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Teacher-rector gender match effects in Swedish private schools

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Abstract

A growing body of economic research incorporates insights from social psychology into standard economic analysis to study how group membership and social context affect economic agents. My paper fits into this literature by investigating gender similarity effects in the manager-employee relationship within the context of Swedish private schools. To this end, I use 2010 and 2011 employee survey data from the largest private education provider in Sweden. Through three specifications accounting for unobserved cluster effects, I estimate the impact of teacher-rector gender match on several outcomes, separately for each gender. Focusing on the *relative* gender match (modelled by a 'difference-in-difference' estimate), I find that teachers of a specific gender working for a same-gender rector (1) report a relatively higher motivation, employee experience and job satisfaction, (2) are relatively more satisfied by their rector as manager and perceive relatively more positively the management skills and behaviour of their rector than when working for a rector of opposite gender (relative to teachers of opposite gender). Moreover, among teacher-rector pairs of opposite gender, male teachers do not report lower levels of satisfaction or rate more negatively the management of their female rector. Lastly, linking employee with customer survey data, I find no direct or indirect effect of teacher-rector gender match on pupil and parent school satisfaction. Thus, my results suggest a need for caution in using subjective evaluations as the sole performance measure in Swedish private schools.

Keywords: Manager-employee relationship, gender differences, gender bias, private schools

JEL: J50, J16, Z13, I21

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1 Introduction

Groups have become a persistent feature of life in society. Individuals tend to associate with others sharing similar characteristics as they are more likely to connect and interact with each other than with dissimilar individuals (McPherson, Smith-lovin, & Cook, 2001). While this phenomenon has long been captured by social psychologists, standard economic analysis typically rests on the assumption that behaviour of economic agents is only determined at the *individual* level (Charness, Rigotti, & Rustichini, 2007; Chen & Li, 2009). Hence, a growing body of economic researchers, starting with Akerlof and Kranton (2000), extends standard economic analysis by also considering the effects of group affiliation and the social context in which economic agents evolve. This new strand of literature offers a novel and alternative perspective to standard economic theories and has the potential to shed new light on economic issues, such as gender discrimination.

Specific examples within education include the effects of gender similarity¹ between a pupil and a teacher. Pupil-teacher gender match has been of special interest for public economists as gender similarity may positively impact educational opportunities and outcomes, and thereby influence demographic gaps in educational achievement (see e.g. Antecol, Eren, & Ozbeklik, 2013; Dee, 2005; Nixon & Robinson, 1999).

My paper applies this gender matching literature to labour economics by investigating how gender similarity affects the employer-employee relationship within the educational context. In comparison with pupil-teacher gender match, there has been less research investigating the effects of *teacher-rector* gender match (Ballou & Podgursky, 1995; Grissom, Nicholson-Crotty, & Keiser, 2012; Lee, Smith, & Cioci, 1993; Marvel, 2015; Pedersen & Nielsen, 2016). The school context is particularly suitable to examine the impact of manager-employee gender match as this relationship is formalised and thus directly comparable across and within schools: all schools are directed by a rector to which teachers directly or indirectly report.

The purpose of this study is to examine the effects of working for a same gender rector for male and female teachers and thereby to investigate the *relative* effects of teacher-rector gender match on (1) teacher satisfaction, (2) rector management as evaluated by teachers, as well as (3) pupil and parent school satisfaction. Specifically, I attempt to answer the following research questions:

- (1) *Do male and female teachers exhibit relatively higher levels of motivation, overall employee experience and/or job satisfaction when working for a same-gender rector?*
- (2) *Do male and female teachers report a relatively higher satisfaction with their rector as manager and/or a relatively better perception of the management skills/behaviour of their rector and of the school management climate when the rector is of same gender?*
- (3) *Does teacher-rector gender match directly or indirectly (i.e. mediated by how teachers are satisfied with and perceive the management of their rector) affect pupil and parent school satisfaction?*

¹In the study, I use the terms gender similarity, gender match, gender matching and gender congruence interchangeably. All indicate that two people are sharing the same gender (i.e. two women, or two men).

To this end, I rely on 2,945 teacher responses to employee surveys from 2010 and 2011 together with 14,752 pupil and parent responses to a customer survey from 2010 that were conducted in around 100 Swedish private schools. Using pooled OLS with clustered standard errors, school brand fixed effects and school fixed effects as specification models, I account for unobserved cluster effects in the sample. In each specification, gender match is modelled by interacting teacher and rector dummy variables and thus corresponds to a '*difference-in-difference*' estimate. Specifically, the estimate compares the relative advantage of female (male) teachers working for a female (male) rector - as opposed to a male (female) rector - with the relative disadvantage of male (female) teachers working for a female (male) rector - as opposed to a male (female) rector.

Focusing on Swedish private schools in my analysis presents several advantages. First, Sweden is a particularly interesting country to look at to analyse gender matching effects, as it is one of the most gender equal countries worldwide (World Economic Forum, 2017) with a relatively low vertical gender segregation in the schooling sector (Skolverket, 2016). Within the Swedish schooling sector, I focus on *private schools*² as pupil and parent school satisfaction is a crucial element of their school success. School attractiveness is highly important for Swedish private schools especially since the school choice reform of 1994 allowing parents to select any school of their choice (Holmlund et al., 2014). Specifically, my dataset includes schools operated by AcadeMedia, the largest private education provider in Sweden. Considering schools belonging to the same company for this type of study has the advantage of holding potential confounding factors constant, such as company culture and structure, while capturing variation in rector gender across schools.

Teacher satisfaction, teacher perception of management and pupil/parent school satisfaction are relevant measures to look at as they are closely connected to school effectiveness. School effectiveness has typically been defined as school characteristics enhancing learning outcomes irrespective of pupil characteristics (Scheerens, 2000). Previous studies show that *teacher satisfaction* is positively associated with higher pupil achievement (e.g. Griffith, 2004; Michaelowa, 2002; Ostroff, 1992). Likewise, there is evidence indicating that *teacher perception of their rector* and the school management itself influence pupil test scores (Bloom, Lemos, Sadun, & Van Reenen, 2015; Grissom & Loeb, 2011; Hallinger & Heck, 1998; Robinson, Lloyd, & Rowe, 2008). Thereby, authors argue that teacher satisfaction with their job and supervisor plays a large role in determining their behaviour which in turn is decisive for knowledge transfer. Studies with a broader definition of school effectiveness also encompass *student satisfaction* as one important aspect besides learning outcomes (e.g. Cameron, 1978; Ostroff, 1992).

Overall, my results indicate positive gender similarity effects in relative terms which are consistent across the three empirical specifications. In particular, I find that teachers of a specific gender sharing the gender of their rector report relatively a greater motivation, overall employee experience and job satisfaction than teachers not sharing the gender of their rector (relative to teachers of opposite gender). Furthermore, teachers working for a

²Throughout the paper, I use the terms private school and independent school interchangeably to refer to Swedish *fristående skola* (also called *friskola*).

same-gender rector appear relatively more satisfied by their rector as manager and perceive relatively more positively the management skills and behaviour of their rector than teachers with a rector of different gender (relative to teachers of opposite gender). However, I do not find evidence that male employees perceive more negatively their female manager than female employees do towards their male manager (i.e. no social norm effects). Finally, I fail to find that teacher-rector gender match *directly* or *indirectly* (mediated by how teachers are satisfied with and perceive the management of their rector) impacts pupil and parent school satisfaction.

The contribution of my thesis is twofold. First, my paper is the first study to empirically test whether previous results about manager-employee gender matching in the educational context hold in a different cultural setting, i.e. that of Sweden. As far as I am aware, all previous studies investigating the effects of teacher-rector gender matching (except Pedersen & Nielsen, 2016) are carried out in the context of US public schools. These US schools are characterised by a large discrepancy between the proportion of female teachers and that of female rectors. While this may be representative of the US school context, it is uncertain whether the results hold in a context less prone to vertical segregation, such as that of Swedish schools. Since the social context and prevailing gender norms may play an important role (Akerlof & Kranton, 2000), this previous research offers a limited view on gender matching effects.

Second, my paper is novel in exploring a new dimension of teacher-rector gender match effects, namely pupil and parent school satisfaction. To the best of my knowledge, no previous study investigates whether teacher-rector gender match effects translate to pupil outcomes. There are reasons to believe that teacher-rector gender match may also influence school outcomes at the pupil level, as another body of research provides evidence that school management and rector characteristics impact pupil outcomes. Most of that literature focuses on the effects of school leadership on student achievement (e.g. Bloom, Lemos, Sadun, & Van Reenen, 2015; Coelli & Green, 2012; Dhuey & Smith, 2014), while few papers consider other measures of school success. The latter group suggests that rector characteristics and school management do not only matter for student achievement, but also for other measures of school performance such as teacher satisfaction and parent assessment of the school (Grissom & Loeb, 2011; Lai, Klasik, & Loeb, 2014). Thus, I enrich this body of literature by studying how teacher perception of rector management impacts pupil and parent school satisfaction, a relatively under-studied aspect of school performance.

The remainder of the paper is structured as follows. I start by providing background information about Swedish private schools and gender segregation in the labour force of Swedish schools in Section 2. I discuss relevant previous literature in Section 3. Then, I present the dataset and describe the sample used for the analysis in Section 4. I proceed by outlining my empirical strategy in Section 5. Thereafter, I present my results and conduct robustness checks in Section 6. In Section 7, I discuss my findings in light of previous studies, before assessing the internal and external validity of my study. Lastly, Section 8 summarizes the paper and concludes.

2 Background

This section aims at providing the information required to better understand the context of the study. I present the Swedish independent schooling sector and AcadeMedia in Section 2.1, before highlighting gender segregation in the teacher and rector occupations in Sweden in Section 2.2.

2.1 The Swedish independent school market

Most schools in Sweden are municipal schools, i.e. schools operated by municipalities (Båvner et al., 2011). The school system also includes independent schools (*fristående skola* or *friskola*) which operate preschools, compulsory schools and upper secondary schools³. These independent schools refer to non-public schools benefiting from municipal grants. They may be run by e.g. private companies or non-profit organizations (Eurydice EACEA, 2018b). As stated in the Education Act (*Skollagen*), independent schools are open to all pupils of corresponding study level in public schools.

In Sweden, the independent schooling sector makes up of almost one quarter of the school market. In the academic year 2016/2017, 22% of preschools, 17% of compulsory schools and 33% of upper secondary schools were independent schools (Eurydice EACEA, 2018b). This penetration of independent school providers has been triggered by the education reforms undertaken by Sweden in the early 1990's. The country implemented a national voucher system in 1992 that enabled independent school providers to run schools and obtain public funding (Sahlgren, 2016). Thereafter, the school choice reform of 1994 enabled parents to select any school of their choice (Holmlund et al., 2014). In the aftermath of these educational reforms, the share of independent school providers in the Swedish school market has substantially increased going from 1% in 1992 (Sahlgren, 2016) to nearly 25% in 2016/2017 (Eurydice EACEA, 2018b).

AcadeMedia is by far the largest independent education provider in Sweden (AcadeMedia, 2016). The group was founded in 1996 and gathers several companies which operate as subsidiaries (AcadeMedia, 2018a). These subsidiaries correspond to different school brands that are independently managed and possess their own education licenses. School brands in turn operate different schools in different locations. In particular, a school brand typically gathers schools from the same study level, i.e. either preschools, compulsory schools or upper secondary schools. School brands operating upper secondary schools differ in their program specialisations: for instance, the brand Rytmus runs different schools with a music orientation, while the brand NTI Gymnasiet focuses on programs in the IT and media industry

³The school system in Sweden is divided into three levels, namely preschool (*förskola*), compulsory school (*grundskola*) and upper secondary school (*gymnasieskola*) (Båvner, Barklund, Hellewell, & Svensson, 2011). Preschool is targeted to children between one and five years old (Eurydice EACEA, 2018a). Compulsory school welcomes children from the age of six to sixteen. Upper secondary school encompasses three study years.

(AcadeMedia, 2018c). At the end of June 2015, 29,000 children and pupils were enrolled in Swedish preschools and compulsory schools of the AcadeMedia group (AcadeMedia, 2015, p. 14). Upper secondary schools welcomed 24,000 pupils in the same time period. Figure 1 depicts the geographical repartition of preschools, compulsory schools and upper secondary schools belonging to the AcadeMedia group.



Source: (AcadeMedia, 2018b)

Figure 1: Repartition of AcadeMedia schools by school type across Sweden

2.2 Gender segregation in the labour market of Swedish schools

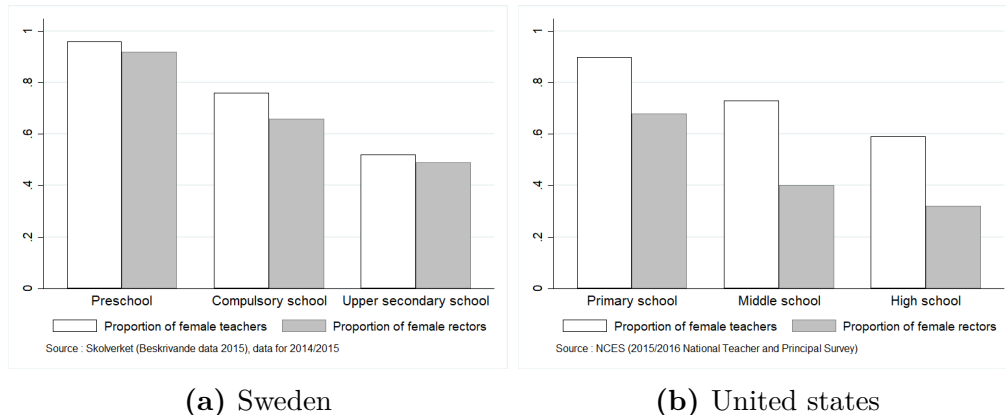
In this section, I briefly present the gender segregation in the teaching body and rector profession within Swedish schools.⁴ To benchmark, comparisons are made with US schools in which most previous studies about teacher-rector gender match are conducted (see Section 3.1.2).

Sweden is recognized as one of the most gender equal countries globally, as evidenced by its first place in the European Gender Equality Index 2017 (European Institute for Gender Equality, 2017) and its fifth position in the Global Gender Gap Report 2017 (World Economic Forum, 2017). Yet, gender segregation is still prevailing in the Swedish labour market, especially among the teaching workforce (Statistics Sweden, 2018). Thereby, differences are observable depending on the type of school. In the academic year 2014/2015, 96% of preschool teachers were women (Skolverket, 2016). This occupation of preschool teaching is the most female dominated in Sweden (Statistics Sweden, 2018). The proportion of female

⁴The statistics presented in this section encompass Swedish *public* schools, since this information is publicly available, as opposed to statistics about Swedish *independent* schools. Numbers may slightly differ in Swedish independent schools, but the general picture likely remains the same.

teachers decreases to 76% for compulsory schools and to only 52% for upper secondary schools in the academic year 2014/2015 (Skolverket, 2016).

US public schools display a similar pattern of lower female representation in the teaching body for higher school levels: in the academic year 2015/2016, women made up 90% of US primary school teachers, 73% of US middle school teachers, and 59% of US high school teachers (NCES, 2017, p. 8).⁵ Hence, the teaching body of both Swedish and US schools is prone to horizontal gender segregation (i.e. unbalanced gender composition in the teaching occupation) which is more prevailing for lower school levels.



Note: The three school types for Sweden and the US are not directly comparable as they are specific to each country and welcome pupils of different ages.

