-debated topic of teacher salaries and their scale structure, the government has not succeeded in generating the required financial resources to properly fund teacher salaries. Even though MYES seeks to improve teacher salaries, the reforms seem to have no significant impact on teachers' economic welfare.

Table 1: Changes in average nominal salaries, 2008-2017

Year	National average salary		Average teacher salary in basic education		Average teacher salary in secondary education	
	Amount (CZK)	Change (%)	Amount (CZK)	Change (%)	Amount (CZK)	Change (%)
2008	23,542	-	23,217	-	24,299	-
2017	29,504	25.3	28,933	24.6	30,078	23.8

Source: Author's illustration and calculation based on statistical data of MYES (2018 and the Czech Statistical Office (2018)

Individuals need to think about numerous different factors when choosing their career path but knowing the average salary might be a starting point in deciding future career. While a positive gender pay gap occurs (a man earns more than a woman) in many occupations, the gender pay gap in the teaching profession is insignificant. Indeed, there are no serious differences between the female and the male salaries in the teaching labour market, as long as school principals are excluded from the analysis.

Table 2: Salary difference between genders in the teaching profession

Year	Average teacher salary in basic education			Average teacher salary in secondary education		
	Amount (CZK)			Amount (CZK)		
	Women	Men	**Difference**	Women	Men	**Difference**
2015	26,054	26,180	126	27,088	27,459	371
2016	26,991	27,026	35	28,104	28,482	378
2017	28,922	29,001	79	29,933	30,348	416

Source: Author's illustration and calculation based on statistical data of MYES (2018)

Table 2 shows the gender pay difference in the last three years. In 2017, the gender wage gap was CZK 79 in basic education and CZK 416 in secondary education in favour of male teachers. On average women earn slightly less than men in basic and secondary education, although the wage gap does not exceed 2%. The pay gap between genders in the teaching profession varies inconsiderably due to the official pay scale in

which gender plays no role. While the average salaries between female and male teachers almost do not differ, the picture is very different with respect to the overall situation in the Czech Republic. Generally, the gender pay gap in average salaries of individuals with higher education is very significant and can differ by tens of percent (Table 3 on the next page). The insignificant gender pay gap in the teaching profession could have a negative impact on the recruitment of male teachers who expect to be paid more than women (Major and Konar, 1984). On the contrary, women may be motivated by this factor and, therefore, encouraged to enter the profession.

2.1.1 Comparison of Teacher Salaries and University Graduate Salaries

Trends in the teacher salaries and the national average salary have been shown, and their comparison has been undertaken in the previous part. Although there seems to be no dispute that the salary level of teachers rose in nominal terms during the last decade and teacher salaries were at the similar level as the national average salary, it is important to advance teacher salaries relative to salaries of university graduates in other occupations. In order to be employed as a teacher in a basic or a secondary school, a person must obtain a university qualification at master's level. In 2017, 91.6% of teachers in basic education and 92.1% of teachers in secondary education had a university degree according to the recent data published by MEYS. Even though MEYS do not distinguish between bachelor's education and higher education, comparison of teacher salaries with salaries of university graduates in other professions is still more meaningful.

Table 3 on the next page shows the average gross nominal monthly earnings for individuals with post-secondary non-tertiary or bachelor's education, and for those with higher education in the Czech Republic. Data for 2017 has not been published yet and therefore, was not included.

Table 3: Average gross nominal monthly earnings in CZK: by gender and by educational attainment in 2008 and in 2016

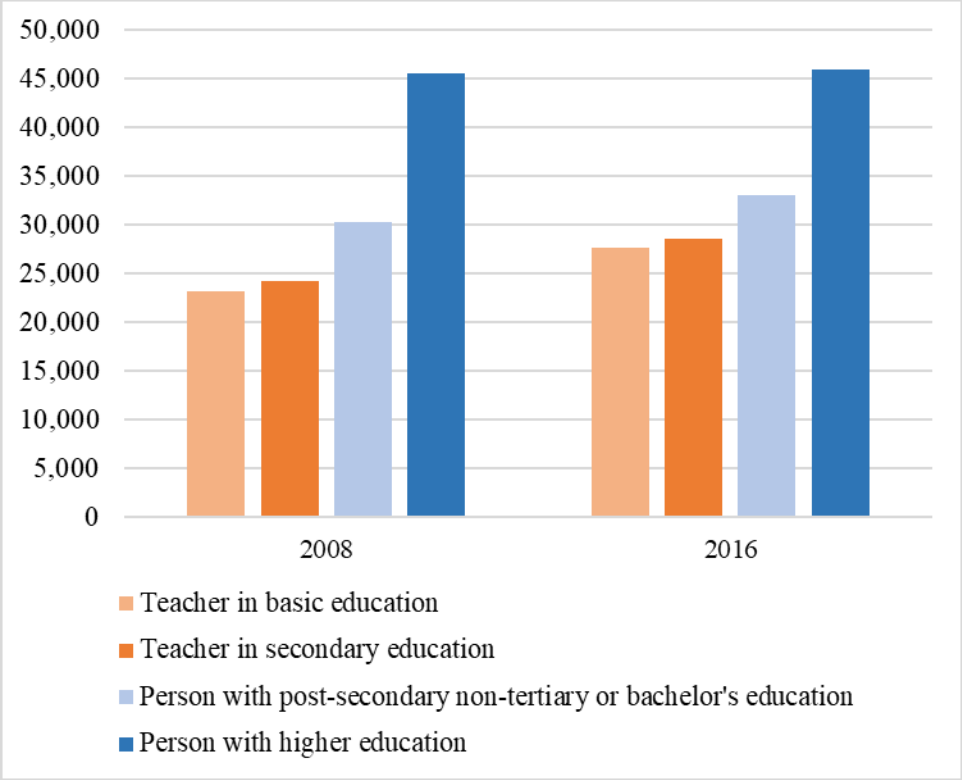
Highest educational attainment	Average gross nominal monthly earnings							
	2008				2016			
	Total	Women	Men	Women/ Men %	**Total**	Women	Men	Women/ Men %
Post-secondary non-tertiary and bachelor's education	**30,263**	26,156	35,322	74	**32,992**	28,700	39,067	73,46
Higher education	**45,566**	35,218	52,097	67,6	**45,906**	37,654	52,695	71,46

Source: Author's illustration and calculation based on statistical data of the Czech Statistical Office (2017)

Regarding the gender pay gap, Table 3 shows it is very significant for both education levels. As mentioned in the previous part of this thesis, an average salary between genders can differ by tens of percent in favour of male employees. This finding may be one of the factors influencing the number of males who would be interested in becoming a teacher but decide for another profession offering better pay instead. However, the discussion of factors influencing and attracting males entering the teaching profession lies beyond the scope of this thesis.

Teacher compensation disadvantage is more significant when it comes to teacher salaries relative to other tertiary-educated workers. Figure 2 shows the breakdown of the average nominal monthly salaries of teachers and similarly educated workers and reveals how unequal earnings are between those groups of employees. Whilst the distribution of teacher salaries is tightly constrained by the official pay scale, far more workers in the comparable occupations can achieve well-above-average incomes. Based on the comparison, teachers appear to be underpaid by tens of thousands of CZK.

Figure 2: Comparison of average gross nominal monthly earnings in CZK for selected groups of employees in 2008 and in 2016



Source: Author's illustration based on statistical data of MYES (2017) and the Czech Statistical Office (2017)

Researchers have argued that relatively low salaries pose an obstruction to recruiting high-quality graduates and retaining talented teachers. The challenges may be especially serious in those fields where jobs in the private sector can command particularly high salaries. For this reason and others, the teachers' pay issue has been recurring in the media in last years. Teacher compensation has emerged as a major issue in efforts to strengthen the teaching profession. The teachers' unions repeatedly claimed that teacher salaries are unsatisfactory, demanding higher pay for teachers. Subsequently, the Czech Ministry of Education has promised a considerable rise in the salaries of teachers. Teacher salaries should be increased up to 130% of the national average salary in the Czech Republic by 2020. It is necessary to mention that this statement concerned the overall average teacher salary in the Czech education system. Even though this paper does not deal with the overall average teacher salary but with the average teacher salary in basic and in secondary education, these figures do not differ significantly from each other. In 2016, the overall average teacher salary was

CZK 28,416 against the average teacher salary in basic and in secondary education of CZK 28,169. With regard to the figures presented in this chapter, the government funding of the Czech education system would have to be increased significantly in order to achieve the salary level promised by the Ministry. And whilst there has been some growth in the salary level of teachers, it has recently been much slower than would be required to meet this target.

Assuming the target would be met in 2020 and teacher salaries would be increased up to 130% of the national average salary still the question remains, whether such a rise in teacher salaries would be an efficient motivator to attract greater number of university graduates to the profession. In 2017, 130% of the national average salary would be equal to CZK 38,355 which would be yet far behind the national average monthly earnings of individuals with higher education. Adding the fact that an increase in salaries of individuals with higher education could be expected in the next years, the intended increase in teacher salaries seems to make no significant difference to teachers' economic status and alternative types of employment would keep looking relatively more attractive.