Figure 2: Gender composition of teachers and rectors by school type in Sweden and the US

In contrast, vertical segregation seems to be lower among Swedish schools compared to US schools. As depicted in panel (a) of Figure 2, the proportion of female rectors is close to that of female teachers for each school type in Sweden. In the academic year 2014/2015, 92% of preschool rectors, 66% of compulsory school rectors and 49% of upper secondary school rectors were women (Skolverket, 2016). However, there is a large discrepancy between the gender composition of the teaching body and that of the rector profession for each school type in US schools (panel (b) of Figure 2). In particular, while women dominate the teaching workforce in US middle and high schools, they are underrepresented at the top position, as men account for more than half of rectors in these school types in the academic year 2014/2015 (NCES, 2017, p. 7). Thus, the rector profession seems to be more accessible for women in Sweden than in the US.

⁵Note that these statistics per school type cannot directly be compared between Sweden and the United States, since the school types are specific to each country and differ in terms of pupil age.

3 Literature review

3.1 Gender matching

As the main body of literature to which my paper contributes is that of gender matching, I dedicate most of the literature review to prior research in this area. I first relate gender matching to economic theories of discrimination, before outlining the main theoretical foundations of gender matching which derive from psychology and sociology (Section 3.1.1). Particular emphasis is laid on the economic modelling of these theories through the Identity Economics framework of Akerlof and Kranton (2000). Thereafter, I present the main results from empirical studies on gender matching within the educational context, focusing on teacher-rector gender match (first part of Section 3.1.2). I also summarize insights from empirical work about manager-employee gender similarity related to upward performance appraisals (second part of Section 3.1.2).

3.1.1 Theoretical foundations of gender matching

Gender matching may result in a same gender bias if individuals favour same-gender others compared to individuals of opposite gender. This is a form of discrimination as distinction is made based on a category, i.e. gender, to which individuals belong. I therefore start by briefly documenting how economic theory accounts for discriminatory behaviour. I proceed by discussing further theoretical foundations of gender matching which can be grouped into two sets of theories (Giuliano, Levine, & Leonard, 2005). The first set focuses on *similarity effects*, while the second set underlines the importance of *social norms*.

Economics of discrimination

Since the pioneering work of Becker (1957), there has been an extensive economic literature focusing on discrimination. Economists typically distinguish between taste-based discrimination (introduced by Becker, 1957) and statistical discrimination (Arrow, 1973; Phelps, 1972). Both types suggest similar outcomes, but the origin of discriminatory behaviour differs. Taste-based discrimination occurs when individuals have a preference, i.e. “taste”, for specific groups and a “distaste” for other groups (Becker, 1957). Hence, an individual experiences disutility if she works together with a member of a group against which she has a distaste. In contrast, *statistical discrimination* is not based on preferences, but results instead from imperfect information. Specifically, discrimination arises when an individual has missing information about another individual and ascribes that person the average characteristics of the group to which the other person belongs (Arrow, 1973; Phelps, 1972).

Moreover, there is a large body of research in experimental economics suggesting that group affiliation may account for discriminatory behaviour against outgroup members, i.e. *outgroup discrimination*. This perspective contrasts with the assumption of standard economic theory that preferences and behaviour of economic agents are only determined at the *individual* level

(Charness, Rigotti, & Rustichini, 2007). Evidence from laboratory experiments suggests for instance that preferences are more favourable for ingroup members (Chen & Li, 2009) and that trust is lower among members of distinct groups (Hargreaves Heap & Zizzo, 2009).

In the context of my thesis, this literature would suggest that a same gender bias in e.g. teacher perception of their rector as manager is a form of discriminatory behaviour of teachers against rectors of the opposite gender.

Similarity effects

The first set of theories predicting a gender matching effect emphasizes the positive consequences resulting from similarity effects.

According to the theory of *relational demography* (Tsui & O'Reilly, 1989), individuals with similar demographic attributes are likely to be drawn to each other and to interact and communicate more frequently (Lincoln & Miller, 1979; McPherson, Smith-lovin, & Cook, 2001; Tsui & O'Reilly, 1989). These interactions in turn may result in enhanced trust and familiarity between similar individuals (Grissom, Nicholson-Crotty, & Keiser, 2012).

Similarly, the field of social psychology includes theories focusing on similarity-dissimilarity effects. Specifically, similarity-attraction theory (Berscheid & Hatfield, 1969; Byrne, 1971) and social identity theory (Tajfel & Turner, 1986) argue that individuals are more likely to identify with similar individuals as similarity facilitates compatibility and mutual understanding. In particular, *similarity-attraction theory* predicts individuals with similar attitudes, values and experiences to be attracted to each other (Byrne, 1971; Byrne, Clore Jr, & Smeaton, 1986; Byrne, Clore Jr, & Worchel, 1966). In contrast, dissimilarity creates a distance between individuals. *Social identity theory* points to the social categories to which individuals belong (e.g. gender) and from which they determine their social identity (Tajfel & Turner, 1986). According to the self-continuity principle, individuals favour similar individuals in order to maintain their social identities continuous (Steele, 1988).

Industrial and organizational psychology applies these theories to the organizational setting with the *person-supervisor fit theory* (Edwards, 2008; Kristof-Brown, 1996; Kristof-Brown, Zimmerman, & Johnson, 2005). A characteristics match between a subordinate and a supervisor is predicted to lead to positive work outcomes.

Thus, in the context of my thesis, this first group of theories would predict that teachers working for same-gender rectors are more satisfied with their job and more motivated in their work, as well as more satisfied with their rector as manager who they perceive to be a better manager, relative to a rector of opposite gender.

Social norms: insights from the Identity Economics framework

The second set of theories related to gender matching highlights the importance of social

norms. In the literature review, I focus on the economic modelling of social norms within the Identity Economics framework developed by Akerlof and Kranton (2000).

Akerlof and Kranton (2000) build an identity model of behaviour by incorporating the insights from social identity theory (Tajfel & Turner, 1979, 1986) into economic analysis. In the model, the behaviour of an economic agent is impacted by her identity, i.e. how she perceives herself. In particular, economic agents belong to social categories that dictate behavioural prescriptions of how they should behave depending on the situation. Economic agents gain utility from conforming to the social norms and ideals of their social category, and loose utility by violating them. The framework also incorporates externalities, where others' actions of violating the social norms decreases one's utility. The authors apply this model to gender in the workplace. Here, the two social categories are man and woman, and the gender norms (i.e. '*gender-job associations*') refer to the jobs commonly associated to man's job (e.g. administrators), and those to woman's jobs (e.g. elementary school teachers) based on gender stereotypes.

This Identity Economics framework has several implications for my thesis. Provided the Swedish private schools context of 2010-2011 is characterised by the gender norms of teacher being rather a woman's job, and school rector a man's job, it is likely that male teachers loose utility by working for a female rector, as this violates the gender norm. This would imply lower overall employee experience, job satisfaction, motivation and satisfaction with their rector for male teachers working for female rectors. Male teachers may also punish their female rector for violating the gender norm by rating her management skills and behaviour more negatively.

The above predictions of the Identity Economics framework rely on the assumption of prevailing gender stereotypes. Predictions differ in the absence of such gender norms. Akerlof and Kranton (2000) indeed model the possibility of an *evolution of social norms*. A cultural shift alleviating gender-job associations would diminish the men's gains (women's losses) in identity, and therefore utility, from working in men's jobs. Such a cultural shift would also decrease the occurrence of externalities, i.e. men punishing women for transgressing gender norms. More women working in previously "male jobs" (e.g. rector), and more men working in previously associated female jobs (e.g. elementary school teacher) would be further evidence of such a cultural shift (Akerlof & Kranton, 2010, p. 90).

Hence, this second set of theories emphasises the importance of the social context for gender stereotypes. As shown in Section 3.1.2, most of the empirical studies about gender matching in the educational setting are carried out in the US context. My thesis enriches the literature by testing whether gender matching results of these US studies differ in the Swedish context in which gender norms are more progressive and vertical segregation in the school context is lower (see Section 2.2).

3.1.2 Empirical evidence of gender matching

Despite supporting theories for a gender match effect, the empirical studies are relatively limited and the effects found are mixed. In this section, I focus on gender matching within the educational context: after briefly outlining the literature about *student-teacher* gender matching, I present the results of studies regarding *teacher-rector* gender match. Lastly, I complement the latter part by summarising the evidence about gender-matching effects on upward appraisals in the employee-manager relationship.

Gender matching in the educational context

There has been extensive literature about potential effects of gender congruence between students and teachers on educational outcomes. This topic arouses attention of public economists examining demographic gaps in educational achievement. Several studies found that *student-teacher* gender match positively impacts student achievements (Antecol, Eren, & Ozbeklik, 2013; Dee, 2005; Muralidharan & Sheth, 2016; Nixon & Robinson, 1999). Dee (2005) has been an influential paper in that strand of literature: the author provides empirical evidence that demographic similarity between a student and a teacher, including gender, positively impacts how teachers perceive student performance. Yet, evidence is mixed as other scholars fail to find such student-teacher gender match effects on educational outcomes (Carrington, Tymms, & Merrell, 2008; Driessen, 2007; Holmlund & Sund, 2008; Marsh, Martin, & Cheng, 2008).

In contrast, there has been fewer research investigating the effects of *teacher-rector* gender matching. Most of these studies were carried out in the context of US public schools and on samples with a highly asymmetric gender composition between teaching and administration. Usually, the majority of teachers are female, while the majority of rectors are male. While this may be representative of the US school context, it is unsure whether the results hold in a different context.

Lee, Smith and Cioci (1993) is one of the first studies to consider teacher-rector gender matching. The authors examine whether teachers perceive the leadership of same-gender rectors as more effective in US schools. In their sample, 44% of teachers are female, while only 10% of rectors are female. They find great differences regarding *female rectors*, whose leadership was seen as very effective by female teachers, but as relatively ineffective by male teachers.

Similarly, Ballou and Podgursky (1995) study teachers' assessment of their rector leadership and find evidence of a gender match effect more pronounced for women. The analysis is conducted in US public schools and is based on US data from the Schools and Staffing Survey (SASS). The authors find that *female teachers* view their female rectors as more supportive and better leaders than male rectors (ibid. p.249-250). On the other hand, there are no significant differences between how male teachers rate female and male rectors. Again, the study relies on a sample with a large discrepancy between the gender composition

of teachers and rectors: 68% of teachers are female, while only 18% of rectors are female.

A more recent study by Grissom, Nicholson-Crotty and Keiser (2012) has been influential in the gender matching literature for public schools. The authors also used data from SASS about US public schools, but for the period 2003-2004. As for the two previous studies, the dataset contains an “asymmetry of female representation in teaching and administration” (Grissom et al., 2012, p. 658), as the large majority of the teaching body is female (76%), while less than half (46%) of rectors are female. The results suggest that teacher-rector gender match plays little role in school with male rectors, but that in schools with *female rectors*, *male teachers* were less satisfied with their job and more likely to turn over.

Using the same dataset of US public schools and incorporating two extra years, Marvel (2015) explores whether teachers exert more effort when sharing the gender of their rector. Results suggest that teacher-rector gender match positively impacts the number of hours worked by *female teachers*, but not that of male teachers. The author investigates three possible explanations for the results, and finds more empirical support (although only partial) for role-modelling, i.e. female teachers emulating the efforts of their female rector.

Lastly, a recent study by Pedersen and Nielsen (2016) analyses teacher-rector gender matching in a different context than the US public school setting, namely Danish public schools. The study points to adverse gender match effects on bureaucratic accountability for *male teachers*: male teachers seem to be more goal aligned with the school, and to comply more with the school rules and regulations when working for a female rector relative to a male rector.

Manager-employee gender match effects on upward assessments

Gender matching has also been studied outside of the school context. Specifically, gender congruence in the manager-employee relationship has been a highly researched topic. I dedicate the remainder of this section to the subset of literature dealing with gender matching effects on upward performance assessments, as this is relevant for this paper. To my knowledge, only few studies look at upward appraisals by examining whether an employee evaluates more positively a same-gender manager. My paper contributes to this strand of literature by analysing whether employees are more satisfied with and perceive more positively the skills and behaviour of their manager, when they share the same gender. I also enrich the literature by exploring whether this effect translates to customer satisfaction.

There is a large body of research investigating whether a manager assesses more positively the performance of a same-gender employee (e.g. Hassan & Hatmaker, 2015; Mobley, 1982; Pulakos, White, Oppler, & Borman, 1989; Tsui & O'Reilly, 1989). Compared to top-down performance ratings, upward assessments have received more limited attention in the gender matching literature. In the school context, Lee et al. (1993) together with Ballou and Podgursdsky (1995) study whether teachers rate more positively the leadership of same-gender-rectors and find evidence for a gender matching effect among female teachers. Outside of the school context, Vecchio and Bullis (2001) report that subordinates rate supervisors of same gender more positively in the US army, by exhibiting higher level of satisfaction with

management.

In the US city government setting, Goldberg, Riordan and Zhang (2008) explore whether supervisor-subordinate demographic similarity, including gender match, positively impacts how subordinates perceive the leadership ability of their supervisor. The authors fail to find evidence for such a relationship and emphasize the importance of social status. Their results suggest that members of the high-status group, male employees in this case, favour members from their own group, i.e. their male supervisor, in order to enhance their identity, leading to a gender matching effect. The opposite is true for female subordinates (i.e. low status group) who enhance their identities by favouring members from the other group, namely male supervisors.

3.2 Rector characteristics, school management and school effectiveness

Besides gender matching, my thesis contributes to the body of literature emphasising the importance of school management and rector characteristics for school outcomes. Most of the previous research focuses on the effects of school leadership on student achievement, while few papers consider other measures of school success. My study enriches the literature by investigating how teacher satisfaction with and perception of rector management affect pupil and parent school satisfaction, a relatively under-studied educational outcome.

The literature has long recognised the key role of rectors for school outcomes. Early studies date back from the 80's and originally focused on *instructional leadership* (see e.g. Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979; Edmonds 1979; Leithwood & Montgomery, 1982), i.e. the ability of rectors to facilitate teaching and learning at school (Murphy 1988). Yet, this body of literature has been criticized to adopt a narrow perspective of the school rector responsibilities by omitting other important aspects of the rector work (Grissom & Loeb, 2011). In particular, other scholars argue for the importance of considering both managerial responsibilities and instructional leadership when defining the job of the rector (Murphy, 1998; Stronge, 1993).

Thus, more recent studies have focused on investigating how *school management* impacts school outcomes. Most of these studies analyse the effects of school management on *student achievement*. Bloom, Lemos, Sadun and Van Reenen (2015) has been an influential paper in this field by looking at management quality across schools from several countries. The authors develop an international management quality index assessing the management practices of the schools which they link to measures of pupil achievements specific to each country. Overall, they find a significant association between school management quality of and student achievements. Yet, this relationship is not significant for Swedish schools. The authors argue that the relatively small sample size of Swedish schools in their dataset may account for these insignificant results.

In contrast, few papers investigate the impact of school leadership on school outcomes other

than student performance. On top of effects on student achievement, Lai et al. (2014) and Grissom and Loeb (2011) study the effect of school leadership on *how employees and parents assess the school* in US public schools. Specifically, Lai et al. (2014) show that school employees perceive a better school climate and parents view the school as more safe and secure when the rector spends time on organization management activities, i.e. managing the functioning of the school. As opposed to the frequency of activities, Grissom and Loeb (2011) analyse the task effectiveness of rectors. The authors highlight the importance of the organization management skills of rectors for school performance. They demonstrate that this competency positively affects teacher satisfaction, student achievements gains and how parents assess the overall school performance.