2.2 The Teaching Workforce in the Czech Republic

The purpose of this chapter is to provide a brief overview of the current teaching workforce situation in the Czech Republic and present some of the major issues concerning the composition of the teaching population. To understand the contemporary Czech teaching workforce, it is necessary to summarize its evolution over the last years.

2.2.1 The Number of Teachers in the Czech Republic

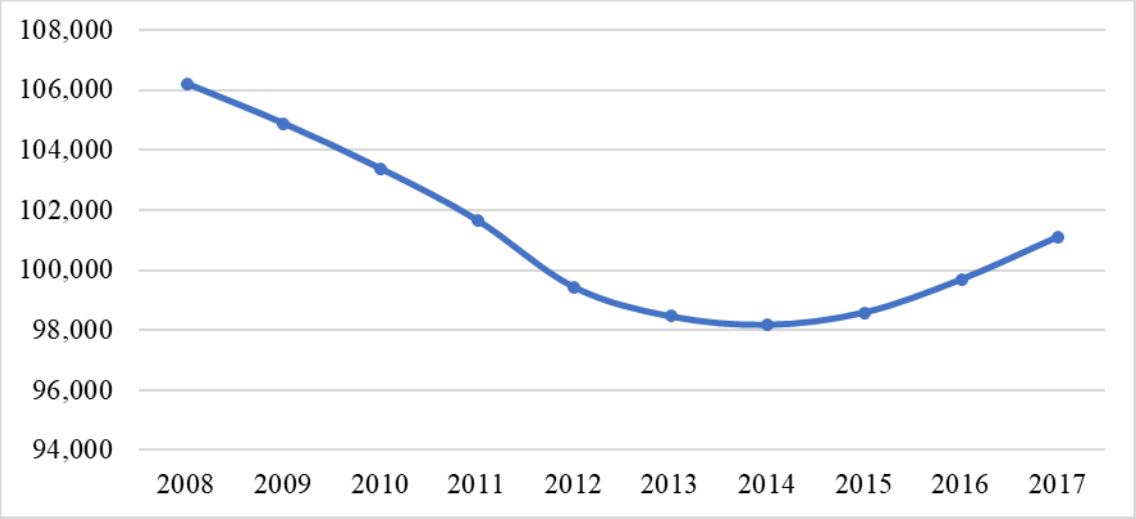
Headlines about recruitment in the teaching profession have been dramatic in recent years. Teachers shortages have been reported or forecasted internationally and the Czech Republic faces a number of challenges in ensuring sufficient teacher supply as other countries. Even though, vacancy rates could be the simplest measure of teacher shortages, the national data on unfilled vacancies for teachers are not available.

Still, there are concerns about teacher shortages in the Czech Republic, but the supply of teachers is less an issue of numbers than one of teaching field and distribution.

In the 2017 school year, there were 101 120 teachers in basic and secondary schools across the Czech Republic (Figure 3). The number of teachers in the Czech

Republic was gradually decreasing between 2008 and 2014. And even though the number was increasing since that year, the size of the workforce declined over the past decade, dropping by 5% between 2008 and 2017.

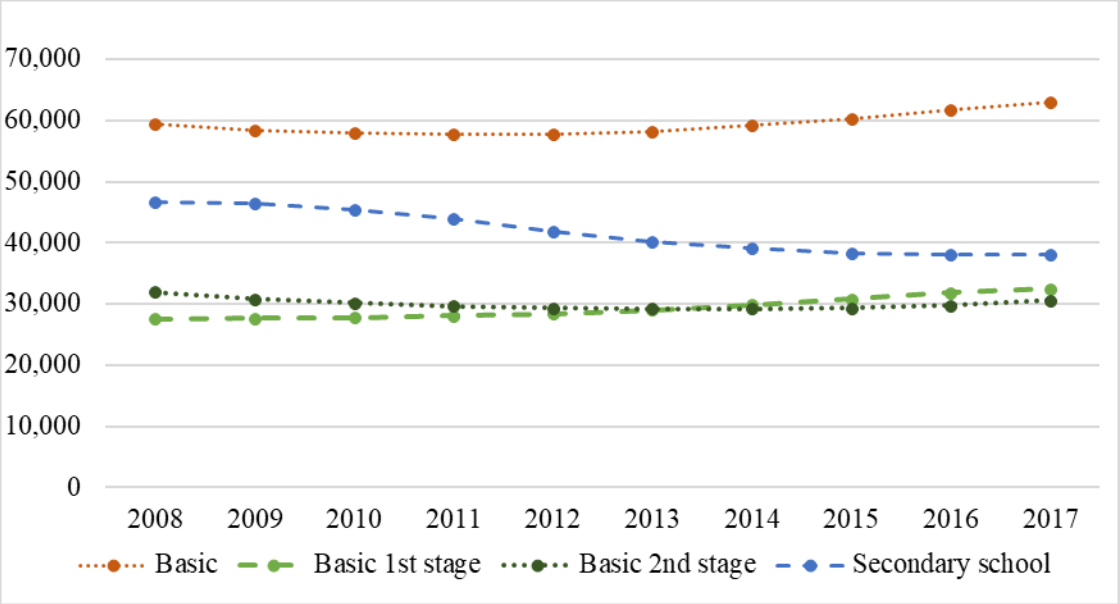
Figure 3: Trend in the total number of teachers in basic education and in secondary education, 2008 – 2017: the number of teachers recalculated to full-time posts



Source: Author based on statistical data of MEYS (2018)

To get better understanding of the overall situation, trends in the teaching workforce in basic and secondary education are presented separately. Figure 4 illustrates trends in the teaching workforce in more detail. The greatest decline is seen in secondary education, with a decrease of 18% between 2008 and 2017. A decline was not experienced in the size of the teaching workforce in basic education. Indeed, the teacher supply in this area expanded by 6% over the same period.

Figure 4: Trend in the number of teachers in basic education and secondary education, 2008 - 2017: the number of teachers recalculated to full-time posts



Source: Author based on statistical data of MEYS (2018)

The demand for teachers is largely a result of the number of children in the population, yet another factor has to be taken account and this is the number of students. Table 4 and Table 5 presents the number of classes, students, and of teachers, as well as the ratio of students to full-time teaching staff (the student-teacher ratio), and the average class size at a given education level (the average class size). A student-teacher ratio expresses the relationship between the number of students enrolled in an education system and the number of "full-time equivalent" teachers employed by the system. A student-classroom ratio expresses the average number of students being taught by teachers in a given education system. In general, average class size will be larger than student-teacher ratio anytime a school assigns more than one teacher to some classrooms.

The student-teacher ratio in the followed tables (Table 4 and Table 5) is calculated by dividing the number of students by the number of full-time equivalent teachers at a given education level. It is widely accepted that a low student-teacher ratio enables individual attention by teachers and therefore can increase student achievement. On the contrary, a high student-teacher ratio suggests that each teacher has to be responsible for a large number of students. As figures in the tables (Table 4 and Table 5) on the next pages show, an improving student-teacher ratio in secondary education

was observed unlike in basic education where the ratio increased in the last decade. Though the Czech student-teacher ratio in basic education fluctuated slightly in the last ten years, it tended to increase through 2008/09 – 2017/18 period ending at 14.7 students per teacher in 2017/18 (Table 4).

Table 4: Number of students, classrooms and teachers in basic education between 2008/09 and 2017/18: the number of teachers recalculated to full-time post

School year	Classes	Students	Teachers	Students per teacher ratio	Students per classroom ratio
2008/09	42,498	816,015	59,492	13.7	19.2
2009/10	41,941	794,459	58,417	13.6	18.9
2010/11	41,720	789,486	58,023	13.6	18.9
2011/12	42,105	794,642	57,815	13.7	18.9
2012/13	41,739	807,950	57,669	14.0	19.4
2013/14	42,334	827,654	58,269	14.2	19.6
2014/15	43,259	854,137	59,129	14.4	19.7
2015/16	44,091	880,251	60,221	14.6	20.0
2016/17	45,116	906,188	61,635	14.7	20.1
2017/18	46,023	926,108	63,005	14.7	20.1

Source: Author's illustration and calculation based on statistical data of MYES (2018) and statistical data of the Czech Statistical Office (2018)

According to a recent international study published by the European Commission (2017) the Czech student-teacher ratio in basic education belongs among the highest in the European Union. Therefore, it is likely to make it more difficult for teachers to dedicate enough time to the students' needs and provide support for each individual student. In general, the ratio is usually lower in secondary education than in basic education[1]. The situation in secondary education in the Czech Republic (Table 5) where the student-teacher ratio stood up at 11.1 in 2017 is comparable to other countries in the EU (European Commission, 2017).

[1] UNESCO Institute of Statistics (2018), accessed 25 March 2018, available at: http://uis.unesco.org/indicator/edu-hr-ptr-total.