4 Data

This section provides an overview of the dataset (Section 4.1), a definition of the variables used for the analysis (Section 4.2), a presentation of relevant descriptive statistics (Section 4.3) and a warning about potential issues of the data (Section 4.4).

4.1 Overview of the dataset

I use survey data collected by Svenskt Kvalitetsindex (SKI, part of the EPSI Rating Group) which is specialized in the measurement of customer and employee satisfaction. The dataset builds on the *employee surveys* from 2010 and 2011 and on the *customer survey* from 2010 that SKI conducted for AcadeMedia (see Section 2.1 for further details about the company).

The 2010 and 2011 *employee surveys* were carried out between 15th February and 15th March 2010, and between 21st February and 17th March 2011 respectively. The surveys were conducted online and targeted all employees having an email address within the group and working in specific schools.⁶ 79.4% of employees who participated in the survey are teachers and are therefore considered in the analysis. Given the scope of the thesis, the remaining employees (i.e. cleaners, administrative, IT and finance staff) are excluded from the analysis sample. The survey questionnaire contains a total of twenty-eight questions common across schools measuring aspects such as employee satisfaction, employee engagement and company’s attractiveness. There are also school-specific questions for some schools.

The 2010 *customer survey* was conducted from February 22nd to March 15th 2010. Depending on the school, either pupils and/or parents were targeted.⁷ Similar to the employee

⁶The list of schools participating in the employee survey in 2010 and/or 2011 can be found in Table A1 in the appendix.

⁷Usually, preschools sent the survey to the parents, while compulsory and upper secondary schools surveyed the pupils most of the time. Some schools have both pupils and parents who took part in the survey. Table A5 depicts statistics.

surveys, the majority of participants had to respond online – with the exception of some parents who sent back the survey per post. Links to the survey were sent per email to the pupils and per post in form of login to the parents. Survey questionnaires include five questions common to all schools and measuring pupil and parent satisfaction with the school. The remaining questions vary across schools and are therefore not considered in the analysis.

To address my research questions, I collected and compiled extra data – i.e. the gender of teachers, pupils, and school rectors - to complement the above-described dataset.

As the surveys did not ask about participants gender, I classified the gender of teachers and pupils using their first name that I extracted from their email address. Inferring gender from names is common in the literature and is the method that e.g. Glover, Pallais and Pariente (2017) used in their paper. To proceed, I relied on the gender classification of 43,775 Nordic names (or names used in Nordic countries) from the website ‘https://www.nordicnames.de/wiki/Main_Page’. If the name was of mixed gender, the gender with the highest probability on the website was chosen. When the first name was not on the website or when the gender probabilities were equal, I investigated on social media (LinkedIn and Facebook) to either find the person, or the most likely gender of a person with this first name.

For the employee surveys, I could infer the gender from all the participants, as they used their professional email addresses when answering the survey. For the customer survey, I could categorize the gender for 73% of the pupils. The gender could *potentially* be inferred for 76% of all pupils because the name of the pupil or the email address of the pupil was indicated. When this information was missing, there was no possible way to determine the gender (e.g. for parents who took part in the survey and used their own email address, as this would give the gender of the parent, but not of the pupil ; and for pupils/parents who took part in the survey per post). Out of the sample where gender could *potentially* be inferred, I could *actually* classify the gender of 96% of them. The reason for the 4% missing is that the email address did not provide information about the first name of the pupil, or that the first name could be either male or female.

As for school rectors, I first had to collect data about their names. To do so, I used the question in the employee survey “My immediate manager is (refers to the person who has had staff and payroll responsibility for you for most of the current fiscal year). Enter the name below:”. When all employees of one school indicated the same person as immediate manager, I assumed that this person was the school rector. When several people were mentioned, I researched online (school webpage, LinkedIn and Facebook) who was the rector at the time of the survey. For the few cases where no information could be found online, I contacted AcadeMedia for information. I proceeded in the same way as for teacher and pupil genders to classify the gender of rectors from their name.

4.2 Variable description

4.2.1 Construction and description of main variables

The purpose of my paper is to study whether teacher-rector gender match influences (1) teacher satisfaction, (2) teacher perception of rector management and (3) pupil/parent school satisfaction. The main variables considered for each dimension are described in Table 1. The main variables for teacher satisfaction and rector management are based on teacher responses to the 2010 and 2011 employee surveys.

The *rector management* questions are grouped into four variables as considered relevant. The first variable *Satisfaction with manager* measures the satisfaction of teachers with their rector as manager. *Manager behaviour* includes questions describing how teachers rate the behaviour of their manager towards themselves (i.e. involving a manager-employee interaction). *Manager skills* encompasses questions where teachers assess the management skills of their manager (i.e. involving no manager-employee interaction). Finally, the remaining questions are grouped into the variable *Overall management climate* as they do not explicitly refer to the manager of the teachers, but rather to the overall school management.

Importantly, the rector management questions do not explicitly refer to the rector, but to the immediate manager of the respondents. There is the risk that teachers answer these questions by thinking about another person than the rector. This is more likely in large schools where teachers may not deal with the rector for daily matters. As teachers were asked to write the name of their immediate manager, it is possible to accurately track who answered the questions referring to the school rector, and who did not. 91% of teachers explicitly referred to their school rector as immediate manager, while 7% referred to a different person, and 2% of teachers did not want to state the name of their immediate manager. Hence, for the regressions involving rector management variables, I restrict the data sample to the 91% of teachers explicitly referring to their school rector as their immediate manager, thereby omitting 307 teacher responses.

The main variables for *pupil and parent satisfaction* rely on pupil and parent responses to the 2010 customer survey. In the main analysis, I use overall pupil and parent school satisfaction. The four other variables are used in the sensitivity analysis to check whether my results are sensitive to the measure of pupil and parent satisfaction.

All variables from the employee and customer surveys are based on a 10-point Likert scale ranging from 1 (“not satisfied at all”; “totally disagree”; “very low”; “very bad”) to 10 (“very satisfied”; “totally agree”; “very high”; “very good”). To my knowledge, this study is the first in the teacher-rector gender matching literature to use such a precise scale as previous studies usually use either a 4-point Likert scale (Ballou & Podgursky, 1995; Grissom & Loeb, 2011; Grissom et al., 2012) or a 5-point one (Pedersen & Nielsen, 2016).

Table 1: Description of main variables

<i>Variable</i>	<i>Range</i>	<i>Description</i>
<i>Gender</i>		
Female rector	0, 1	Dummy variable = 1 if the rector is female, = 0 if male
Female teacher	0, 1	Dummy variable = 1 if the teacher is female, = 0 if male
Female pupil	0, 1	Dummy variable = 1 if the pupil is female, = 0 if male
Proportion teacher-rector gender matches	0 to 1	Proportion of same-gender teacher-rector pairs in a school
<i>Teacher satisfaction</i>		
Overall employee experience	1 to 10	"Think of all the experience you have working with [School name]. How satisfied are you?"
Job satisfaction	1 to 10	Score average of 3 questions: (1) "How satisfied are you with your current work in relation to your expectations?" (2) "How satisfied are you with your current work in relation to an ideal workplace where you would like to work?" (3) "How satisfied are you with the challenge your work provides you with?"
Motivation	1 to 10	Score average of 2 questions: (1) "I feel motivated in my work."; (2) "I am willing to make an extra effort if needed."
<i>Rector management</i>		
Satisfaction with manager	1 to 10	"My general opinion about my immediate manager is positive."
Manager behaviour	1 to 10	Score average of 4 questions: (1) "My immediate manager shows confidence in me as a co-worker."; (2) "My immediate manager gives me support in my daily work."; (3) "My immediate manager gives me constructive feedback on my work."; (4) "My immediate manager coaches me with my work if I need or wish."
Manager skills	1 to 10	Score average of 6 questions: (1) "My immediate manager is able to lead the work according to the goals set."; (2) "My immediate manager is able to solve problems and conflicts."; (3) "My immediate manager is able to make the right decision."; (4) "My immediate manager creates engagement and a good atmosphere."; (5) "My immediate manager encourages dialogue and communication."; (6) "My immediate manager communicates the vision, goals and strategies of the business in a clear way."
Management climate	1 to 10	Score average of 6 questions: (1) "Management's ability to make the right decision is ..."; (2) "Management's ability to inform staff is ..."; (3) "Management and its ethics are ..."; (4) "Management's ability to create guiding goals and values is ..."; (5) "Management's ability to create commitment and participation ..."; (6) "Management's ability to represent the company externally is ..."
<i>Pupil and parent satisfaction</i>		
Overall pupil and parent satisfaction	1 to 10	"How satisfied are you with your school overall? / How satisfied are you with your child's school overall?"
Would recommend school	1 to 10	"I would recommend my school to other pupils / I would recommend my child's school to other parents"
Have recommended school	1 to 10	"I have recommended my school to other students / I have recommended my children's school to other parents"
School relative to expectations	1 to 10	"I think my school lives up to my expectations of a good school. / I think my child's school meets the requirements I have from a good school."
School relative to ideal school	1 to 10	"Imagine a school that is perfect in every way. How close from this perfect school do you feel your school is? / Imagine a school that is perfect in every way. How close from this perfect school do you feel your child's school is?"

Note: Variables made of several survey questions are constructed as the score average of non-missing responses.

4.2.2 Selection and description of control variables

The selection of control variables for the different specifications is based on previous literature and on the summary statistics. Note that the survey data constrains the possible candidates for control variables: limitations are further discussed in Section 4.4. Control variables are grouped into three categories: school characteristics, rector characteristics and teacher characteristics as described in Table 2. Information about rector and teacher characteristics are extracted respectively from rector and teacher answers to the 2010 and 2011 employee surveys.

School characteristics include school size and school type. School size is modelled by the total number of employees in the school. This information was obtained from the schools. Previous studies in the school context usually consider school size as control variable (Ballou & Podgursky, 1995; Lee et al., 1993; Pedersen & Nielsen, 2016). The second school characteristic I control for relates to the type of the school. I model school type using four dummy variables: preschool, compulsory school with integrated preschool, compulsory school, and upper secondary school. In the regressions, the omitted category is compulsory schools with an integrated preschool. Pedersen and Nielsen (2016) also control for school type, and La-helma (2000) shows that pupil-teacher gender match effects vary across school segments. In my summary statistics, I also find that the outcome variables of interest vary across school types: preschools and compulsory schools with integrated preschools usually exhibit a higher satisfaction, while satisfaction tends to be lower in upper secondary schools (see Table A4).

Rector characteristics comprise the school tenure of the rector, which is modelled via four categorical variables: rector has been working in the school for 3 months – 1 year, for 2 – 3 years, for 4 – 5 years, and for more than 5 years. The omitted category in the regression is the shortest school tenure, namely the dummy variable indicating a school tenure of 3 months – 1 year. This measure was collected via rector responses to the employee survey question “State the number of years you have been working at school X”. Rectors had to select one of the four above-stated category in their answer. Note that this does not capture for how long the rector has been working as rector in the school, but rather for how long the rector has been working in the school as rector or performing a different role. Hassan and Hatmaker (2015) argue for the important role of the duration of the manager-employee relationship. Most previous gender matching studies in the school context control for school tenure (Ballou & Podgursky, 1995; Grissom et al., 2012; Lee et al., 1993; Marvel, 2015).

Teacher characteristics contain the school tenure of the teacher and the teaching subject. Teacher school tenure is measured in the same way as rector school tenure. Teaching subject refers to a categorical variable which equals 1 when the teacher reports teaching a theoretical subject, and 0 if the teacher states teaching a practical subject. This corresponds to one question in the employee survey. Previous studies on teacher-rector gender match also control for the teaching area (e.g. Marvel, 2015).

Table 2: Description of control variables

<i>Variable</i>	<i>Range</i>	<i>Description</i>
<i>School characteristics</i>		
Number of school employees	3 to 80	Total number of employees working in the school in 2010
Preschool	0, 1	Dummy variable = 1 if the school is a preschool, = 0 otherwise
Compulsory school with integrated preschool	0, 1	Dummy variable = 1 if the school is compulsory school with an integrated preschool, = 0 otherwise
Compulsory school	0, 1	Dummy variable = 1 if the school is a compulsory school (without an integrated preschool), = 0 otherwise
Upper secondary school	0, 1	Dummy variable = 1 if the school is an upper secondary school, = 0 otherwise
<i>Rector characteristics</i>		
Rector 3m-1y school tenure	0, 1	Dummy variable = 1 if the rector has been working in the school for 3 months to 1 year, = 0 otherwise
Rector 2-3y school tenure	0, 1	Dummy variable = 1 if the rector has been working in the school for 2 to 3 years, = 0 otherwise
Rector 4-5y school tenure	0, 1	Dummy variable = 1 if the rector has been working in the school for 4 to 5 years, = 0 otherwise
Rector more than 5y school tenure	0, 1	Dummy variable = 1 if the rector has been working in the school for more than 5 years, = 0 otherwise
<i>Teacher characteristics</i>		
Teacher 3m-1y school tenure	0, 1	Dummy variable = 1 if the teacher has been working in the school for 3 months to 1 year, = 0 otherwise
Teacher 2-3y school tenure	0, 1	Dummy variable = 1 if the teacher has been working in the school for 2 to 3 years, = 0 otherwise
Teacher 4-5y school tenure	0, 1	Dummy variable = 1 if the teacher has been working in the school for 4 to 5 years, = 0 otherwise
Teacher more than 5y school tenure	0, 1	Dummy variable = 1 if the teacher has been working in the school for more than 5 years, = 0 otherwise
Theoretical subject	0, 1	Dummy variable = 1 if the teachers reports teaching a theoretical subject, = 0 for a practical subject

4.3 Descriptive statistics

In this section, I present some descriptive statistics about the sample that I use for the analysis. I first provide information about the employee surveys 2010 and 2011 in Section 4.3.1, and thereafter about the customer survey 2010 in Section 4.3.2.

4.3.1 2010 and 2011 Employee surveys

The employee survey dataset comprises a total of 2,945 teacher responses, 1,487 of which come from the 2010 survey and the remaining 1,458 from the 2011 survey⁸. About 60% of these responses (i.e. 1,756 responses) are given by teachers who took part in the survey both in 2010 and in 2011: this is the case for 878 teachers. The remaining 40% of answers refer to teachers who participated only once in the employee survey, either in 2010 (609 of them) or in 2011 (580 of them). Hence, the sample is made of a total of 2,067 *unique* teachers.

The 2010 employee survey was conducted in 99 schools which are grouped into 11 school brands, while the 2011 employee survey was carried out in 113 schools belonging to 13 school brands. 95 schools took part in both the 2010 and 2011 employee surveys, while 4 schools only did the 2010 survey and 18 schools only the 2011 one. Table A1 in the Appendix presents the detailed list of schools and their corresponding school brand for each survey year.

As shown in the first column of Table 3, the majority of schools are upper secondary schools: in the 2010 employee survey, 70% of schools are upper secondary schools (69 out of 99 schools), 13% are compulsory schools, another 13% compulsory schools with integrated preschools, and the last 4% preschools. These percentages amount to 66% (74 out of 113 schools), 14%, 16% and 4% respectively for the 2011 employee survey.

Furthermore, in both survey years, gender composition of the rector profession seems overall relatively balanced as about 45% of schools have male rectors, and 55% female ones. Yet, there are large discrepancies when taking the school type into consideration: Table 3 indeed suggests that all the preschools in the dataset have a female rector, while less than half of upper secondary schools are directed by a woman. This pattern of lower proportion of female rectors as the school level increases is consistent with the reality of Swedish schools, as further described in Section 2.2. Hence, my sample appears representative of the current Swedish school market.

⁸Survey respondents who did not answer any question of interest are excluded from the sample. The remaining 2,945 teachers thus answered at least one (but not necessarily all) employee satisfaction question relevant for my study.

Table 3: Sample statistics of school and rector characteristics across rector gender

	All schools #	Male rector schools #	Male rector schools %	Female rector schools #	Female rector schools %
<i>Employee survey 2010</i>					
<i>School type</i>					
Preschools	4	0	0%	4	100%
Compulsory schools with integrated preschool	13	2	15%	11	85%
Compulsory schools	13	4	31%	9	69%
Upper secondary schools	69	38	55%	31	45%
<i>School tenure</i>					
Rector 3m-1y school tenure	32	13	41%	19	59%
Rector 2-3y school tenure	31	14	45%	17	55%
Rector 4-5y school tenure	12	6	50%	6	50%
Rector more than 5y school tenure	24	11	46%	13	54%
All schools	99	44	44%	55	56%
<i>Employee survey 2011</i>					
<i>School type</i>					
Preschools	4	0	0%	4	100%
Compulsory schools with integrated preschool	19	3	16%	16	84%
Compulsory schools	16	6	37%	10	63%
Upper secondary schools	74	45	61%	29	39%
<i>School tenure</i>					
Rector 3m-1y school tenure	23	9	39%	14	61%
Rector 2-3y school tenure	44	22	50%	22	50%
Rector 4-5y school tenure	15	10	67%	5	33%
Rector more than 5y school tenure	31	13	42%	18	58%
All schools	113	54	48%	59	52%

Note: Figures refer to number of schools. Percentages reflect the gender composition of rectors for each characteristic. Variables are defined in Tables 1 and 2.

Table 4 depicts the gender distribution of teachers across school types. While overall slightly more than half of teachers in the dataset are women, the proportion of female teachers amounts to about 90% for preschools and around 80% for compulsory schools with integrated preschools as well as for compulsory schools. On the other hand, less than half of teachers in upper secondary schools are female. Thus, similar to the rector profession, the teaching body becomes more female-dominated the lower the school level. This pattern is also representative of the current Swedish school market (see Section 2.2).

Table 4: Sample statistics of teacher characteristics across teacher gender

	All teachers	Male teachers		Female teachers	
	#	#	%	#	%
<i>Employee survey 2010</i>					
<i>School type</i>					
Preschools	56	6	11%	50	89%
Compulsory schools with integrated preschool	273	47	17%	226	83%
Compulsory schools	279	61	22%	218	78%
Upper secondary schools	879	471	54%	408	46%
<i>School tenure</i>					
Teacher 3m-1y school tenure	444	175	39%	269	61%
Teacher 2-3y school tenure	508	203	40%	305	60%
Teacher 4-5y school tenure	217	80	37%	137	63%
Teacher more than 5y school tenure	318	127	40%	191	60%
<i>Teaching subject</i>					
Theoretical subject	971	337	35%	634	65%
Practical subject	516	248	48%	268	52%
All teachers	1,487	585	39%	902	61%
<i>Employee survey 2011</i>					
<i>School type</i>					
Preschools	43	4	9%	39	91%
Compulsory schools with integrated preschool	321	75	23%	246	77%
Compulsory schools	231	47	20%	184	80%
Upper secondary schools	863	473	55%	390	45%
<i>School tenure</i>					
Teacher 3m-1y school tenure	338	139	41%	199	59%
Teacher 2-3y school tenure	501	213	43%	288	57%
Teacher 4-5y school tenure	249	93	37%	156	63%
Teacher more than 5y school tenure	370	154	42%	216	58%
<i>Teaching subject</i>					
Theoretical subject	959	350	36%	609	64%
Practical subject	499	249	50%	250	50%
All teachers	1,458	599	41%	859	59%

Note: Figures refer to the number of teachers. Percentages reflect the gender composition of teachers for each characteristic. Variables are defined in Tables 1 and 2.

Furthermore, these statistics suggest that my dataset is characterised by a relatively low discrepancy between the proportion of female teachers and that of female rectors in each school type: when women dominate the teaching body, e.g. in preschools, compulsory schools with an integrated preschool and in compulsory schools, they also dominate the rector profession. This is representative of Swedish schools and contrasts to US schools

where there is an asymmetry between the gender distribution of women in the teaching workforce and in rector positions (see Section 2.2 for further details). As brought up in the literature review (Section 3.1.2), most of previous studies about teacher-rector gender matching are conducted in the US school context, and are prone to this asymmetry (Ballou & Podgursky, 1995; Grissom et al., 2012; Lee et al., 1993; Marvel, 2015).

Given that this study focuses on teacher-rector gender match effects, it is important that each of the four possible teacher-rector gender pairs is sufficiently represented in the dataset. Table 5 depicts the proportion of each pair for the 2010 and 2011 surveys. As expected given the female-dominated environment of schools, the most frequent pair is female teacher-female rector (38% of all pairs). Then comes the male teacher- male rector gender match pair (24% of all pairs), followed by the female teacher-male rector pair (22% of all pairs) and lastly comes the male teacher-female rector pair (16% of all pairs). Compared to previous studies (Grissom et al., 2012; Lee et al., 1993; Marvel, 2015), my dataset contains a sufficiently balanced proportion of each teacher-rector gender pairs.

Table 5: Proportion of teacher-rector gender pairs in 2010 & 2011 employee surveys

	Male rector	Female rector	All rectors
Male teacher	711 (24%)	473 (16%)	1184 (40%)
Female teacher	649 (22%)	1,112 (38%)	1,761 (60%)
All teachers	1,360 (46%)	1,585 (54%)	2,945

Note: Figures refer to the number of teachers. The basis of the percentages is the total number of teachers participating in employee survey 2010 and/or 2011. Teachers who did the employee survey in both years are counted twice.

Turning to the content of teacher responses, few gender differences appear depending on either teacher gender or rector gender. Panel (a) of Table 6 presents the summary statistics of survey responses according to *teacher gender*. For any dimension, female teachers are slightly more satisfied than male teachers, although the difference is not that large. Variability in answers is also alike across both teacher genders, as suggested by the similar standard deviations.

Panel (b) of Table 6 suggests that teacher responses vary slightly more depending on the *rector gender*. Teachers appear be more satisfied in schools directed by female rectors: on a 10-Likert scale, the score teachers give to the management behaviour of female rectors is on average 7.72, against 7.19 for their male counterparts. The score amounts to 7.98 when assessing the management skills of female rectors, as opposed to 7.46 for male rectors. Yet, solely based on these summary statistics, it is unclear whether this higher satisfaction of teachers in female-led schools is due to rector gender or to other school characteristics systematically different in such schools. In particular, Table A4 in Appendix shows that preschools and compulsory schools with an integrated preschool tend to display higher satisfaction measures compared to upper secondary schools. As shown in Table 3, male rectors

are underrepresented in these two school types, which may be a reason why male-led schools have lower satisfaction levels.

Table 6: Summary statistics of survey responses

(a) Summary statistics of teacher responses by teacher gender

Employee Surveys 2010 & 2011	All teachers		Male teachers		Female teachers	
	<i>Mean</i>	<i>Std. dev.</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Mean</i>	<i>Std. dev.</i>
<i>Teacher satisfaction</i>						
Overall employee experience	7.27	1.86	7.17	1.89	7.34	1.83
Job satisfaction	7.11	2.01	6.94	1.99	7.22	2.01
Motivation	8.33	1.67	8.14	1.75	8.46	1.60
<i>Rector management</i>						
Satisfaction with manager	8.21	2.29	8.14	2.24	8.26	2.32
Manager behaviour	7.48	2.21	7.36	2.14	7.56	2.26
Manager skills	7.74	2.17	7.63	2.10	7.82	2.22
Management climate	6.81	2.30	6.53	2.32	7.00	2.27

(b) Summary statistics of teacher responses by rector gender

Employee Surveys 2010 & 2011	All schools		Male rector		Female rector	
	<i>Mean</i>	<i>Std. dev.</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Mean</i>	<i>Std. dev.</i>
<i>Teacher satisfaction</i>						
Overall employee experience	7.27	1.86	7.14	1.88	7.38	1.83
Job satisfaction	7.11	2.01	6.94	2.03	7.26	1.98
Motivation	8.33	1.67	8.16	1.70	8.47	1.63
<i>Rector management</i>						
Satisfaction with manager	8.21	2.29	7.96	2.38	8.42	2.18
Manager behaviour	7.48	2.21	7.19	2.22	7.72	2.18
Manager skills	7.74	2.17	7.46	2.23	7.98	2.10
Management climate	6.81	2.30	6.54	2.34	7.03	2.24

(c) Summary statistics of pupil and parent responses by rector gender

Customer Survey 2010	All schools		Male rector		Female rector	
	<i>Mean</i>	<i>Std. dev.</i>	<i>Mean</i>	<i>Std. dev.</i>	<i>Mean</i>	<i>Std. dev.</i>
<i>Pupil and parent satisfaction</i>						
Overall pupil/parent satisfaction	7.48	2.02	7.42	2.07	7.52	1.98
Would recommend school	7.60	2.46	7.59	2.47	7.61	2.45
Have recommended school	6.47	3.45	6.26	3.50	6.67	3.40
School relative to expectations	7.30	2.34	7.26	2.36	7.34	2.32
School relative to ideal school	7.06	2.15	7.05	2.17	7.06	2.14

Note: Variables are defined in Tables 1. In panels (b) and (c), male (female) rector columns refer to schools with a male (female) rector. Answers are on a 10-point Likert scale as described in Section 4.2.1.

4.3.2 2010 Customer survey

The customer survey sample used for my analysis contains 14,752 pupil or parent responses.⁹ 58% of the responses (i.e. 8,548) are from pupils, and the remaining 42% from parents (i.e. 6,204). The customer survey targeted 97 schools which were also chosen for the 2010 employee survey. The detailed list of schools included in the customer survey dataset can be found in Table A1 in Appendix. Table A5 in Appendix further depicts the sample statistics of pupil/parent responses across school and rector characteristics.

Panel (c) of Table 6 describes the summary statistics of pupil and parent responses. The average of the five satisfaction measures are rather similar. As expected, there are fewer pupils and parents who actually recommended the school, than those stating they would do it: the score of "would recommend school" is 7.60 on a 10-Likert scale, while that of "have recommended school" amounts to 6.37. The satisfaction measure about pupils and parents having recommended the school is the one with the greatest variability in responses, as showed by the standard deviation of 3.45 points while other measures have a standard deviation within a range of 2.02 and 2.46.

Furthermore, pupil and parent satisfaction seems on average to be alike in male-led schools and female-led schools, both in terms of magnitude and dispersion.

4.4 Potential issues

In this section, I discuss two potential issues with my data, i.e. the ambiguity of some survey questions and the constraints of the dataset. The limitations of the study and concerns about internal validity are outlined in Section 7.2.

Imprecise and ambiguous survey questions are the first issue of the employee survey data. This concerns for instance the measure of teacher and rector school tenure: respondents had to choose one out of four discontinuous possibilities, i.e. 3 months-1 year, 2-3 years, 4-5 years and more than 5 years. It is unclear which category a teacher (rector) who has been working in the school for one year and a half should choose, since the school tenure is larger than 3 months-1 year but smaller than 2-3 years. Thus, there is the concern that teachers (rectors) with the same school tenure chose different categories, thereby incorrectly appearing as having two different school tenures in my dataset. However, I believe that this does not greatly affect my results, since this may only affect a small proportion of teachers (rectors) and as school tenure is not the main variable of interest.

Another ambiguous question is that of asking teachers about their teaching subject. Teachers can only choose between two categories, namely theoretical subject and practical subject.

⁹Survey respondents who did not answer any of the five questions on which the pupil and parent satisfaction measures are based are excluded from the sample (this is the case for 88 pupils/parents). The remaining 14,752 pupil and parent thus answered at least one (but not necessarily all) customer satisfaction question of interest for my study.

Yet, no definition of each group is provided, and it may be that teachers interpret differently the two categories although they are teaching the same subject. Even though there could be some measurement error, I argue that this measure is still relevant to include in the regressions as teachers of the same discipline are still *likely* to choose the same subject type, thus controlling for some common characteristics.

Moreover, the survey dataset constrains my choice of control variables (please refer to Table 2 for the list of control variables), as I can only include variables coming from the survey data or that I can collect on my own using publicly available information on the school websites. In particular, available teacher characteristics that I can control for are limited. Factors that previous literature accounted for but that I do not have information about include e.g. teacher age (Ballou & Podgursky, 1995; Pedersen & Nielsen, 2016; Szymanska & Rubin, 2018), teacher degree and teaching experience (Pedersen & Nielsen, 2016). Similar concerns apply to rector characteristics, such as age (Szymanska & Rubin, 2018), degree and previous experience (Ballou & Podgursky, 1995), and for school characteristics including e.g. pupil discipline or average social economic status of pupils (Ballou & Podgursky, 1995). In case one of this element correlates with the dependent variable and with at least one independent variable, there could be an omitted variable bias. This drawback can be alleviated by using school fixed effects to account for unobserved school characteristics and rector characteristics provided there is no rector change, and teacher fixed effects to account for unobserved teacher characteristics (see Section 6.2.1 in the sensitivity analysis).

5 Empirical strategy

The empirical strategy needs to take into account the specific structure of the data. My dataset includes observations at either the teacher level (employee survey) or the pupil level (customer survey). Each teacher (pupil) is part of a school, which in turn belongs to a school brand. This data structure can be referred to as a *cluster sample* (Wooldridge, 2010). The data has the particularity of displaying two levels of cluster, namely schools and school brands. This multilevel structure is common in data from the educational context (Marsh et al., 2008).

Furthermore, in cluster samples, observations are not independent as they likely correlate with other observations from that cluster (Wooldridge, 2010). Indeed, schools operated by a school brand share the same guidelines and welcome the same type of pupils depending on the specific orientation of the school brand (e.g. pupils interested in IT subjects, as opposed to pupils specializing in music studies). Within a school, teachers face the same pupil discipline and are located in the same specific geographical area. Most importantly, teachers working in the same school all share and are answering questions about the same rector (provided there was no rector change between 2010 and 2011). These unobserved cluster effects need to be considered in the models of my empirical strategy. I therefore use

the following specifications¹⁰:

1. OLS regression with standard errors clustered at the school level
2. School brand fixed effects
3. School fixed effects

In my analysis, I will compare the results from the three specifications. I use distinct models given the trade-off between (a) high internal validity with few unobserved variation in the data and (b) high statistical power given by enough variation in the data.

In the sections below, I present the model specifications for each research question: Section 5.1 focuses on teacher satisfaction and on rector management and Section 5.2 on pupil/parent school satisfaction. I thereby discuss assumptions, advantages and disadvantages of each specification. I finish by motivating further model choices in Section 5.3.

5.1 Models of teacher satisfaction and rector management

The models in this section aim at investigating whether female (male) teachers display a *relatively* higher motivation, overall employee experience and/or job satisfaction when sharing the gender of their rector than when working for a rector of opposite gender (relative to teachers of opposite gender). I am also interested in whether female (male) teachers who share the gender of their rector (a) are relatively more satisfied by their rector as manager, (b) perceive relatively more positively the management skills of their rector, (c) state that their rector treats them relatively better, and (d) report a relatively more positive management climate than when working for a rector of different gender (relative to teachers of opposite gender).