Table 5: Number of students, classrooms and teachers in secondary education between 2008/09 and 2017/18: number of teachers recalculated to full-time posts

School year	Classes	Students	Teachers	Students per teacher ratio	Students per classroom ratio
2008/09	23,357	564,326	46,735	12.1	24.2
2009/10	23,260	556,260	46,489	12.0	23.9
2010/11	22,904	532,918	45,385	11.7	23.3
2011/12	21,986	501,220	43,876	11.4	22.8
2012/13	20,918	470,754	41,789	11.3	22.5
2013/14	20,192	448,792	40,214	11.2	22.2
2014/15	19,771	435,542	39,070	11.1	22.0
2015/16	19,546	427,107	38,386	11.1	21.9
2016/17	19,380	424,849	38,070	11.2	21.9
2017/18	19,266	421,535	38,115	11.1	21.9

Source: Author's illustration and calculation based on statistical data of MYES and the Czech Statistical Office

The numbers of teachers discussed above do not provide complete information whether there is a shortage or surplus in the labour market. Even though teachers are not equally distributed among the different areas and schools in the country, according to the European Commission (2013) the Czech Republic does not face an overall shortage of qualified teachers. However, there is an inadequate supply of teachers in the fields of mathematics, science or technological subjects.

Surprisingly, the Ministry does not collect data on the teacher shortages regularly, and therefore there is limited national data on the issue. According to MEYS (2015), there was a long-run undersupply of teachers estimated at 4780 in several areas such as teachers of the first stage of basic education (819 teachers needed), English language (774), Physics (405), IT (324), Mathematics (252) and in other subjects. When faced with difficulties in finding and maintaining an adequate supply of good quality teachers, traditionally less-qualified teachers are hired, or school administrators assign teachers trained in one area to teach in the shortage area.

Whilst a lower student-teacher ratio generally implies smaller class size, a higher student-teacher ratio reflects teacher heavy workload. Even though, teacher workload is affected by a variety of factors, the number of classes for which a teacher is responsible, and the number of classes taken by students are considered the crucial ones. Given that the student-ratio in basic education is among the highest in the EU and teacher salaries

in the Czech Republic are significantly lower than the EU average (European Commission, 2013), the teacher satisfaction in the profession caan be threaten. Thus, heavy workload and the inadequacy of teacher compensation may be expected to lead to higher rates of teacher attrition. Indeed, the quality of first teaching experience is one of the major predictors of the teacher dropout (Chapman, 1994) and teachers very often consider leaving the profession because of their workload. This issue is especially acute among beginning teachers.

2.2.2 Gender imbalances in the teaching profession

Teaching is a feminised occupation in many countries around the world (Kelleher, 2011). According to Anker's study (1998) teaching is among the top ten feminised occupations. There have been expressions of concern by the government or by the media, in a number of countries about the level of feminisation of the teaching profession.

In the past century and a half of public schooling, teaching in the Czech Republic has evolved as an occupation with a characteristic demographic profile. A major feature of the teaching profession in the Czech Republic is its high degree of feminisation. The teaching of young children has long been dominated by women who make up the majority of teachers both of basic and secondary education.

Although the change in gender composition of teachers over the last 10 years was not strong, the share of female teachers increased slightly both basic and secondary schools. The gender composition of the current permanent teaching workforce is shown in Table 6.

Table 6: Share of women in the teaching workforce in selected school years: by education level

Education level	School Year					
	2008/2009	2010/11	2012/13	2014/15	2016/17	2017/18
Basic	83.9%	84.1%	84.2%	84.5%	84.8%	**84.7%**
Secondary	58.5%	58.9%	59.7%	59.9%	60.1%	**60.3%**

Source: Author's illustration and calculation based on statistical data of MYES (2018)

The proportion of female teachers in 2017 reached 84.7% in basic education (against an OECD average of 82%). The situation is more balanced in secondary education, where the share of female teachers stood at 60.3% (OECD average of 63%).

Gender imbalance in the teaching workforce tend to decrease with the level education level not only in the Czech Republic, but in the OECD countries overall (OECD, 2017).

Many attempts have been made to identify the reasons why the profession became gender imbalanced in favour of women. When identifying factors causing the feminisation of teaching, economic influence on men and women's career orientation should not be overlooked. There is a growing belief among researchers that low salary is one of the key factors for men not entering the teaching profession. Indeed, males are very sensitive to salaries and career prospects of pecuniary concerns unlike females who are much more influenced by other factors (Ethington, 1988).

Representation of men in the teaching profession may be very important for students' view on education and their opinion about the teaching profession. It is necessary for the future development of the teaching workforce, that young students do not associate education with females solely. It is suggested that more men need to be encouraged into the profession, as it becomes increasingly feminised. Also, building a more genuine acceptance of males as teachers of young children and encouraging young boys to consider teaching as a career may be helpful. However, the importance of pay level is substantial, and to improve the image of the teaching workforce, the profession should be compensated accordingly to attract more talented (male) students.

2.2.3 Age Structure of the Teaching Profession

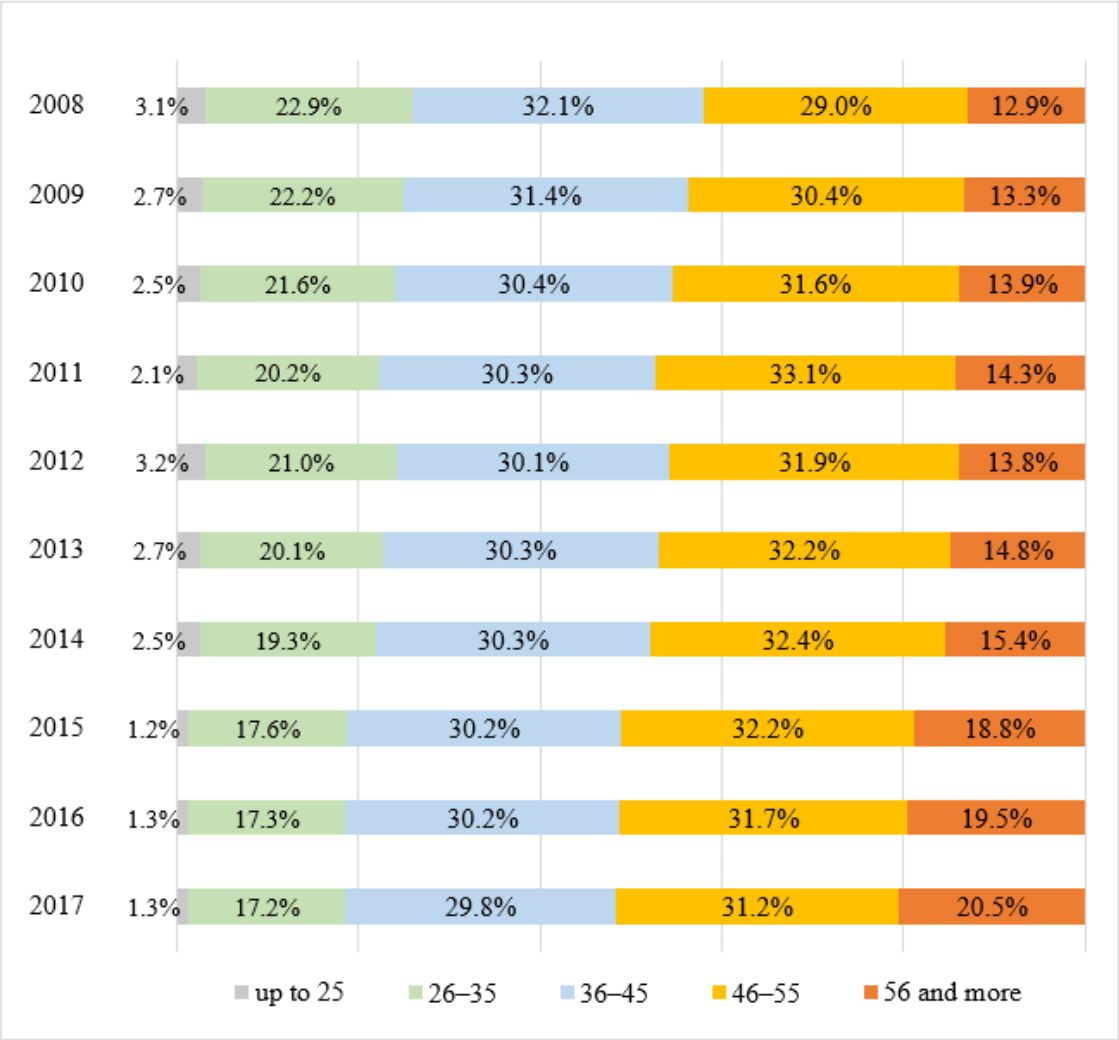
According to the European Commission (2017), the teaching workforce in the Czech Republic is ageing. Although the ageing does not concern only the teaching workforce but has been observed generally in the Czech population, the demographic population ageing is not as pronounced as the ageing of teachers in the Czech education system. The age distribution of the teaching workforce is necessary information for planning for the future. Thus, the age distribution of the profession has been attracting a lot of interest. This part of the thesis examines data from 2008 to 2017. Despite the fact that ageing of the teaching workforce had been reported even before 2008, examining data from the last decade is sufficient to demonstrate the ageing issue.

Even though increasing median age of teachers is significantly influenced by the extension of the retirement age, it also signals a lack of university graduates interested in a teaching career. Whilst the ageing of the teaching workforce is an issue around the world, it is comparatively worse in the Czech Republic than in other countries.