Note that I use the same regression models for teacher satisfaction and rector management. Only the outcome variable differs. Overall employee experience, job satisfaction and motivation are the three outcome variables of interest for teacher satisfaction. Satisfaction with manager, manager skills, manager behaviour and management climate are the outcome variables for rector management. These outcomes variables are described in Table 1. Separate regressions are run for each outcome variables.

I first explain the intuition for my modelling of teacher-rector gender matching effects and the corresponding hypothesis tests in Section 5.1.1, before outlining the specificities of each regression model in Section 5.1.2, Section 5.1.3 and Section 5.1.4.

¹⁰Note that for the third research question, the data is aggregated at the school level to link employee with customer survey data, and therefore the school fixed effects specification is not used. Also, the standard errors are not clustered at the school level in the OLS regression.

5.1.1 Intuition for gender-matching effects and hypothesis tests

There are four possible teacher-rector gender combinations, namely (1) male teacher with male rector (MTMR), (2) male teacher with female rector (MTFR), (3) female teacher with male rector (FTMR) and (4) female teacher with female rector (FTFR). In my analysis, I am interested in the marginal effect of switching from one combination to the other. More specifically, I am interested in whether a female (male) teacher matched with a rector of opposite gender would be relatively better off if matched with a rector of same gender.

For now, let focus on the interpretation and intuition of my modelling of gender matching effects and assume that all matches are random. In that scenario, to investigate the marginal effects described above, consider the following regression¹¹ :

$$Y_{ijkt} = \alpha + \beta_1 FR_{jkt} * FT_{ijk} + \beta_2 FT_{ijk} + \beta_3 FR_{jkt} + \varepsilon_{ijkt} \quad (A)$$

Y_{ijkt} represents the outcome variables of interest for teacher satisfaction and rector management as listed in Table 1. For illustrative purposes, I take job satisfaction as example in the interpretation. Similar interpretation applies to the other outcome variables. Y_{ijkt} corresponds to job satisfaction of teacher i at school j of school brand k at time t . FR_{jkt} is a dummy variable equal to 1 when the teacher's rector at time t is female, and 0 when the teachers' rector is male. FT_{ijk} is a dummy variable taking the value of 1 when the teacher is female, and 0 when the teacher is male.

Given the dummy variables included in the regression, the omitted category is (1) male teacher with male rector. By definition, the intercept α is the expected value of the omitted category. The expected values for the three other teacher-rector pairs can be computed combining α and the coefficients of interest β_1 , β_2 and β_3 as depicted in Table 7.

Table 7: Expected values of each teacher-rector gender pair

	Male teacher	Female teacher
Male rector	α	$\alpha + \beta_2$
Female rector	$\alpha + \beta_3$	$\alpha + \beta_1 + \beta_2 + \beta_3$

Note: These expected values are calculated based on coefficients of specifications (1), (2) and (3) for teacher satisfaction and rector management models.

The marginal effects of interest can be measured by conducting several hypothesis tests on the regression coefficients and on linear combinations of these coefficients. The full list of hypothesis tests can be found in Table 8.

¹¹I follow the method of Muralidharan and Sheth (2016) to model the gender matching effects. The interpretation of the coefficients is also derived from their paper.

Table 8: Hypothesis tests for teacher-rector gender match effects

H_0	H_1	Interpretation*
$\beta_1 = 0$	$\beta_1 \neq 0$	$\beta_1 > 0$ would indicate that female (male) rectors are <i>relatively</i> more effective (compared to rectors of the opposite gender) at generating job satisfaction to teachers of their own gender.
$\beta_3 = 0$	$\beta_3 \neq 0$	$\beta_3 < 0$ would imply that <i>male teachers</i> working for a female rector report a lower job satisfaction than male teachers working for a male rector.
$\beta_1 + \beta_3 = 0$	$\beta_1 + \beta_3 \neq 0$	$\beta_1 + \beta_3 > 0$ would suggest that <i>female teachers</i> have a higher job satisfaction when working for a female rector relative to a male rector.
$\beta_2 = 0$	$\beta_2 \neq 0$	$\beta_2 < 0$ would mean that female teachers exhibit a lower job satisfaction when working for a <i>male rector</i> than male teachers do when working for a male rector.
$\beta_1 + \beta_2 = 0$	$\beta_1 + \beta_2 \neq 0$	$\beta_1 + \beta_2 > 0$ would indicate that female teachers display a higher job satisfaction when working for a <i>female rector</i> than male teachers do when working for a female rector.
$\beta_3 = \beta_2$	$\beta_3 \neq \beta_2$	$\beta_3 < \beta_2$ would imply that among teacher-rector pairs of opposite gender, male teachers (with a female rector) have a lower job satisfaction than female teachers (with a male rector).

Note: These statistical tests are conducted on the coefficients of specifications (1), (2) and (3) for teacher satisfaction and rector management models. Separate regressions are run for each outcome variable.

*Job satisfaction is taken as example for the interpretation. Similar interpretation applies to the other outcome variables.

In particular, β_2 measures the difference in job satisfaction of a female teacher working for a male rector relative to a male teacher working for a male rector. This can be seen formally by taking the expected values from Table 7 :

$$FTMR - MTMR = (\alpha + \beta_2) - \alpha = \beta_2$$

Hence, $\beta_2 < 0$ would suggest that *male rectors* generate a lower job satisfaction to female teachers compared to male teachers.

Analogous to β_2 for male rectors, $\beta_1 + \beta_2$ assesses the difference in job satisfaction for a female teacher working for a female rector compared to a male teacher working for a female rector. Specifically :

$$FTFR - MTFR = (\alpha + \beta_1 + \beta_2 + \beta_3) - (\alpha + \beta_3) = \beta_1 + \beta_2$$

Thus, $\beta_1 + \beta_2 > 0$ would imply that *female rectors* generate a higher job satisfaction to female teachers in comparison to male teachers. In other words, female rectors are more effective at generating a higher job satisfaction to teachers of their own gender.

Furthermore, β_3 corresponds to the difference in job satisfaction levels of male teachers working for a female rector as opposed to a male rector. Formally :

$$MTFR - MTMR = (\alpha + \beta_3) - \alpha = \beta_3$$

β_3 thus captures the potential disadvantage of *male teachers* when not matched to a rector of a same gender¹². $\beta_3 < 0$ would be evidence of positive gender matching effects for male teachers.

Similar to β_3 for male teachers, $\beta_1 + \beta_3$ compares the job satisfaction of female teachers with a female rector to that of female teachers with a male rector. Specifically :

$$FTFR - FTMR = (\alpha + \beta_1 + \beta_2 + \beta_3) - (\alpha + \beta_2) = \beta_1 + \beta_3$$

$\beta_1 + \beta_3$ thus refers to the potential advantage of *female teachers* when matched with a same gender rector as opposed to a rector of different gender¹². $\beta_1 + \beta_3 > 0$ would imply that female teachers exhibit higher job satisfaction when paired with a female rector compared to a male rector.

The four above-mentioned hypothesis tests capture the marginal effect of varying one element of the possible teacher-rector gender combinations. This corresponds to the difference in expected values between two teacher-rector pairs. In contrast, β_1 is a *difference-in-difference* estimate and should be interpreted in *relative* terms. Specifically, β_1 captures the impact of female rectors managing female teachers as opposed to male teachers *relative* to that of male rectors managing female teachers as opposed to male teachers. Formally, β_1 can be derived from the expected values in Table 7 as follows :

$$\begin{aligned} (FTFR - MTFR) - (FTMR - MTMR) &= [(\alpha + \beta_1 + \beta_2 + \beta_3) - (\alpha + \beta_3)] - [(\alpha + \beta_2) - \alpha] \\ \iff \\ (FTFR - MTFR) - (FTMR - MTMR) &= \alpha + \beta_1 + \beta_2 + \beta_3 - \alpha - \beta_3 - \alpha - \beta_2 + \alpha \\ \iff \\ (FTFR - MTFR) - (FTMR - MTMR) &= \beta_1 \end{aligned} \quad (*)$$

Thus, β_1 compares the relative advantage of female rectors managing female teachers (rather than male teachers) with the relative disadvantage of male rectors managing female teachers (rather than male teachers). In other words, β_1 corresponds to the relative effectiveness of female rectors (compared to male rectors) in reducing the mean difference in job satisfaction between female and male teachers.

Note that this differs from the *absolute* improvement if female teachers are matched with a same gender rector. It could be for instance that female rectors are overall less effective even for teachers of same gender, so that both male and female teachers are better off with a male rector than a female rector (i.e. $\beta_3 < 0$ and $\beta_1 + \beta_3 < 0$). A positive β_1 would then imply that female rectors are ‘less bad’ for female teachers than for male teachers relative to male rectors. Hence, the gender similarity I am capturing in this specification is a *differential* effect, not an absolute effect.

Importantly, β_1 is “*symmetric and equivalent*” to the relative effectiveness of male rectors

¹²Note that I expect here positive gender matching effects as found by previous literature, but we still do not know at this point whether it is an advantage or a disadvantage.

managing male teachers compared to female teachers relative to female rectors managing male teachers compared to female teachers (Muralidharan Sheth, 2016, p. 279). Rearranging terms from equation (*), β_1 can indeed also be expressed as :

$$\begin{aligned}
\beta_1 &= (FTFR - MTFR) - (FTMR - MTMR) & (*) \\
&\iff \\
\beta_1 &= FTFR - MTFR - FTMR + MTMR \\
&\iff \\
\beta_1 &= MTMR - FTMR - MTFR + FTFR \\
&\iff \\
\beta_1 &= (MTMR - FTMR) - (MTFR - FTFR)
\end{aligned}$$

Thus, β_1 also compares the relative advantage of male rectors in managing male teachers than female teachers with the relative disadvantage of female rectors in managing male teachers than female teachers. β_1 is therefore informative of similarity effects for each gender¹³.

Another comparison that might be of interest is analysing whether male teachers with female rectors report lower outcomes than female teachers with male rectors. Specifically, this can be obtained by testing whether $\beta_3 - \beta_2 = 0$ (or equivalently $\beta_3 = \beta_2$) as demonstrated below :

$$MTFR - FTMR = (\alpha + \beta_3) - (\alpha + \beta_2) = \beta_3 - \beta_2$$

This can be considered as suggestive evidence of *social norm effects*.

Hence, regression (A) allows me to analyse several aspects of teacher-rector gender matching via different hypothesis tests on β_1 , β_2 and β_3 coefficients. In interpreting these coefficients previously, I assumed that these matches were random as would be required for a causal interpretation.

In practice, this assumption of random matches could be violated for several reasons. Specifically, there could be either unobserved teacher, school and rector characteristics or endogenous sorting of either rectors and/or teachers. For instance, an IT-oriented school may be characterised by more male teachers and rectors making the male teacher-rector gender match more likely. If job satisfaction is higher in an IT-oriented school due to other factors, then the regression coefficients may be biased. Moreover, there would be endogenous teacher sorting if e.g. female teachers purposely target schools directed by a female rector or if female rectors are more likely to hire female teachers.

In my analysis, I address these concerns by controlling for teacher, school and rector characteristics (Section 5.1.2), including school brand fixed effects (Section 5.1.3) and school fixed effects (Section 5.1.4).

¹³Note that β_1 can also be expressed as $(FTFR - FTMR) - (MTFR - MTMR)$ or equivalently as $(MTMR - MTFR) - (FTMR - FTFR)$. Thus, $\beta_1 > 0$ can also be interpreted as follows: female (male) teachers report a *relatively* higher job satisfaction (relative to teachers of opposite gender) when working for a same-gender rector as opposed to a rector of opposite gender.

5.1.2 OLS regression with standard errors clustered at the school level

The first specification I use in my analysis is a classical OLS regression which includes standard errors clustered at the school level:

$$Y_{ijkt} = \alpha + \beta_1 FR_{jkt} * FT_{ijk} + \beta_2 FT_{ijk} + \beta_3 FR_{jkt} + \beta_4 \gamma_t + SCH_{jkt}\Omega + REC_{jkt}\Upsilon + TEA_{ijkt}\Gamma + \varepsilon_{ijkt} \quad (1)$$

Y_{ijkt} , FR_{jkt} and FT_{ijk} are defined as before. As in Section 5.1.1, I take job satisfaction as example for the interpretation. Same reasoning applies to the other outcome variables. γ_t refers to the 2011 time dummy variable, which equals 1 if the survey response is from 2011, and 0 if it is from 2010. Control variables include vector of school characteristics SCH_{jkt} , rector characteristics REC_{jkt} and teacher characteristics TEA_{ijkt} . Table 2 describes the content of these vectors.

The advantage of this OLS specification is that it captures variation both *between* and *within* schools.

The error term ε_{ijkt} is assumed to respect the *zero conditional mean assumption*:

$$E[\varepsilon_{ijkt} \mid FT_{ijk}, FR_{jkt}, \gamma_t, SCH_{jkt}, REC_{jkt}, TEA_{ijkt}] = 0$$

This assumption requires the error term to be uncorrelated with the independent variables, which is essential in an OLS regression in order to have unbiased estimates (Wooldridge, 2013, p. 86). In particular, this assumption should hold for the main coefficients of interest β_1 , β_2 and β_3 so that my estimates for gender matching effects are unbiased: there should be no other factors correlated with teacher-rector gender match, teacher gender, or rector gender that also affect job satisfaction. Control variables controlling for school, rector and teacher characteristics are included to mitigate the risk of omitted variable bias (see Table 2).

Besides unbiased estimates, I also need to ensure that the coefficients are efficient and yield correct standard errors. Given the structure of the data as a cluster sample, the assumption of homoscedasticity and no autocorrelation is likely to be violated, as the errors of teachers working in the same school may be correlated. In particular, I would expect $E[\varepsilon_{ijkt}, \varepsilon_{l jkt} \mid \mathbf{X}] > 0$ ¹⁴ for teacher i and teacher l belonging to the same school j : their survey responses are likely positively correlated as the school shares common characteristics and as they answer questions about the same rector. Clustering the standard errors at the school level would make them robust to the presence of the group structure, by allowing changing variances within each school cluster (Wooldridge, 2013, p. 483). Not accounting for the correlation in errors for teachers working at the same school would lead to an overestimated precision of the estimates, since the standard errors would then be too small. In studies performed

¹⁴ \mathbf{X} refers to the independent variables of specification (1).

at either the teacher or the pupil level, it is common to cluster the standard errors at the school level (Clark et al., 2009; T. S. Dee, 2007; Grissom & Loeb, 2011; Grissom et al., 2012; Muralidharan & Sheth, 2016; Pedersen & Nielsen, 2016).

Given that schools are grouped into school brands, an alternative cluster would have been school brands. Choosing schools rather than school brands as clusters provides me with more conservative inferences, i.e. higher standard errors. Similarly to Dee (2007), I favour the more conservative option for choosing the cluster.

5.1.3 School brand fixed effects

The second model adds school brand fixed effects δ_k to specification (1):

$$Y_{ijkt} = \alpha + \beta_1 FR_{jkt} * FT_{ijk} + \beta_2 FT_{ijk} + \beta_3 FR_{jkt} + \beta_4 \gamma_t + SCH_{jkt} \Omega + REC_{jkt} \Upsilon + TEA_{ijkt} \Gamma + \delta_k + \varepsilon_{ijkt} \quad (2)$$

The elements of specification (2) are identical to those in specification (1). The fixed effects transformation subtracts the school brand average from all variables (Wooldridge 2003, p.134). Hence, specification (2) only captures variation *within* each school brand. All the factors common to a school brand that may potentially bias the estimates in specification (1) are held constant. Such factors may include profile of pupils (e.g. IT-interested pupils, pupils specialising in music studies, etc) or the school brand policy regarding the school budget. To illustrate this potential bias in specification (1), suppose that job satisfaction is overall higher in the IT-oriented school brand (IT-Gymnasiet) than in any other school brands and that male teacher-male rector pairs are overrepresented in this school brand. Then specification (1) may mistakenly suggest that male teachers are more satisfied when their rector is also male. The school brand fixed effects specification solves this concern as teacher satisfaction is compared within a school brand: within the IT-oriented school brand, job satisfaction of male teacher-male rector pairs is compared with the three other possible gender pairs who also work for this IT-oriented school brand.

However, controlling for unobserved school brand effects comes at the cost of losing variation in the data, as the variation *between* school brands is removed. This negatively affects the efficiency of the estimates.

In order to have unbiased estimates, the zero conditional mean assumption should hold after having controlled for school brand fixed effects. Specifically, this assumption requires that conditional on being in the same school brand, the only reason why male and female teachers differ in their job satisfaction is that they share the gender of their rector (holding teacher, school and rector characteristics constant).

Two types of sorting, i.e. teacher and rector sorting across schools within a school brand, may confound the estimates and thus violate this assumption. First, the estimates would

mistakenly indicate gender similarity effects if female (male) *teachers* with higher job satisfaction within a school brand systematically worked in a school directed by a female (male) rector. Similarly, the estimates would also wrongly capture positive gender match effects if female (male) *rectors* were systematically assigned to schools where female (male) teachers report greater levels of job satisfaction within a school brand. However, I believe that these two scenarios are rather unlikely given possible changes in rector gender and the formalized recruitment process for teachers and rectors. In particular, it seems unlikely that teachers with higher job satisfaction systematically change schools whenever a rector of opposite gender is appointed to the school.

5.1.4 School fixed effects

The third model adds school fixed effects \emptyset_j to specification (1) as follows:

$$Y_{ijkt} = \alpha + \beta_1 FR_{jkt} * FT_{ijk} + \beta_2 FT_{ijk} + \beta_3 FR_{jkt} + \beta_4 \gamma_t + REC_{jkt} \Upsilon + TEA_{ijkt} \Gamma + \emptyset_j + \varepsilon_{ijkt} \quad (3)$$

The fixed effects transformation takes away the school averages from the independent and dependent variables (Wooldridge, 2003, p. 134). The vector of school characteristics is omitted from the regression as these factors are constant within schools. Note, however, that the vector of rector characteristics and the rector gender variable are *not* omitted from the regression since they may vary within a school over time in the case of a rector change between 2010 and 2011¹⁵. The model is assumed to fulfill the zero conditional mean assumption after controlling for school fixed effects.

This specification assesses the effect of teacher-rector gender match using differences between female and male teachers *within* a school¹⁶. Doing so allows us to hold constant factors common to all teachers of a school that may impact their job satisfaction and potentially create some bias in specification (1). These may include factors such as the level of pupil achievement, the amount of pupil discipline problems at the school, the average social economic status of pupils and the school financial resources (Grissom et al., 2012). For instance, school discipline likely affects teacher job satisfaction and would bias the estimate β_3 of rector gender in specification (1) if e.g. male rectors were systematically assigned to schools where the pupil discipline is worse: lower teacher job satisfaction in schools directed by male rectors would then mistakenly be linked to rector gender. However, this increased internal validity comes at the cost of less variation in the data, and thereby lower efficiency of the estimates.

¹⁵26 schools experienced a rector change between 2010 and 2011, 14 of which had a rector in 2011 of a different gender than the 2010 rector.

¹⁶Note that the interaction term is also identified for a school without a rector gender change thanks to the variation in teacher gender within the school.

5.2 Models of pupil and parent school satisfaction

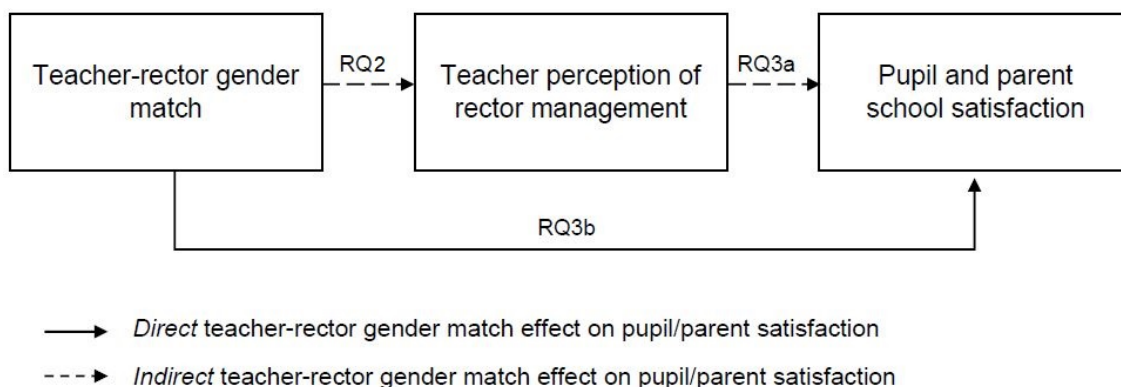
The previous models of teacher satisfaction and rector management only exploit answers from the employee surveys 2010 and 2011. In this section, answers from the *customer survey* 2010 are also considered and linked to those from the employee survey 2010. As there was no customer survey in 2011, responses from the employee survey 2011 cannot be linked to those of the customer survey and are therefore excluded from the employee survey dataset used in this section.

I first present the models testing for an *indirect* teacher-rector gender match effect on pupil and parent school satisfaction (mediated by rector management), and then the models investigating the *direct* effect.

5.2.1 Rector management on pupil/parent school satisfaction (*indirect* gender match effect)

In this section, I study whether teachers' satisfaction with and perception of rector management influence pupil and parent school satisfaction. Provided that teacher-rector gender match affects teachers' satisfaction with and perception of management (as tested by specifications (1), (2) and (3)), I am thus testing for an *indirect* teacher-rector gender match effect on pupil and parent school satisfaction. Figure 3 illustrates this indirect gender match effect.

Arguably, a teacher who is more satisfied by their rector as manager and feels more supported, may be more effective at teaching, thereby enhancing the satisfaction of the pupils and parents.



Note: RQ2 refers to the second research question discussed in Section 5.1, RQ3a to the first part of the third research question discussed in Section 5.2.1 and RQ3b to the second part discussed in Section 5.2.2.

Figure 3: Direct vs. indirect teacher-rector gender match effects on pupil and parent school satisfaction

Given the constraints of the dataset, this analysis is carried out at the *school level*, as op-

posed to the teacher level as in previous specifications. This is because the dataset does not contain the information about the class(es) in which teachers were teaching. Pupil/parent answers of one school will be connected to teacher responses of the same school. Hence, pupil/parent answers, as well as teacher answers, have to be aggregated at the school level. I compute the school average of non missing values in order to maximise the sample size of responses on which the average is computed for each survey question.

OLS regression

The first model includes a standard OLS regression conducted separately for each management dimension :

$$PS_{jk} = \alpha + \beta_1 SM_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \varepsilon_{jk} \quad (4)$$

$$PS_{jk} = \alpha + \beta_1 MSK_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \varepsilon_{jk} \quad (5)$$

$$PS_{jk} = \alpha + \beta_1 MB_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \varepsilon_{jk} \quad (6)$$

$$PS_{jk} = \alpha + \beta_1 MC_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \varepsilon_{jk} \quad (7)$$

The independent variable PS_{jk} refers to the average pupil/parent satisfaction measure of school j in school group k . In the main analysis, this corresponds to the overall pupil/parent satisfaction measure as defined in Table 1. Four alternate customer satisfaction measures will be used as robustness checks in Section 6.2.2. The variable SM_{jk} relates to the average teacher overall satisfaction with manager of school j in school group k . MSK_{jk} , MB_{jk} and MC_{jk} correspond respectively to the school-average teacher perception of the rector management skills, rector management behaviour and overall school management climate of school j in school brand k . As previously explained, these variables are aggregates of individual pupil/parent or teacher responses at the school level. Vectors of control variables controlling for school characteristics SCH_{jk} and rector characteristics REC_{jk} are also included in the regression. These are the same as in specification (1), with rector gender added in the rector characteristics.

The model is assumed to fulfill the zero conditional mean assumption. Specifically, for β_1 to be unbiased, there should be no factors correlated with teacher perception of rector management that also affect pupil and parent school satisfaction.

The coefficient of interest is β_1 . In specification (4), rejecting $\beta_1 = 0$ would imply that the average teacher satisfaction with their rector as manager impacts the average pupil and parent satisfaction of the school. In specifications (5), (6) or (7), a rejection of $\beta_1 = 0$ would suggest that pupil/parent school satisfaction is influenced by how teachers on average perceive the management of their rector and/or the school management climate.

School brand fixed effects

The second model adds school brand fixed effects δ_k to specifications (4), (5), (6), and (7):

$$PS_{jk} = \alpha + \beta_1 SM_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \delta_k + \varepsilon_{jk} \quad (8)$$

$$PS_{jk} = \alpha + \beta_1 MSK_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \delta_k + \varepsilon_{jk} \quad (9)$$

$$PS_{jk} = \alpha + \beta_1 MB_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \delta_k + \varepsilon_{jk} \quad (10)$$

$$PS_{jk} = \alpha + \beta_1 MC_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \delta_k + \varepsilon_{jk} \quad (11)$$

Variables are the same as in specifications (4), (5), (6), and (7). Specifications (8), (9), (10), and (11) capture *within school brands* variation of school average management satisfaction, management perception and customer satisfaction.

The advantage of this specification is that school brand factors are held constant. However, this comes at a cost of less variation in the data, since the between school brands variation is removed, which decreases the efficiency of the estimates (Wooldridge, 2013, p. 511). This may be problematic, as the sample size is already small (97 schools). There is a risk of a lack of statistical power in the regressions, which would increase the probability of making a *Type-II error*, i.e. failing to reject $\beta_1 = 0$ while it should be rejected. This illustrates the trade-off between high internal validity with few unobserved variation in the data and high statistical power given by enough variation in the data.

5.2.2 Teacher-rector gender match on pupil/parent school satisfaction (*direct gender match effect*)

While the previous section investigates the *indirect* impact of teacher-rector gender match on pupil/parent school satisfaction, this section considers the *direct* impact. The difference between the two is illustrated in Figure 3. Again, the analysis has to be done at the *school level*, as the dataset does not allow to link a teacher with the pupils he/she was teaching to. Pupil and parent school satisfaction is aggregated at the school level by doing the average of the non missing responses, as described in Section 5.2.1. To aggregate teacher-rector gender congruence at the school level, I compute for each school the *proportion* of teacher-rector gender matches in the school.

OLS regression

The first model considers a standard OLS regression:

$$PS_{jk} = \alpha + \beta_1 PGM_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \varepsilon_{jk} \quad (12)$$

PGM_{jk} corresponds to the proportion of teacher-rector gender matches at school j of school brand k . It is a percentage ranging from 0 to 1. PS_{jk} , SCH_{jk} and REC_{jk} are average

pupil/parent satisfaction measure, school characteristics and rector characteristics respectively as defined in specification (4).

The coefficient of interest is β_1 . Rejecting $\beta_1 = 0$ would indicate that the proportion of teacher-rector gender matches in the school affects average pupil/parent satisfaction with the school.

The assumptions are the same as for specifications (4) to (7).

School brand fixed effects

The second model adds school brand fixed effects δ_k to specification (12):

$$PS_{jk} = \alpha + \beta_1 PGM_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \delta_k + \varepsilon_{jk} \quad (13)$$

Advantages and disadvantages of this model are the same as specifications (8) to (11). This specification compares within each school brand the variation in the proportion of same teacher-rector gender pairs of the schools operated by the school brand. A rejection of $\beta_1 = 0$ would suggest a direct teacher-rector gender match effect on pupil/parent school satisfaction.

5.3 Further model choices

5.3.1 Modelling the gender match effect

To model the gender-match effect, I interact the two gender dummy variables, namely teacher gender and rector gender. This method was also chosen by previous gender matching studies (Goldberg et al., 2008; Lee et al., 1993; Mobley, 1982; Muralidharan & Sheth, 2016; Szymanska & Rubin, 2018).

Previous literature used alternative methods as follows. One alternative would have been to use four dummy variables, one for each possible gender pair, i.e. female rector-female teacher, female rector-male teacher, male rector-female teacher and male rector-male teacher. One category would then be omitted in the regression due to multicollinearity. This approach was adopted by Hassan and Hatmaker (2015) to model manager-employee gender match effects in performance ratings. Another method consists in using one dummy variable indicating the gender of the teacher, and another dummy variable signalling whether the rector has the same gender as the teacher (Dee, 2005; Giuliano et al., 2005). A last possibility would be to run two separate regressions, one only including schools led by female rectors, and the other one only for schools directed by male rectors. Using a Chow test, one can compare whether coefficients of the two regressions are statistically significant. Grissom et al. (2012) chose that option.

I chose the interaction term with the two gender dummy variables in order to easily test for

a relative gender match effect and further analyse differentials of the effect across genders. With hypothesis tests combining the coefficient of the interaction term and that of either rector gender or teacher gender, I can easily analyse all the aspects of gender matching (see Table 8). For instance, for rector management, it could be that (a) *male teachers* perceive differently male and female rectors, (b) *female teachers* perceive differently male and female rectors, (c) female and male teachers perceive differently *male rectors*, and/or (d) female and male teachers perceive differently *female rectors*.

5.3.2 Fixed effects vs. Random effects

My specifications including either school brand or school fixed effects could also have been specified using random effects as opposed to fixed effects. Both methods remove the unobserved cluster effect and capture only the within-cluster variations. The random effects model is more appropriate when the unobserved effect is not correlated with the independent variables, while the fixed effects model allows for such correlation (Wooldridge, 2013, p. 495). Using the Hausman test, I can determine which of the two models to use. The null hypothesis states that there is no correlation between the independent variables and the unobserved effect.

I conduct the Hausman test for each outcome variable both for school brand and school unobserved effects. Results from the tests are not clear-cut: depending on the outcome variable, the test suggests using either fixed or random effects. For a few outcome variables, the test cannot be conducted because of a negative chi-square. In the analysis, I choose fixed effects over random effects as previous studies on gender matching (Grissom et al., 2012; Pedersen & Nielsen, 2016) do so.

6 Results and analysis

I first present the regression results from the main analysis in Section 6.1 before discussing results from the sensitivity analysis in Section 6.2.

6.1 Regression results

I present results in turn for each outcome of interest. Section 6.1.1 focuses on teacher satisfaction, Section 6.1.2 on rector management and Section 6.1.3 on pupil/parent school satisfaction.

6.1.1 Teacher satisfaction

I first investigate teacher-rector gender match effects on teacher (a) motivation, (b) overall employee experience and (c) job satisfaction for each gender separately.