Surprisingly, the precise data on time trend in the mean age of teachers is not available in the Czech Republic.

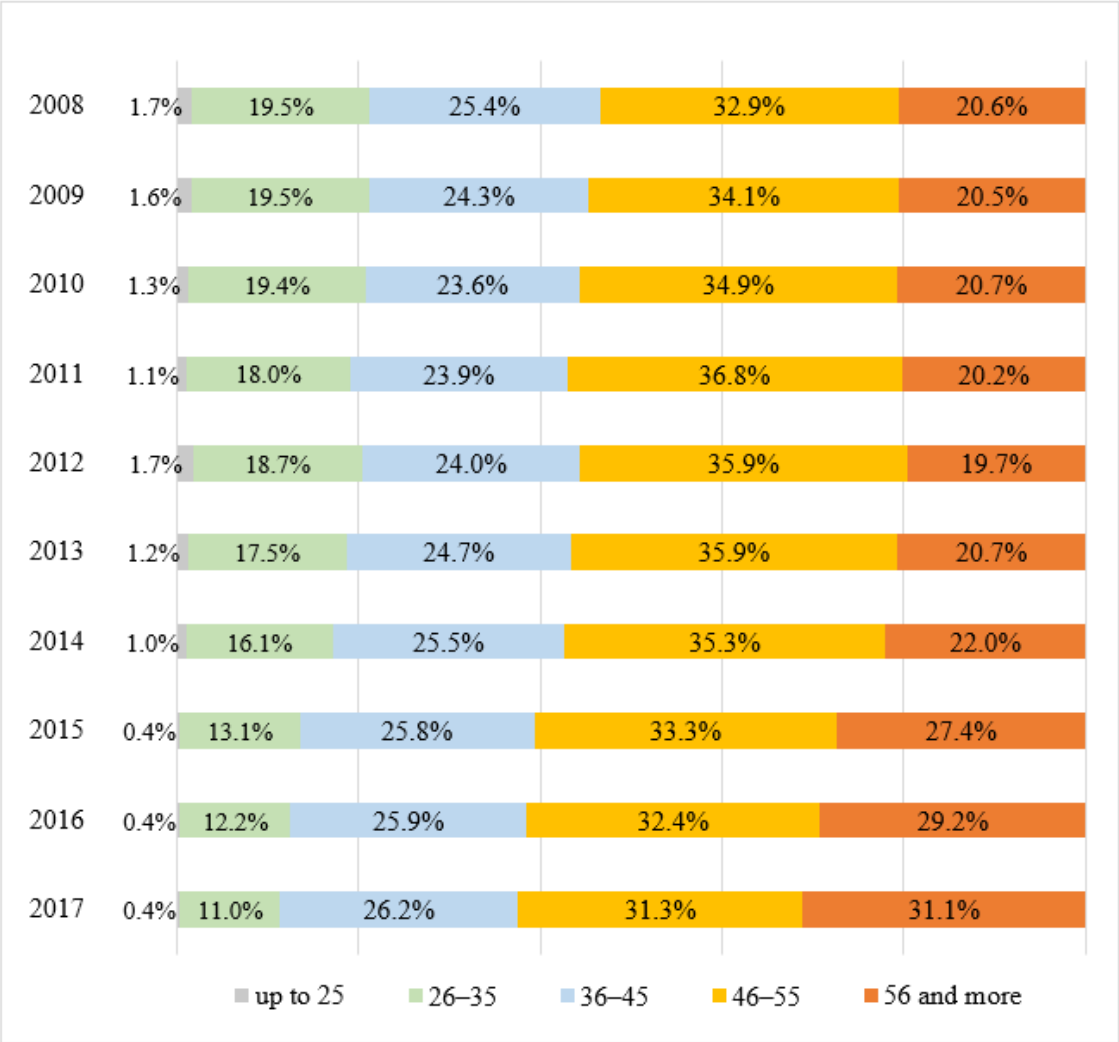
The age distribution of the teaching workforce in basic and in secondary education in different age groups is illustrated in Figure 5 and Figure 6 on the next pages. In both figures, the increasing proportions of aged persons have been accompanied by declines in the proportion of young persons. Over the last decade, the proportion of the youngest teachers (25 years old and younger) dropped by 1.8 percentage points in both education levels. In the basic education the proportion dropped from 3.1% in 2008 to 1.3% in 2017 while in secondary education the drop was from 1.7% to 0.4%. The fact may be linked to the fact that new requirements for becoming a teacher were implemented in the Czech education system and the deadline for teachers to complete potentially missing education was in 2015. Therefore, the entry of individuals aged 25 and less to the teaching profession has been more difficult. Nevertheless, the proportion of teachers between the ages of 26 and 35 has also dropped by 5.8 percentage points and by 8.5 percentage points in basic and in secondary education respectively. From 2008 to 2017, the proportion of 36-45-year-old teachers changed slightly in both education levels but with a different tendency. Whilst there was 2.3 percentage points decrease in basic education, the proportion of this age group increased by 0.8 percentage point in secondary education. The age group of 46-55 years has experienced an increase by 2.2 percentage points in basic education, but a decline by 1,6 percentage points in secondary education. The age group of 56 and older has grown rapidly in both education levels. The largest increase of 10.5 percentage points was observed in secondary education stayed at 31.1%, followed by 7.6 percentage points increase in basic education settled at 20.5%. Overall, the situation of the teaching workforce with regard to the age distribution has worsened with time. An examination of the figures for teachers reveals an increase in the proportion of these in the age ranges 46-55 and over 56. Teachers aged 46 and more make up 51.7% of the teaching workforce in basic education and 62.3% in secondary education. On the other hand, the proportion of teachers aged 35 and less now constitutes less than 20% of the teaching workforce in basic education and less than 12% in secondary education.

Figure 5: Percentage of teachers in basic education by age range between 2008 and 2017



Source: Author's illustration based on MEYS Database

Figure 6: Percentage of teachers in secondary education by age range between 2008 and 2017



Source: Author's illustration based on MEYS Database

This reveals that the age distribution of the profession in basic and secondary education in 2017 was spread much more unevenly than in 2008. The proportion of those aged over 46 was significantly higher in 2018 (31.9% in basic education and 53.5% in secondary education) than it was in 2017 (51.7% in basic education and 62.4% in secondary education). These results are in accord with previous studies indicating that the teaching workforce in the Czech Republic is ageing.

But how does Czech's experience of ageing teaching workforce compare with that of other countries? The Czech teaching population is noticeably aged in comparison with the selected OECD countries. This is illustrated in Table 7 showing the age distribution of the teaching population from primary to upper secondary education level in those OECD countries where the data is available. Figures in the Table 7 show there

are substantively fewer Czech teachers under the age of 40 (29%) compared to the average of the listed countries (36%).

Table 7: Distribution of teachers in % by age range in selected OECD countries (primary to upper secondary education level

Country	Age			
	Less than 30	30-39 years	40-49 years	50 and over
Austria	10	18	28	43
Belgium	18	29	25	28
Canada	11	31	31	26
Chile	22	32	18	28
Czech Republic	**7**	**22**	**29**	**42**
Finland	7	26	31	36
France	7	29	34	30
Germany	7	23	26	45
Greece	4	18	39	39
Hungary	6	24	32	37
Ireland	14	40	21	25
Italy	1	8	27	64
Korea	15	35	27	23
Latvia	7	17	31	45
Luxembourg	17	38	24	21
Netherlands	14	25	20	41
New Zealand	11	21	27	41
Norway	12	24	29	35
Poland	7	29	34	29
Slovak Republic	8	28	27	37
Slovenia	4	27	33	35
Spain	5	28	31	35
Sweden	7	23	31	39
United States	15	28	25	31

Source: Author's illustration based on MEYS Database

For last several years, a concern has been expressed about the ageing of the teaching workforce in the Czech Republic. The current age distribution of the teaching population may serve as an indicator of future shortages in the teaching profession. Due to high proportion of teachers in their 50s, many teachers will retire in the near future and the demand to replace them will likely increase. To address the problem of teacher supply, the government should mainly concentrate on attracting young people into the

profession through financial or other incentives. Nevertheless, the age structure of the teaching workforce remains an issue not only in the Czech Republic but around the world.

3. The Teacher Dropout Rate

The third part of the thesis investigates attrition among beginning teachers in the Czech Republic and presents findings of studies on this topic conducted elsewhere in the world. Data provided in the previous parts of this thesis and other measures reflect the economic status of teachers in our society. Even though there might be several factors influencing individual's decision to become a teacher or their decision to quit the profession, the question is how much the social and the economic status of teachers affects people in leaving the teaching profession. Studies on causes for teacher attrition have identified a range of factors that influence individual's decision to leave the profession (Chapman, 1994; Stinebrisckner, 2002; Guarino et al., 2004; Santiago, 2004). Although, many of those causes are nonsalary-related, teacher compensation is frequently mentioned as a part of the early career attrition issue. Indeed, several studies agreed that higher salaries are highly connected with lower teacher attrition and teacher attrition can be effectively eliminated by raising salaries high enough (Guarino et al., 2004). However, even countries where teachers are paid well have difficulties with high dropout rate for beginning teachers. This may be linked with to the fact that the salary scale in a great number of countries rewards seniority (Chapman, 1994) and, therefore, encourage talented young teachers to leave the field for a better-paid career.

High attrition rate generally results in high economic costs as teachers must be continually hired and trained. Improving teacher salaries and teachers' work environment could be more cost efficient than replacing teachers who left the teaching profession.

The issue of teacher salaries has received a great deal of national attention and has been well documented in the Czech Republic in the academic and professional literature (Münich et al., 2015; Münich, D., 2017). Many authors have highlighted a possible association between inadequate teacher compensation and high teacher attrition, particularly among young teachers (Guarino et al., 2004; Santiago, 2004). However, despite widespread attention by the teachers' unions and the government to the issue, an empirical analysis on the teacher dropout rate has not been done yet. Such

analysis can provide important initial insights into additional research questions and motivate appropriate policy review and development. Therefore, in the third part of the present thesis, the dropout analysis is presented to investigate what share of young teachers in the Czech Republic leave the profession shortly after starting.

3.1 Teacher Dropout around the World

Although the rates of teacher attrition vary across countries, high rate of new teacher attrition is an acknowledged problem in many countries and a great number of studies addressing the issue of teacher attrition have been published, particularly in Commonwealth countries (Rickman and Parker, 1990; Ress, 1991; Chapman, 2004; Ballou, 1998; Stinebrickner, 1998; Stinebrickner, 1999; Stinebrickner 2002; Guarino et al., 2004; Borman and Dowling, 2008).

Many studies state that the highest attrition rates seen for teachers occurred in their first years of teaching (Guarino et al., 2004; Santiago, 2004). Researchers seek to understand why teacher attrition occurs and what are the patterns governing individuals to leave the teaching profession. Many studies suggest that a high teacher dropout rate might be linked to the fact that future-teachers are inadequately or only partially prepared for teaching and are idealising the teaching profession. Other factors reported in the literature included lack of initial interest in the profession (Evans, 1987), personal characteristics of teachers (Adams, 1996), lack of a promotion process (Shipp, 1999) or the social status of teachers that had long been considered as a powerful motivation to enter the teaching profession and remain in teaching. But the prestige of the profession has fallen over the years and, therefore, one of the most occurring complaint of teachers worldwide is its declining prestige (Chapman, 1994).

Nevertheless, the important role of teacher salaries is inevitable. It has been documented that higher salaries reduce the probability of quitting (Seyfarth and Bost; 1986; Rees, 1991; Ballou, 1998). Rickman and Parker (1990) found that an increase of 1% in the wage differential (actual teacher salaries relative to salaries in other occupations) may decrease the probability of leaving by 2%.

Regarding dropout rates for young teachers around the world, estimates of new teacher attrition are highly imprecise and range widely from less than 10% up to 50%. Recent federal data in the United States indicates that new teacher attrition rates are 17% (Aragon, 2016). Unlike the rates reported in the analysis by Ingersoll (2001) where

reported rates among American teachers were as high as 30%. Numerous surveys conducted in Australia estimated that 30–40% of teachers quit teaching within the first five years (Milburn, 2011). In recently published report addressing the issue in the United Kingdom, 59% of those teachers who were interviewed considered leaving the profession during the last six months and 20% considered leaving the teaching occupation within the next academic year (Worth, Bamford, and Durbin, 2015).

3.2 The Analysis of Dropout of Young Teachers

The goal of this chapter is to provide as precise as possible estimate of the incidence of teacher attrition. The dropout analysis of young teachers is presented using two alternative models estimating teacher attrition between 2008 and 2017 so that the teacher dropout rate can be identified properly. The analysis relies on data published by the Ministry of Education, Youth and Sports (MYES), the Czech Statistical Office (CZSO) and the Czech Social Security Administration (CSAA). In order to address the issue from a wider perspective, and due to the lack of data on teacher attrition, two different approaches towards estimating teacher dropout rates are provided.

As mentioned earlier, the dropout rate for young teachers is a percentage or proportion of teachers leaving the teaching profession within the first years of being a teacher. While studies published in other countries report the dropout rates for teachers who leave the educational system within the first year or first five years after becoming a teacher, the limited data available in the Czech Republic does not allow for using the same definition.

While there exist statistics on the total number of teachers and their distribution over age groups, there is no official statistics reporting inflows and outflows of teachers in the Czech Republic. It is very important to monitor outflows of teachers because teacher attrition results in negative effects on student achievement (Ronfeldt, Loeb and Wyckoff, 2013), a need for recruitment, replacement, and training, and great financial losses (Synar and Maiden, 2012). Teacher attrition would be particularly problematic if those leaving were the more able teachers.

The analysis is presented in two separate parts. First, the analysis starts with retrieving the number of teachers in specific age groups to estimate the flows – inflows and outflows of teachers in the education system. Second, two different approaches are provided to obtain data on teacher attrition among young teachers. Both approaches use

the same base data, that is data on entrants to the teaching profession reported for the first time in 2017 by MYES. But, the estimation of entrants between 2008 and 2016 in both approaches differs in order to address the issue from different angels.

Three assumptions have to be made before retrieving the flow of teachers using the available data. Firstly, no teacher attrition for teachers older than 35 occurs except retiring. Secondly, the rate of retiring from the teaching profession is at the level of average retiring in the Czech population. Thirdly, there is even distribution of teachers over single age cohorts within the broad age intervals. This is clearly an abstraction from reality, but for purposes of examining the dropout rate for young teachers, it may not be too erroneous approach for a number of reasons. First and foremost, the assumptions do not have an impact on the actual numbers of dropout rate for young teachers obtained. The assumptions only serve to support the fact that the movement of teachers within the educational system is mainly caused by natural ageing of the teaching workforce. Finally, the correctness of the method used in the flow model is measured by comparing the actual numbers published by MYES with the outcomes of the model. Thus, the outflow pattern can be used to calculate teacher attrition itself.

Additional assumptions have to be made for the models before proceeding to calculating teacher attrition. Data on entrants to the teaching profession was published by MYES for the first time in 2017 and the reported numbers of the total teachers entering basic and secondary education considered only those who started teaching within one year after finishing the required university education. Therefore, the first model estimating teacher attrition assumes that all teachers aged 25 or less are entrants to the teaching profession. Although this assumption is questionable, it is likely that a new entrant aged under 25 will move to the next age group the next year. The next assumptions are introduced further in the models' calculations.

3.2.1 The Flow of Teachers in Education System

On the basis of the abovesaid assumptions, the flow of teachers in education system is presented.

The first step is to use data on teacher distribution by age groups (Figure 5 and Figure 6 illustrated previously in the paper, see pages 20-21) in combination with the total number of teachers in basic and secondary education. The data comes from annual reports by MYES. All teachers are classified into five age groups as follows: under and 25 years old, 26-35 years, 36-45 years, 46-55 years, and 56 years old and over. Data

from the tables allows for computing the number of teachers in each age group between 2008 and 2017. This is illustrated in Table 8 and Table 9 below, where teachers are divided into five age groups, and teacher distribution and the number of teachers recalculated to full-time posts in different age groups can be seen.

Table 8: Percentage and number of teachers in basic education by age range between 2008 and 2017

School Year	Total number of teachers (all ages)		Number of teachers by age groups									
			under 25		26-35		36-45		46-55		56 and more	
	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
2008	100%	59,492	3.1%	1,833	22.9%	13,596	32.1%	19,094	29.0%	17,282	12.9%	7,688
2009	100%	58,417	2.7%	1,601	22.2%	12,953	31.4%	18,331	30.4%	17,748	13.3%	7,784
2010	100%	58,023	2.5%	1,455	21.6%	12,540	30.4%	17,637	31.6%	18,334	13.9%	8,057
2011	100%	57,815	2.1%	1,229	20.2%	11,678	30.3%	17,545	33.1%	19,113	14.3%	8,251
2012	100%	57,669	3.2%	1,836	21.0%	12,121	30.1%	17,356	31.9%	18,388	13.8%	7,968
2013	100%	58,269	2.7%	1,552	20.1%	11,705	30.3%	17,628	32.2%	18,740	14.8%	8,645
2014	100%	59,129	2.5%	1,498	19.3%	11,433	30.3%	17,940	32.4%	19,135	15.4%	9,123
2015	100%	60,221	1.2%	734	17.6%	10,578	30.2%	18,159	32.2%	19,407	18.8%	11,343
2016	100%	61,635	1.3%	772	17.3%	10,687	30.2%	18,618	31.7%	19,531	19.5%	12,027
2017	100%	63,005	1.3%	834	17.2%	10,860	29.8%	18,761	31.2%	19,640	20.5%	12,909

Source: Author's illustration and calculation based on statistical data of MYES (2018)

Table 9: Percentage and number of teachers in secondary education by age range between 2008 and 2017