Table 9: Teacher-rector gender match on teacher satisfaction

(a) Teacher-rector gender match on motivation			
	(1) OLS	(2) School brand FE	(3) School FE
Female teacher * Female rector	0.262* (0.148)	0.286** (0.128)	0.280** (0.130)
Female teacher	0.0972 (0.107)	0.0573 (0.0923)	0.0548 (0.0925)
Female rector	-0.0309 (0.140)	-0.0913 (0.107)	0.152 (0.211)
Intercept	8.842*** (0.233)	8.877*** (0.509)	8.486*** (0.152)
School characteristics	YES	YES	YES
Rector characteristics	YES	YES	YES
Teacher characteristics	YES	YES	YES
$\beta_1 + \beta_3 = 0$	p=0.06*	p=0.03**	p=0.04**
$\beta_1 + \beta_2 = 0$	p=0.00***	p=0.00***	p=0.00***
$\beta_3 = \beta_2$	p=0.34	p=0.15	p=0.65
N	2942	2942	2942

(b) Teacher-rector gender match on overall employee experience			
	(1) OLS	(2) School brand FE	(3) School FE
Female teacher * Female rector	0.400** (0.156)	0.436*** (0.141)	0.351** (0.139)
Female teacher	-0.114 (0.124)	-0.155 (0.102)	-0.0945 (0.0993)
Female rector	-0.199 (0.179)	-0.291** (0.118)	0.165 (0.226)
Intercept	7.992*** (0.310)	7.817*** (0.564)	7.421*** (0.163)
School characteristics	YES	YES	YES
Rector characteristics	YES	YES	YES
Teacher characteristics	YES	YES	YES
$\beta_1 + \beta_3 = 0$	p=0.23	p=0.16	p=0.02*
$\beta_1 + \beta_2 = 0$	p=0.007***	p=0.006***	p=0.009***
$\beta_3 = \beta_2$	p=0.62	p=0.23	p=0.25
N	2945	2945	2945

(c) Teacher-rector gender match on job satisfaction

	(1) OLS	(2) School brand FE	(3) School FE
Female teacher * Female rector	0.448** (0.185)	0.495*** (0.153)	0.529*** (0.151)
Female teacher	-0.0255 (0.125)	-0.0923 (0.111)	-0.0979 (0.108)
Female rector	-0.171 (0.176)	-0.326** (0.128)	0.0991 (0.246)
Intercept	8.007*** (0.321)	8.509*** (0.609)	7.361*** (0.177)
School characteristics	YES	YES	YES
Rector characteristics	YES	YES	YES
Teacher characteristics	YES	YES	YES
$\beta_1 + \beta_3 = 0$	p=0.12	p=0.13	p=0.01**
$\beta_1 + \beta_2 = 0$	p=0.00***	p=0.00***	p=0.00***
$\beta_3 = \beta_2$	p=0.43	p=0.06*	p=0.42
N	2931	2931	2931

Note: Variables are defined in Tables 1 and 2. The first column refers to an OLS regression with standard errors clustered at the school level. Column (2) refers to the school brand fixed effects specification, and column (3) to the school fixed effect regression. For a full regression table including estimates of control variables (school, rector and teacher characteristics) please refer to Tables A6, A7, and A8 in Appendix. Interpretation of hypothesis tests is described in Table 8. Standard errors are written in parentheses. Significance levels are reported as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Let first consider teacher motivation (panel (a) of Table 9). All specifications consistently suggest that *female teachers* are significantly more motivated if matched to a female rector as opposed to a male rector ($\beta_1 + \beta_3 > 0$). In contrast, I do not find evidence that the motivation level of *male teachers* is negatively impacted when replacing a male rector by a female rector ($\beta_3 = 0$).

Furthermore, the *difference-in-difference* estimate β_1 suggests that the advantage of female teachers working for a female rector (as opposed to a male rector) is higher *relative to* the disadvantage of male teachers working for a female rector (as opposed to a male rector). Note that this *relative* gender match effect is equivalent and symmetric for male teachers¹⁷. Thus, $\beta_1 > 0$ implies that teachers of a specific gender working for a same gender rector report a *relatively* higher motivation than when working for a rector of opposite gender (relative to teachers of opposite gender).

Likewise, I find consistent positive gender match effects (in relative terms) for overall employee experience and job satisfaction ($\beta_1 > 0$ in panels (b) and (c) of Table 9). This suggests that teachers of a specific gender working for a same gender rector report a *relatively* higher

¹⁷Specifically, β_1 can be expressed as $(\text{FTFR} - \text{FTMR}) - (\text{MTFR} - \text{MTMR})$ or equivalently as $(\text{MTMR} - \text{MTFR}) - (\text{FTMR} - \text{FTFR})$. Thus, β_1 also suggests that the advantage of male teachers working for a male rector (as opposed to a female rector) is higher *relative to* the disadvantage of female teachers working for a male rector (as opposed to a female rector).

employee experience and job satisfaction than when working for a rector of opposite gender (relative to teachers of opposite gender). The magnitude of the 'difference-in-difference' estimate across panels (a), (b) and (c) of Table 9 further indicates that gender similarity has a particularly large impact on job satisfaction. The school fixed effects estimate (column (3) of panel (c) in Table 9) suggests that holding teacher and rector characteristics constant, teachers of a specific gender working for a same gender rector exhibit a job satisfaction on average 0.529 point higher (on a 10-point Likert scale) than teachers working for a rector of different gender (relative to teachers of opposite gender). This differential amounts to 0.280 for motivation and 0.351 for overall employee experience and (column (3) of panels (a) and (b) respectively in Table 9).

Note that estimates of relative gender match remain similar in magnitude and statistically significant across the three specifications (columns (1), (2) and (3) of panels (a), (b) and (c) respectively in Table 9). This suggests that relative gender match effects are not influenced by endogenous teacher or rector sorting across schools/school brands.

It is also important to note that a positive β_1 does not necessarily imply that teachers matched with a same-gender rector would be better off in *absolute* terms. In particular, $\beta_3 = 0$ in the school fixed effect regression (column (3) of panels (a), (b) and (c) in Table 9). This suggests that moving male teachers managed by a female rector to a male rector would not lead to an *absolute* increase in motivation, employee experience and job satisfaction for male teachers¹⁸. Hence, the distinction between relative and absolute effects is particularly salient (see Section 5.1.1 for further discussion).

Moreover, panels (a), (b) and (c) in Table 9 indicate that female teachers consistently report higher motivation, employee experience and job satisfaction than male teachers in schools directed by a *female rector* ($\beta_1 + \beta_2 > 0$). This contrasts with *male-rector* schools, where I fail to reject at any confidence level that female and male teachers differ in their overall employee experience, job satisfaction or motivation levels ($\beta_2 = 0$). Hence, the results imply that teacher-rector gender match seems to matter in female-rector schools, but not in schools with a male rector.

Lastly, for all specifications, I fail to reject the null hypothesis that $\beta_3 = \beta_2$ at the 5% significance level. This means that there is no significant differences in motivation, employee experience and job satisfaction of male teachers working for a female rector compared to female teachers working for a male rector. Thus, I find no evidence of *social norm effects* among teacher-rector pairs of opposite gender.

¹⁸This conclusion relies heavily on treating the school fixed effects specification as the preferred one. The conclusion would be different looking at e.g. the school brand fixed effects specification: the latter would instead suggest that moving male teachers managed by a female rector to a male rector would make male teachers better off in absolute terms ($\beta_3 < 0$).

6.1.2 Rector management

I now investigate the relative gender match effects on four dimensions of rector management as evaluated by teachers, specifically (a) satisfaction with manager, (b) perception of management behaviour, (c) perception of management skills and (d) perception of the overall management climate of the school.

Table 10: Teacher-rector gender match on teacher perception of rector management

(a) Teacher-rector gender match on satisfaction with manager			
	(1) OLS	(2) School brand FE	(3) School FE
Female teacher * Female rector	0.483** (0.231)	0.565*** (0.182)	0.637*** (0.174)
Female teacher	-0.200 (0.180)	-0.338** (0.133)	-0.387*** (0.125)
Female rector	0.100 (0.239)	-0.218 (0.152)	-0.801*** (0.281)
Intercept	9.008*** (0.417)	9.100*** (0.197)	9.384*** (0.205)
School characteristics	YES	YES	YES
Rector characteristics	YES	YES	YES
Teacher characteristics	YES	YES	YES
$\beta_1 + \beta_3 = 0$	p=0.02**	p=0.008***	p=0.56
$\beta_1 + \beta_2 = 0$	p=0.06*	p=0.09*	p=0.04**
$\beta_3 = \beta_2$	p=0.27	p=0.41	p=0.14
N	2656	2656	2656

(b) Teacher-rector gender match on manager behaviour

	(1) OLS	(2) School brand FE	(3) School FE
Female teacher * Female rector	0.526** (0.242)	0.565*** (0.175)	0.692*** (0.171)
Female teacher	-0.191 (0.161)	-0.299** (0.128)	-0.393*** (0.123)
Female rector	0.0588 (0.231)	-0.175 (0.146)	-0.611** (0.275)
Intercept	8.519*** (0.385)	8.562*** (0.189)	8.474*** (0.201)
School characteristics	YES	YES	YES
Rector characteristics	YES	YES	YES
Teacher characteristics	YES	YES	YES
$\beta_1 + \beta_3 = 0$	p=0.02**	p=0.00***	p=0.77
$\beta_1 + \beta_2 = 0$	p=0.06*	p=0.04**	p=0.01**
$\beta_3 = \beta_2$	p=0.35	p=0.38	p=0.43
N	2672	2672	2672

(c) Teacher-rector gender match on manager skills

	(1) OLS	(2) School brand FE	(3) School FE
Female teacher * Female rector	0.433* (0.223)	0.486*** (0.172)	0.529*** (0.161)
Female teacher	-0.199 (0.161)	-0.319** (0.125)	-0.361*** (0.116)
Female rector	0.0709 (0.243)	-0.212 (0.143)	-0.659** (0.259)
Intercept	8.779*** (0.415)	8.692*** (0.185)	8.872*** (0.189)
School characteristics	YES	YES	YES
Rector characteristics	YES	YES	YES
Teacher characteristics	YES	YES	YES
$\beta_1 + \beta_3 = 0$	p=0.06*	p=0.03**	p=0.61
$\beta_1 + \beta_2 = 0$	p=0.12	p=0.18	p=0.14
$\beta_3 = \beta_2$	p=0.33	p=0.44	p=0.25
N	2670	2670	2670

(d) Teacher-rector gender match on overall management climate

	(1)	(2)	(3)
	OLS	School brand FE	School FE
Female teacher * Female rector	0.172 (0.218)	0.181 (0.187)	0.265 (0.183)
Female teacher	0.0990 (0.159)	0.0683 (0.136)	0.0143 (0.131)
Female rector	-0.135 (0.225)	-0.203 (0.155)	0.126 (0.294)
Intercept	8.348*** (0.402)	7.893*** (0.201)	7.466*** (0.215)
School characteristics	YES	YES	YES
Rector characteristics	YES	YES	YES
Teacher characteristics	YES	YES	YES
<i>N</i>	2488	2488	2488

Note: Variables are defined in Tables 1 and 2. The first column refers to an OLS regression with standard errors clustered at the school level. Column (2) refers to the school brand fixed effects specification, and column (3) to the school fixed effect regression. For a full regression table including estimates of control variables (school, rector and teacher characteristics) please refer to Tables A9, A10, A11 and A12 in Appendix. The sample only includes teachers who explicitly stated their rector as their immediate manager. Standard errors are written in parentheses. Significance levels are reported as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

All specifications in panels (a), (b) and (c) of Table 10 suggest that rectors of a specific gender are relatively better perceived (a) as manager, (b) in terms of management behaviour and (c) in terms of management skills by teachers of their own gender (rather than by teachers of opposite gender) *relative to* rectors of the opposite gender ($\beta_1 > 0$). In particular, female rectors are relatively better perceived by female teachers (than by male teachers) compared to how male rectors are perceived by female teachers (than by male teachers). Equivalently, male rectors are better perceived by male teachers (than by female teachers) relative to how female rectors are perceived by male teachers (than by female teachers)¹⁹.

Yet, estimates provide no evidence that this relative gender matching effect translates to the perception of (d) the overall management climate (panel (d) of Table 10): the management climate of a female-rector school (relative to a male-rector school) is not perceived more positively by female teachers than by male teachers. Equivalently, the management climate of a male-rector school (relative to a female-rector school) is not perceived more positively by male teachers than by female teachers.

The relative gender matching impact is particularly large on teacher perception of management behaviour. Column (3) of panel (b) in Table 10 suggests that holding teacher, school and rector characteristics constant, teachers of a specific gender sharing the gender of their rector perceive the management behaviour of their rector on average 0.692 point higher (on

¹⁹In particular, $\beta_1 > 0$ suggests that (FTFR - MTFR) - (FTMR - MTMR) > 0 or equivalently (MTMR - FTMR) - (MTFR - FTFR) > 0 (see Section 5.1.1).

a 10-point Likert scale) than same-gender teachers working for a rector of a different gender (relative to teachers of the opposite gender). This difference-in-difference estimate equals to 0.529 for teacher perception of rector management skills (column (3) of panel (c) in Table 10). Column (3) of panel (a) in Table 10 implies that teachers of a specific gender are more satisfied with their rector as manager by on average 0.637 point more when working for a same-gender rector than same-gender teachers working for a rector of a different gender (relative to teachers of the opposite gender).

Again, it is important to keep in mind that $\beta_1 > 0$ is evidence of positive gender similarity effects in *relative* terms, but is not informative about *absolute* gender matching effects. To illustrate this point, consider the school fixed effects estimates of panel (a) in Table 10. Taking the coefficients at face value, one would conclude that moving from a male rector to a female rector would reduce satisfaction with manager in absolute terms both for male teachers ($\beta_3 < 0$) and for female teachers ($\beta_1 + \beta_3 < 0$ although not statistically significant²⁰). This is an example of a case where the *absolute* gender matching effects are negative although the *relative* gender matching effects are consistently positive. Note however that this example was only for illustrative purposes given that $\beta_1 + \beta_3$ is statistically not different from 0 (indicating that the satisfaction with manager of female teachers is statistically undistinguishable when moving from a male to a female rector).

While I find consistent gender matching effects in relative terms ($\beta_1 > 0$), evidence is mixed when considering gender matching effects in *absolute* terms. For *female teachers*, both the OLS and the school brand fixed effects specification suggest that satisfaction with manager, manager behaviour and manager skills are higher when the rector is female as opposed to male ($\beta_1 + \beta_3 > 0$ in columns (1) and (2) of panel (a), (b) and (c) in Table 10). The school fixed effects specification fails to find a significant effect on any three of these variables. In contrast, for *male teachers*, only the school fixed effects specification suggests that satisfaction with manager, manager behaviour and manager skills are larger for same-gender rector as opposed to female rectors ($\beta_3 < 0$ in column (3) of panel (a), (b) and (c) in Table 10). The regression with school fixed effects is the most conservative specification and suggests that male teachers perceive more positively their same-gender rector compared to rectors of opposite gender, while female teachers do not.