School Year	Total number of teachers (all ages)		Number of teachers by age groups									
			under 25		26-35		36-45		46-55		56 and more	
	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage	Number
2008	100%	46,735	1.70%	802	19.50%	9,098	25.40%	11,851	32.90%	15,353	20.60%	9,630
2009	100%	46,489	1.60%	726	19.50%	9,081	24.30%	11,290	34.10%	15,849	20.50%	9,543
2010	100%	45,385	1.30%	610	19.40%	8,807	23.60%	10,702	34.90%	15,856	20.70%	9,409
2011	100%	43,876	1.10%	470	18.00%	7,900	23.90%	10,486	36.80%	16,136	20.20%	8,884
2012	100%	41,789	1.70%	731	18.70%	7,800	24.00%	10,017	35.90%	15,022	19.70%	8,219
2013	100%	40,214	1.20%	485	17.50%	7,031	24.70%	9,915	35.90%	14,451	20.70%	8,332
2014	100%	39,070	1.00%	408	16.10%	6,286	25.50%	9,957	35.30%	13,809	22.00%	8,610
2015	100%	38,386	0.40%	152	13.10%	5,040	25.80%	9,902	33.30%	12,778	27.40%	10,515
2016	100%	38,070	0.40%	142	12.20%	4,632	25.90%	9,858	32.40%	12,324	29.20%	11,113
2017	100%	38,115	0.40%	146	11.00%	4,182	26.20%	9,983	31.30%	11,947	31.10%	11,857

Source: Author's illustration and calculation based on statistical data of MYES (2018)

The second and the third step examine the flow of teachers out of the educational system in order to evaluate the theory and accuracy of calculations used in the flow model. First, the proportion of employees aged 55 and more who retire and leave the field is computed for each year (Table 10).

Table 10: Number and age distribution of the Czech labour workforce and newly granted old-age pensions between 2008 and 2016

Year	Total number of employees	Number of employees aged 55 and more		Number of newly granted old-age pensions	Number of newly granted old-age pensions / Number of employees aged 55 and more
		Proportion	Number		Proportion
2008	4,172,417	16.68%	695,890	100,011	14.37%
2009	3,955,596	16.97%	671,197	118,711	17.69%
2010	3,920,200	16.97%	668,002	107,553	16.10%
2011	3,916,600	16.73%	655,247	147,614	22.53%
2012	3,920,400	17.07%	669,212	71,401	10.67%
2013	3,905,882	17.45%	684,616	83,398	12.18%
2014	3,923,300	17.62%	691,285	92,020	13.31%
2015	4,006,200	17.68%	708,296	107,521	15.18%
2016	4,102,200	17.72%	726,910	97,864	13.46%

Source: Author's illustration and calculation based on statistical data of MYES and CZSO

Numbers presented in this table are obtained by combining statistical data on the Czech labour market from CZSO with data on the old-age pension from CSAA. The total number of employees in the Czech national workforce and their age distribution found in the CZSO reports allows for computation of the number of employees aged 55 and more. Next, the number of employees aged 55 and more is divided by the number of newly granted old-age pension (CSAA) in each year to obtain the proportion of employees who retire each year. Then, using the assumption that the rate of retiring from the teaching profession is at the level of average retiring, proportion of teachers retiring each year is calculated.

Next, ageing causing the flow of teachers leaving an age group and entering the next age group is taken into account. For this reason, first two age groups (under 25 and 26-35) are merged. As mentioned previously, the model assumes that no teacher older 35 years leaves the profession, and that there is even distribution of teachers within the age intervals. Because each age group consists of ten age cohorts, one-tenth of the

number of teachers in each age group is assumed to enter the next age group every year (Figure 7 and Figure 8 in Appendix).

The above computations are performed in order to evaluate the accuracy of the approach used in the flow model, given its strict assumptions. If the accuracy is satisfactory, the ageing approach will be applied in the following models estimating numbers on teacher attrition.

Figure 7 and Figure 8 demonstrates the accuracy of the estimations by comparing the estimated number of teachers in each age group with the actual numbers. Even though the estimated figures differ from the actual figures, the difference is less than 5% for most of the outcomes. Only three out of the total 54 estimated figures differ significantly from the actual figures. The low accuracy of the figures obtained for 2011 may be explained by the high average retirement rate in the Czech population caused by the upcoming reform in the old-age pension system that may not had strong impact on the teaching workforce. The accuracy of the flow model does not violate the assumption that the flow of teachers above the age of 35 in the Czech education system can be illustrated by natural ageing of the teaching workforce.

Indeed, the estimates correspond, but with some error. The total average error is computed (Table 11) to take this error into account when estimating teacher attrition. Because the models estimating numbers on teacher attrition apply only the ageing flow, the total average error is computed for the age groups not influenced by retirement (age group 56 and more is excluded).

Table 11: The total average error in the flow model for 36-45 and 46-45 age groups

	Under-estimated values		Over-estimated values	
Education Level	Basic	Secondary	Basic	Secondary
Number	15	8	3	10
Average accuracy	97.1%	96.3%	102.3%	102.4%
Average error	3.33%		2.36%	
Total average error	**3%**			

Source: Author's illustration and calculation

The total average error in the flow model for the age groups not influenced by retirement is 3%. Thus, the same error of 3% is applied in the following models estimating numbers on teacher attrition among young teachers

3.2.2 The First Model

As previously states, the first model relies on two assumptions. Firstly, the model assumes that the proportion between new entrants aged less than 25 and new entrants aged 26-35 is constant over time. Secondly, the models make the calculations using the assumption that all teachers aged 25 or less are entrants to the teaching profession.

The first approach for estimation of the yearly number of entrants by age groups uses a constant ratio between entrants aged 25 and less, and entrants aged 26-35. According to MEYS, in 2017, there were 1925 teachers (recalculated to full-time posts) entering basic education and 670 teachers entering secondary education. The numbers of entrants can be divided into two groups based on age: under and 25 years old, and 26-35 years old. Assuming all teachers aged 25 or less are new entrants to the teaching profession, the number of entrants aged 26-35 is represented by subtracting the entrants aged 25 or less from the total number of entrants. The proportion of each age group among new entrants is calculated by dividing the number of entrants within each age group by the total number of entrants. The proportion is expressed as a percentage. These numbers are next used for estimating the total number of entrants between 2008 and 2016 where no direct data on entrants to the teaching profession was published by MEYS. The results are given in Table 12 and Table 13. In these tables, the estimations are coloured yellow and the data available from MEYS blue.

Table 12: Total number of entrants to the teaching profession in basic education between 2008 and 2017

School Year	Total number of entrants		Number of entrants by age groups			
			under 25		26-35	
	Percentage	Number	Percentage	Number	Percentage	Number
2008	100%	4,230	43.32%	1,833	56.68%	2,397
2009	100%	3,694	43.32%	1,601	56.68%	2,094
2010	100%	3,358	43.32%	1,455	56.68%	1,903
2011	100%	2,836	43.32%	1,229	56.68%	1,607
2012	100%	4,239	43.32%	1,836	56.68%	2,402
2013	100%	3,582	43.32%	1,552	56.68%	2,030
2014	100%	3,458	43.32%	1,498	56.68%	1,960
2015	100%	1,693	43.32%	734	56.68%	960
2016	100%	1,781	43.32%	772	56.68%	1,009
2017	100%	1,925	43.32%	834	56.68%	1,091

Note: The data for the total number or entrants and the number of teachers aged 25 or less from MYES (2017). The estimates are coloured yellow and the data from MEYS blue.

Source: Author's illustration and calculation

Table 13: Total number of entrants to the teaching profession in secondary education between 2008 and 2017

School Year	Total number of entrants		Number of entrants by age groups			
			under 25		26-35	
	Percentage	Number	Percentage	Number	Percentage	Number
2008	100%	3,680	21.79%	802	78.21%	2,878
2009	100%	3,332	21.79%	726	78.21%	2,606
2010	100%	2,799	21.79%	610	78.21%	2,189
2011	100%	2,157	21.79%	470	78.21%	1,687
2012	100%	3,355	21.79%	731	78.21%	2,624
2013	100%	2,226	21.79%	485	78.21%	1,741
2014	100%	1,872	21.79%	408	78.21%	1,464
2015	100%	698	21.79%	152	78.21%	546
2016	100%	652	21.79%	142	78.21%	510
2017	100%	670	21.79%	146	78.21%	524

Note: The data for the total number or entrants and the number of teachers aged 25 or less from MYES (2017). The estimates are coloured yellow and the data from MEYS blue.

Source: Author's illustration and calculation

Table 14 (and Table 15) illustrates the calculations leading to the estimated dropout rates among young teachers in the Czech Republic. Column (1) repeats the

estimated number of new entrants to the teaching profession as shown in Table 12 (and Table 13). Column (2) repeats the total number of teachers below the age of 35 as reported by MEYS. Column (3) repeats the estimated number of teachers below the age of 35 in the next year, after taking into account aging, as presented in Figure 7 and Figure 8 in the appendix. In other words, the number in column (3) is 90% of the number in column (2). To conduct more precise estimates on teacher attrition, the same error of 3% as in the flow model is present in column (3) and propagation of the error is done in the computations that follow. Comparison of column (2) and (3) leads to the estimated number of new teachers that should have entered the profession to compensate for ageing. This number is reported in column (4). It is calculated as the difference between column (2) for the next year and column (3) for the current year. It is visible in the table that the number of new teachers needed to compensate for ageing is much smaller than the number of new entrants to the teaching profession. The difference between these two figures is assumed to be caused by teacher attrition – i.e. the number of teachers less than 35 leaving the profession between two consecutive years. This number is reported in column (5). The estimated dropout rate in column (6) is calculated as the ratio between column (5) and column (1). In other words, the estimated dropout rate representing teacher attrition rate compares the estimated outflow to the estimated inflow of teachers.

The following text equation demonstrate the calculation steps described above to get better understanding of the approach.

*Dropout rate (t): [Total number of entrants (t) – (Reported number of teachers(t)-0.9*Reported number of teachers(t-1) ±3%)] / Total number of entrants (t),*
where *t* stands for the year for which the rate computation is made.

Table 14: Teacher dropout in basic education between 2009 and 2016

	(1)	(2)	(3)	(4)	(5)	(6)
School Year	**Total number of entrants**	**Reported number of teachers**	**Number of teachers remaining**	**Number of teachers needed (including error)**	**Dropout**	**Dropout / Total number of entrants %**
2008	**4,230**	15,428	13,885±417	668±417	-	-
2009	**3,694**	14,553	13,098±393	896±393	**3,026±417**	82%±11%
2010	**3,358**	13,994	12,595±378	311±378	**2,462±393**	73%±12%
2011	**2,836**	12,906	11,616±348	2,341±348	**2,524±378**	89%±13%
2012	**4,239**	13,957	12,561±377	696±377	**1,897±348**	45%±8%
2013	**3,582**	13,257	11,931±358	1,000±358	**2,886±377**	81%±11%
2014	**3,458**	12,931	11,638±349	-326±349	**2,458±358**	71%±10%
2015	**1,693**	11,311	10,180±305	1,278±305	**2,020±349**	119%±21%
2016	**1,781**	11,459	10,313±309	1,382±309	**503±305**	28%±17%
2017	**1,925**	11,695	-	-	-	-
Average of column 6:						**74%±13%**

Note: The same average error of 3% as in the flow model is presented in column (3). Propagation of the error is seen is done for column (4), column (5), column (6), and the average dropout rate at the bottom of the table.

Source: Author's illustration and calculation

Table 15: Teacher dropout in secondary education between 2009 and 2016

	(1)	(2)	(3)	(4)	(5)	(6)
School Year	**Total number of entrants**	**Reported number of teachers**	**Number of teachers remaining**	**Number of teachers needed**	**Dropout**	**Dropout / Total number of entrants %**
2008	**3,680**	9,900	8,910±267	897±267	-	-
2009	**3,332**	9,807	8,826±265	591±265	**2,437±267**	73%±8%
2010	**2,799**	9,417	8,475±254	-105±254	**2,209±265**	79±9%
2011	**2,157**	8,370	7,533±226	998±226	**2,262±254**	104%±12%
2012	**3,355**	8,531	7,678±230	-162±230	**2,357±226**	70%±7%
2013	**2,226**	7,516	6,764±203	-70±203	**2,388±230**	107%±10%
2014	**1,872**	6,694	6,025±181	-833±181	**1,943±203**	104%±11%
2015	**698**	5,192	4,673±140	101±140	**1,530±181**	219%±26%
2016	**652**	4,774	4,297±129	31±129	**550±140**	84%±22%
2017	**670**	4,328	-	-	-	-
Average of column 6:						**105%±13%**

Note: The same average error of 3% as in the flow model is presented in column (3). Propagation of the error is seen is done for column (4), column (5), column (6), and the average dropout rate at the bottom of the table.

Source: Author's illustration and calculation

As shown in Table 14 and Table 15, the average estimated annual attrition rate among young teachers is 74% for basic education and 105% for secondary education. Even though, the error is estimated at 13% for both education levels, the results of the first model indicate high attrition rate among young teachers both in basic and secondary education in the Czech Republic.

To demonstrate the issue, the results of the first model are compared with the results of the second model at the end of this chapter.

3.2.3 The Second Model

The first model assumed a constant ratio between two different age groups of entrants for every year. However, the ratio may vary in years also as a consequence of the reform in the Czech education system. In 2005, change in requirements for becoming a teacher was implemented, when a person must (newly) obtain a university qualification at master's level in order to be employed as a teacher. Teachers were provided with sufficient time (originally 5 years, later extended again to 2015) to obtain

the required qualification. The reform implementing stricter requirements may lead to fewer individuals entering the teaching profession, particularly to fewer young entrants in the age of 25 or less.

The second model therefore approaches the issue from a different perspective. The estimations made in the second model relies on the assumption, that there is a constant proportion between two ratios - the number of teachers aged 35 and less (denoted by T) and the total number of university graduates (denoted by G), and the number of entrants (denoted by E) and the total number of university graduates (G). In other words, the model uses the assumption that

$$(T/G) / (E/G) = constant.$$

Therefore,

$$T/E = constant.$$

The total number of teachers in the age 35 and less is calculated as the sum of the numbers of teachers in two age groups: the number of teachers aged 25 and less, and the number of teachers aged 26-35. The number the new entrants (E) was reported for the year 2017 by MYES. Thus, the ratio for the year 2017 can be calculated. The 2017 ratio between the number the new entrants (E) and the number of teachers aged 35 (T) is 0.177 and 0.155 for basic and secondary education respectively (Table 16). Data on total number of university graduates is published yearly by MYES and is shown in the table for informative purposes only.

Then, the constant ratio is used for estimating the total number of entrants between 2008 and 2016. The estimated number of entrants is calculated as the multiplication of the total number of teachers aged 35 and less, and the constant ratio. The results are given in Table 16. In the table, the estimations of the number of entrants are coloured yellow and the data available from MEYS blue.

Table 16: Total number of entrants to the teaching profession in basic and secondary education between 2008 and 2017

School Year	Total number of university graduates	Age group 35 and less					
		Basic education			Secondary Education		
		Teachers	Entrants	Ratio	Number	Entrants	Ratio
2008	73,250	13,596	2,410	0.177	9,900	1,535	0.155
2009	81,757	12,953	2,296	0.177	9,807	1,520	0.155
2010	88,075	12,540	2,223	0.177	9,417	1,460	0.155
2011	93,104	11,678	2,070	0.177	8,370	1,297	0.155
2012	94,090	12,121	2,148	0.177	8,531	1,322	0.155
2013	91,692	11,705	2,075	0.177	7,516	1,165	0.155
2014	88,187	11,433	2,026	0.177	6,694	1,038	0.155
2015	82,037	10,578	1,875	0.177	5,192	805	0.155
2016	77,382	10,687	1,894	0.177	4,774	740	0.155
2017	72,057	10,860	1,925	0.177	4,328	670	0.155

Note: The data for the total number or entrants, the number of teachers aged 35 or less, and the number of university graduates from MYES (2018). The estimates are coloured yellow and the data from MEYS blue.

Source: Author's illustration and calculation

As the last step, the estimated dropout rate is computed in the second model the same way as in the first model (see pages 33 and 34). The estimations are shown in Table 17 and Table 18.

Table 17: Teacher dropout in basic education between 2009 and 2016

	(1)	(2)	(3)	(4)	(5)	(6)
School Year	**Total number of entrants**	**Reported number of teachers**	**Number of teachers remaining**	**Number of teachers needed**	**Dropout**	**Dropout / Total number of entrants %**
2008	2,410	15,428	13,885±417	668±417	-	-
2009	2,296	14,553	13,098±393	896±393	**1,628±417**	71%±18%
2010	2,223	13,994	12,595±378	311±378	**1,326±393**	60%±18%
2011	2,070	12,906	11,616±348	2,341±348	**1,759±378**	85%±18%
2012	2,148	13,957	12,561±377	696±377	**-193±348**	-9%±16%
2013	2,075	13,257	11,931±358	1,000±358	**1,379±377**	66%±18%
2014	2,026	12,931	11,638±349	-326±349	**1,027±358**	51±18%
2015	1,875	11,311	10,180±305	1,278±305	**2,201±349**	117%±19%
2016	1,894	11,459	10,313±309	1,382±309	**616±309**	33%±16%
2017	1,925	11,695	-	-	-	-
Average of column 6:						**59%±18%**

Note: The same average error of 3% as in the flow model is presented in column (3). Propagation of the error is seen is done for column (4), column (5), column (6), and the average dropout rate at the bottom of the table.

Source: Author's illustration and calculation

Table 18: Teacher dropout in secondary education between 2009 and 2016

	(1)	(2)	(3)	(4)	(5)	(6)
School Year	**Total number of entrants**	**Reported number of teachers**	**Number of teachers remaining**	**Number of teachers needed**	**Dropout**	**Dropout / Total number of entrants %**
2008	1,533	9,900	8910±267	897±267	-	-
2009	1,518	9,807	8826±265	591±265	**621±267**	41%±18%
2010	1,458	9,417	8475±254	-105±254	**867±265**	59%±18%
2011	1,296	8,370	7533±226	998±226	**1,401±254**	108%±20%
2012	1,321	8,531	7678±230	-162±230	**323±226**	24%±17%
2013	1,164	7,516	6764±203	-70±203	**1,325±230**	114%±20%
2014	1,036	6,694	6025±181	-833±181	**1,107±203**	107%±20%
2015	804	5,192	4673±140	101±140	**1,636±181**	204%±22%
2016	739	4,774	4297±129	31±129	**638±140**	86%±19%
2017	670	4,328	-	-	-	-
Average of column 6:						**93%±19%**

Note: The same average error of 3% as in the flow model is presented in column (3). Propagation of the error is seen is done for column (4), column (5), column (6), and the average dropout rate at the bottom of the table.

Source: Author's illustration and calculation

As shown in Table 17 and Table 18, the average estimated annual attrition rate among young teachers is 59% for basic education and 93% for secondary education. Even though, the error is estimated at 18% for basic education and 19% for secondary education, the results of the second model support the hypothesis of high attrition rate among young teachers in the Czech Republic.

3.2.4 Findings and Discussion

First, it is encouraging to compare the results of both models constructed in the paper. Both approaches used in the models indicate higher attrition rate in secondary education than in basic education. This may be linked to the fact that there are those subject areas in secondary education which provide more opportunities outside education. The attrition rate among young teachers in basic education was estimated at 74% in the first model and at 59% in the second model, while the attrition rate in secondary education was estimated at 105% and at 93% respectively. Taking into account the estimated errors in the estimations, the results seem to be relatively consistent with each other. Thus, the models' estimates for attrition rate suggest the magnitude of the issue.

High attrition rate among young teachers together with long-term decreasing trend in number of young entrants to the profession and growth in numbers of those approaching retirement may result in teacher shortages.

Even though the constructed models may be valid, there may be experimental errors resulting from lack of the longitudinal national data. Because the results cannot be compared with other studies, the models' estimates may not to be an accurate representation of the real situation. The estimates provide a better understanding of the trend on teacher attrition among young teachers, rather than precise measurements of the dropout rate.

Next, the results are most likely affected by teacher migration between schools. Although teacher migration between basic and secondary school does not decrease the overall net supply of teachers, it would have an impact on the estimates of the dropout rate. These findings, therefore, need to be interpreted with caution and further studies, which take additional variables into account, will need to be undertaken in the future. Yet, these findings raise intriguing questions regarding the nature and the effect of the teacher dropout.

The teacher dropout numbers were discussed only quantitatively without mentioning anything about their quality due to lack of data. Nevertheless, researchers examining the teacher attrition highlight the importance of the nature of the attrition that should not be overlooked. Several studies claim that the best teachers with the strongest skills, or those working in subject areas which provide more opportunities are the ones most likely to leave teaching (Chapman, 1994; Guarino et al., 2004). Those teachers have the most employment alternative unlike the poorest-performing teachers, who lack other job alternatives and therefore tend to stay in teaching.

The dropout rate for young teachers and teacher turnover are serious problems that should be productively addressed. In view of the findings of this bachelor thesis, it is important to suggest some directions for future research. First, understanding of why teacher attrition occurs and addressing the most important factors that cause the dropout of young teachers is crucial. Teachers may not leave teaching simply for better jobs but for other personal reasons, such as departures for pregnancy, health problems and others. Secondly, attention should be paid to what can be done to prevent teacher attrition. It should be the aim of any government to make teaching more attractive including increasing teacher salaries, rather than covering financial costs associated with teacher attrition. Furthermore, it is necessary to emphasize the need for reliable empirical data, and improved data collection efforts followed by additional studies that would allow for developing a full picture of the teacher dropout. In addition, it is important to note the lack of data on teacher turnover available in the Czech Republic and, therefore, the impossibility to conduct more precise calculations.

Conclusion

Teachers form the core of the school system, and they are an important school-determinant for quality in education and education outcomes. The performance and efficiency of the education system are highly associated with the quality of the teaching population. Evidence on the career decisions of teachers shows that financial compensation strongly influences who enters the teaching profession, who stays in teaching, and who decides to leave this career path.

The aim of this bachelor thesis was to examine the salary level of teachers in the Czech Republic and its possible impacts on the teaching workforce and particularly on the dropout rate for young teachers. The main contribution presented in this thesis is a

first-time dropout analysis of young Czech teachers that provides important insights into early career attrition.

First, despite ongoing debates over the adequacy of teacher compensation, Ministry's incentives have not lead to notable changes and a long-term significant rise in the level of teacher compensation. Political commitment to this issue seems to be lacking, and the Ministry of Education has failed to put in place a coherent strategy and have focused instead on piecemeal initiatives. There is an urgent need for new approach, systematic strategy and policy to improve teacher recruitment and retention. If the policy goal is to improve the quality of the entire teaching workforce, then an adequate raise in teacher salaries, which would stimulate interest in the teaching profession, is inevitable.

Next, based on the national statistical data, this bachelor thesis builds up the dropout rate analysis estimating teacher attrition among young teachers. Notwithstanding, this particular issue contribution has several limitations, the Czech Republic seems to be experiencing high rates of attrition.

Furthermore, the Czech government is currently faced with the loss of large numbers of retiring teachers, and there are concerns about a lack of teachers willing to step into the teaching career in the future. All together with high attrition among young teachers in the education sector, it may mean upcoming shortages in the teaching workforce. Furthermore, gender trends in the teaching profession remain a matter for concern. Decreasing share of male teachers over the past decade does not suggest an improvement in gender parity.

Finally, improving overall teacher quality require introducing and implementing effective policies that do not solely focus on changing the composition of current compensation but also on an actual increase in compensation. The salary level of Czech teachers should increase significantly in order to make the teaching profession more attractive particularly for young graduates and therefore counter the ageing of the teaching workforce. Lack of teachers in the education system, either quantitative or qualitative, most likely result in the inefficient functioning of the system. Additionally, there is a need for better monitoring of teacher attrition and more comprehensive research on this topic.

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List of Tables and Figures

List of Figures

List of Tables

Appendix

Figure 7: Teacher flow in basic education between 2008 and 2017

Year	under 35		36-45		46-55		56 and more	
2008	15428	1543	19094	1909	17282	1728	7688	1663
	13885		18727	102.2%	17463	98.4%	7753	99.6%
2009	14553	1455	18331	1833	17748	1775	7784	1539
	13098		17953	101.8%	17807	97.1%	8020	99.5%
2010	13994	1399	17637	1764	18334	1833	8057	2228
	12595		17273	98.5%	18264	95.6%	7663	92.9%
2011	12906	1291	17545	1754	19113	1911	8251	1084
	11616		17081	98.4%	18956	103.1%	9078	113.9%
2012	13957	1396	17356	1736	18388	1839	7968	1201
	12561		17016	96.5%	18284	97.6%	8606	99.5%
2013	13257	1326	17628	1763	18740	1874	8645	1400
	11931		17190	95.8%	18628	97.4%	9119	100.0%
2014	12931	1293	17940	1794	19135	1913	9123	1675
	11638		17439	96.0%	19015	98.0%	9361	82.5%
2015	11311	1131	18159	1816	19407	1941	11343	1788
	10180		17475	93.9%	19283	98.7%	11495	95.6%
2016	11459	1146	18618	1862	19531	1953	12027	1203
	10313		17902	95.4%	19440	99.0%	12778	99.0%
2017	11695	1169	18761	1876	19640	1964	12909	

	reported numbers
	flow (ageing or retirement)
1000	predicted number of teachers
100.0%	accuracy (prediction/reported number)

Source: Author's illustration and calculation

Figure 8: Teacher flow in secondary education between 2008 and 2017

Year	under 35		36-45		46-55		56 and more	
2008	9900	990	11851	1185	15353	1535	9630	1972
	8910		11656	103.2%	15003	94.7%	9194	96.3%
2009	9807	981	11290	1129	15849	1585	9543	1792
	8826		11142	104.1%	15393	97.1%	9336	99.2%
2010	9417	942	10702	1070	15856	1586	9409	2477
	8475		10574	100.8%	15341	95.1%	8518	95.9%
2011	8370	837	10486	1049	16136	1614	8884	1120
	7533		10274	102.6%	15571	103.7%	9378	114.1%
2012	8531	853	10017	1002	15022	1502	8219	1204
	7678		9868	99.5%	14522	100.5%	8630	103.6%
2013	7516	752	9915	992	14451	1445	8332	1338
	6764		9675	97.2%	13997	101.4%	8717	101.2%
2014	6694	669	9957	996	13809	1381	8610	1806
	6025		9631	97.3%	13424	105.1%	10090	96.0%
2015	5192	519	9902	990	12778	1278	10515	1668
	4673		9431	95.7%	12490	101.4%	10722	96.5%
2016	4774	477	9858	986	12324	1232	11113	1111
	4297		9350	93.7%	12077	101.1%	11234	94.7%
2017	4328	433	9983	998	11947	1195	11857	1186

	reported numbers
	flow (ageing or retirement)
1000	predicted number of teachers
100.0%	accuracy (prediction/reported number)

Source: Author's illustration and calculation