Furthermore, it is also interesting to analyse whether *female rectors* are perceived differently by male and female teachers. My results suggest that female teachers perceive more positively their female rector as manager and in terms of management behavior ($\beta_1 + \beta_2 > 0$ in panels (a) and (b) of Table 10), whereas the management skills of female rectors are not perceived differently by female and male teachers ($\beta_1 + \beta_2 = 0$ in panel (c) of Table 10). Concerning *male-rector* schools, the specifications with either school brand or school fixed effects suggest that male teachers assess more positively both the management behaviour and skills of their same-gender rector relative to female teachers; male teachers are also more satisfied by their same-gender rector as manager than female teachers are ($\beta_2 < 0$ in columns (2) and (3) of panel (a), (b) and (c) of Table 10). Hence, contrary to previous dimensions of teacher satisfaction (Section 6.1.1), gender matching matters for teachers' satisfaction with and

²⁰We have $\beta_1 + \beta_3 = 0.637 + (-0.801) = -0.164$ in column (3) panel (a) of Table 10.

perception of management *both* in female-rector and male-rector schools. The assessment of management skills of female rectors is an exception.

Finally, I fail to reject the null hypothesis that among teacher-rector pairs of opposite gender, male teachers' satisfaction with and perception of management of their opposite-gender rector differs from that of their female counterparts ($\beta_3 = \beta_2$).

6.1.3 Pupil and parent school satisfaction

Rector management on pupil/parent school satisfaction (*indirect* teacher-rector gender match effects)

In Section 6.1.2, I show that teachers sharing the same gender as their school rector are relatively more satisfied with their management, perceive relatively more positively their management skills and management behaviour than teachers not sharing the gender of their rector (relative to teachers of opposite gender). I now investigate whether these gender match effects *indirectly* transfer to customer satisfaction. In particular, I am interested in whether teacher's satisfaction with and perception of rector management impacts pupil and parent school satisfaction²¹. The analysis is conducted at the school level as explained in Section 5.2.1.

In Table 11, the OLS estimates (columns (1), (3) and (5)) suggest a positive effect of rector management as perceived by teachers on overall pupil and parent satisfaction significant at the 5% level. In particular, schools where teachers are on average more satisfied by their rector have a higher overall customer satisfaction. Pupils and parents are also on average more satisfied by schools where teachers perceive more positively the management skills and behaviour of their rectors. Holding schools and rector characteristics constant, a school where teachers give on average 1 extra point to the management behavior measure can expect an increase in overall customer satisfaction of 0.191 point. The increase in overall customer satisfaction amounts to 0.166 and 0.169 point when teachers rate their satisfaction with their rector and the management skills of their rector (respectively) with a 1-point-higher score.

However, the school brand fixed effects estimates (columns (2), (4) and (6) of Table 11) contrast the OLS ones. At any conventional significance level, I fail to reject the null hypothesis of no impact of teacher perception of rector management on customer satisfaction. This suggests that pupil and parent satisfaction with the school is not affected by how teachers are satisfied with their rectors and by how teachers perceive the management skills and behaviour of their rector.

The effect becoming insignificant as school brand fixed effects are included points to possible unobserved school brand effects. In particular, the relationship may have been incorrectly found significant in the OLS regressions due to some confounding effects at the school brand

²¹I do not investigate whether teacher perception of the school management climate impacts pupil/parent school satisfaction since I did not find gender matching effects for this dimension.

level held constant in the fixed effects regressions. Recall that the structure of AcadeMedia schools is very particular as the schools are grouped into school brands which are independently managed. There may be confounding factors at the school brand level impacting pupil and parent school satisfaction, such as corporate culture or the school budget. A school brand with a higher school budget may invest more in school infrastructures and thereby rendering pupils and parents more satisfied with the schools. If this also positively impacts how teachers are satisfied with their rector, then the estimate of satisfaction with manager may capture the effect of school budget. Contrary to the fixed effects regressions, the OLS specifications do not account for such school brand level factors. Also note that the magnitude of the effect found in the OLS specification is relatively small.

Hence, overall, Table 11 does not provide evidence of rector management affecting customer satisfaction, thereby no evidence for an *indirect* teacher-rector gender match effect on pupil and parent satisfaction.

Table 11: Satisfaction with manager, manager skills and manager behaviour on overall pupil and parent satisfaction

	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE
Satisfaction with manager	0.166** (0.0637)	0.0871 (0.0677)				
Manager skills			0.169** (0.0643)	0.0872 (0.0742)		
Manager behaviour					0.191** (0.0748)	0.0933 (0.0874)
Intercept	7.144*** (0.733)	7.113*** (0.498)	7.146*** (0.728)	7.138*** (0.534)	6.995*** (0.792)	7.099*** (0.619)
SCHOOL BRAND FE	NO	YES	NO	YES	NO	YES
School characteristics	YES	YES	YES	YES	YES	YES
Rector characteristics	YES	YES	YES	YES	YES	YES
<i>N</i>	97	97	97	97	97	97

Note: Variables are defined in Tables 1 and 2. Odd columns refer to OLS specifications, while even columns correspond to school brand fixed effects specifications. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. Variables are defined in Tables 1 and 2. For a full regression table including estimates of control variables (school, rector and teacher characteristics) please refer to Table A13 in Appendix. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Teacher-rector gender match on pupil/parent school satisfaction (*direct* gender match effects)

After investigating the *indirect* impact of teacher-rector gender match on pupil and parent school satisfaction, I now focus on the *direct* impact. The analysis is carried out at the school level and tests whether the proportion of same gender teacher-rector pairs in a school affects the average overall customer satisfaction of the school.

At any conventional significance level, I fail to reject the null hypothesis of no direct teacher-rector gender match effect on overall customer satisfaction (Table 12). Both the OLS and the school brand fixed effects estimates suggest this conclusion. Thus, the proportion of same-gender teacher-rector pairs in a school does not appear to influence pupil and parent satisfaction with the school.

Table 12: Proportion of teacher-rector gender matches on overall pupil/parent satisfaction

	(1) OLS	(2) School brand FE
Proportion teacher-rector gender matches	-0.372 (0.416)	-0.61 (0.574)
Intercept	8.928*** (0.48)	8.215*** (0.288)
School characteristics	YES	YES
Rector characteristics	YES	YES
<i>N</i>	97	97

Note: Variables are defined in Tables 1 and 2. The first column refers to an OLS specification while the second column includes school brand fixed effects. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. Variables are defined in Tables 1 and 2. For a full regression table including estimates of control variables (school, rector and teacher characteristics) please refer to Table A14 in Appendix. Standard errors are written in parentheses. Significance levels are reported as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6.2 Sensitivity analysis

I test the robustness of my results by using teacher fixed effects as alternate specification model (Section 6.2.1) and by considering different measures of pupil/parent school satisfaction (Section 6.2.2).

6.2.1 Teacher fixed effects

In the main analysis, I used three specifications to test for gender match effects on teacher satisfaction and rector management dimensions, namely OLS with clustered standard errors, school brand fixed effects and school fixed effects. I now test whether the results are robust to an alternate specification including teacher fixed effects ρ_i :

$$Y_{ijkt} = \alpha + \beta_1 FR_{jkt} * FT_{ijk} + \beta_3 FR_{jkt} + \beta_4 \gamma_t + SCH_{jkt} \Omega + REC_{jkt} \Upsilon + \rho_i + \varepsilon_{ijkt} \quad (14)$$

Teacher fixed effects hold the individual characteristics of teachers constant and compare the different observations at several points in time (i.e. in 2010 and in 2011) for each relevant teacher, exploiting the *within*-teacher variation. Thus, the teacher individual characteristics

TEA_{ijkt} included as control variables in specification (1) are not needed in the specification anymore.

This regression model with teacher fixed effects has, to my knowledge, not been tested in former studies about teacher-rector gender match. It presents the advantage of holding the teacher characteristics constant while exploiting variation in rector gender that can occur in two cases:

- (a) Teacher answers the survey for school A at time $t=1$ and at time $t=2$. School A has a new rector at time $t=2$ who has a different gender than that of rector at time $t=1$.
- (b) Teacher answers the survey for school A at time $t=1$ and for school B at time $t=2$. The gender of school B rector at time $t=2$ differs from that of school A rector at time $t=1$.

Yet, this specification has the disadvantage of removing a lot of variation and observations from the dataset: only teachers who took part in the employee survey both in 2010 and in 2011 and who experienced a change in rector gender are considered, i.e. 84 teachers (4% of the teacher sample considered in the main analysis). Among them, 78 belong to case (a) and the remaining 6 teachers refer to case (b). This strongly affects the efficiency of the estimates, given that standard errors become larger.

Results are reported in column (4) of the full regression tables in Appendix (see Tables A6, A7 and A8 for teacher satisfaction, and Tables A9, A10, A11 and A12 for rector management dimensions). Estimates of the teacher fixed effects regression provide a different picture than the three other specifications. For all dimensions except satisfaction with manager, I fail to find a significant gender match effect. The estimate even suggests an *adverse* relative gender match effect on satisfaction with manager (see column (4) of Table A9). This discrepancy in results with the three other regressions may be due to the very small data variation captured in the teacher fixed effects specification. The reliability of these estimates is also called into question by the inconsistent magnitude of intercepts that exceed the maximum survey range of 10 (see column (4) of Tables A9, A10 and A11).

6.2.2 Alternate measures of pupil and parent school satisfaction

In the main analysis, I used the pupils' and parents' answer to the questions "How satisfied are you with your school overall?" and "How satisfied are you with your child's school overall?" respectively to measure their satisfaction with the school. I test the robustness of the results highlighted in Section 6.1.3 by considering four alternate measures of pupil and parent satisfaction, namely (1) would recommend school, (2) have recommended school, (3) school relative to expectations and (4) school relative to ideal school. These four measures are defined in Table 1.

I first consider the effects of rector management on alternate measures of pupil and parent satisfaction (i.e. *indirect* teacher-rector gender match effect). I run the OLS specifications (4), (5), (6), and (7) and the school brand fixed effects specifications (8), (9), (10) and (11) for each of the four alternate measures of pupil and parent satisfaction as outcome

variable. Regression results are depicted in Tables A15, A16, A17 and A18 in Appendix. The findings of the primary analysis (Table 11) are robust to the customer satisfaction measure. In particular, the OLS estimates suggest that pupils and parents are (1) more likely to be willing to recommend and (2) to have recommended a school where teachers are on average more satisfied by their rectors, perceive more positively the management skills and behaviour of their rectors as well as the school overall management climate. The OLS estimates also suggest that pupils and parents perceive a school with a higher teacher satisfaction with and perception of management (3) closer to their expectations and (4) to their representation of an ideal school. Yet, as for the primary analysis, the school brand fixed effects estimates suggest no significant relationship between rector management and alternate pupil and parent satisfaction measures.

Second, I test whether the result of no *direct* teacher-rector gender match effects on overall pupil and parent school satisfaction holds for the other four customer satisfaction measures. Tables A19, A20, A21 and A22 in Appendix present the regression results. Results are the same as for the main analysis and imply no significant direct relationship between teacher-rector gender matching and the alternate pupil and parent satisfaction measures.²²

7 Discussion

In this section, I explain how my results relate to previous findings, thereby highlighting the contribution of my study to the literature (Section 7.1). Thereafter, I discuss the limitations together with the internal and external validity of my study in Section 7.2.

7.1 Comparison to previous findings

I discuss my results in light of previous studies separately for each outcome: Section 7.1.1 deals with teacher satisfaction, Section 7.1.2 with rector management and Section 7.1.3 with pupil and parent school satisfaction.

7.1.1 Teacher satisfaction

In Section 6.1.1, I show that teachers of a specific gender working for same-gender rectors report a relatively higher motivation, overall employee experience and job satisfaction than teachers working for a rector of a different gender (relative to teachers of opposite gender). Thereby, I provide empirical evidence for similarity effects (in relative terms) of gender matching as predicted by several theories, such as relational demography (Tsui & O'Reilly,

²²All coefficients of proportion of teacher-rector gender matches are insignificant, except that of specification (14) with school relative to expectations as outcome variable which is significant at the 10% significance level (Table A22).

1989), similarity-attraction theory (Berscheid & Hatfield, 1969; Byrne, 1971), and social identity theory (Tajfel & Turner, 1986).²³

My results further suggest that gender matching effects are more prevailing in schools directed by *female rectors* and that gender congruence has a particularly large impact on job satisfaction. These findings are consistent with those of Grissom, Nicholson-Crotty and Keiser (2012) who find evidence of a positive teacher-rector gender match effect on teacher job satisfaction in US public schools. The authors also claim that teacher-rector gender congruence matters mostly for female-rector schools, while it plays little role in male-rector schools. Yet, they fail to find a significant gender match effect in their school fixed effects specification, while my results indicate that teachers within a school are relatively more satisfied by their job (relative to teachers of opposite gender) if they have the same gender as the rector than if they work for a rector of opposite gender. Hence, my study confirms that the results of Grissom, Nicholson-Crotty and Keiser (2012) also hold in a different educational and cultural context, namely Swedish private schools. I also go beyond their study by showing that teacher-gender match affects another aspect of teacher satisfaction, i.e. overall employee experience.

My findings with respect to teacher motivation can be put into perspective with the study of Marvel (2015). The author shows how teacher-rector gender congruence positively impacts employee efforts of female teachers in US public schools. Contrary to their male counterparts, female teachers are found to do more overtime when working for a same-gender rector. Similarly, I show that teacher-rector gender similarity impacts the motivation level (in absolute terms) of *female teachers*, but not that of male teachers.

Overall, my results do not provide evidence of prevailing gender stereotypes and social norms in the Swedish private school context. Among teacher-rector pairs of opposite gender, male teachers working for a female rector do not exhibit a significantly lower motivation, employee experience and job satisfaction than female teachers working for a male rector. This result is rather consistent with predictions of theories modelling the effects of evolving gender norms. In particular, the Identity Economics framework (Akerlof & Kranton, 2000) suggest that less prevailing gender-job associations would diminish the loss in utility men experience when working in a job commonly associated to women (i.e. teacher) and when women work in a job perceived as a man’s job (i.e. rector) (see Section 3.1.1 for further explanations). This is not surprising in the Swedish context given that Sweden is one of the most gender equal countries worldwide.

7.1.2 Rector management

Besides teacher motivation, employee experience and job satisfaction, I further investigate gender matching effects on teachers’ satisfaction with and perception of management of their rector (Section 6.1.2). My results suggest that teachers of a specific gender working for a

²³For explanation of these theories, please refer to Section 3.1.1 of the literature review.

same-gender rector are relatively more satisfied by their rector as manager and perceive relatively more positively the management behaviour and skills of their rector than when working for a rector of opposite gender (relative to teachers of the opposite gender). Yet, I find that teachers do not relatively differ in their perception of the school management climate when sharing the gender of their rector compared to when working for a rector of a different gender (relative to teachers of opposite gender). Hence, this suggests that gender matching effects mainly apply to the manager-employee relationship as they do not affect the perception of the broader management climate of the school.

Further looking at absolute similarity effects for each gender separately, my school fixed effects estimates suggest that male teachers perceive more positively their same-gender rector compared to their rector of opposite gender, while female teachers do not. This finding is partially aligned with the study results of Goldberg, Riordan and Zhang (2008): male subordinates are found to assess more positively the leadership ability of their male supervisors, whereas female subordinates tend to rate their female supervisor more negatively than their male supervisor. To explain adverse gender match effects for female employees, the authors emphasise the importance of self-continuity and social status: individuals who care a lot about the continuity of their identity and who belong to a high social status (men) tend to rate similar people (e.g. male manager) more positively, while individuals of a low social status (women) rather associate themselves with individuals from a higher social status (e.g. male manager) by rating them more positively. While in my sample female teachers do not rate male rectors higher than female rectors, they still do not assess same-gender rector better than opposite-gender rector, while male teachers do. The difference in results for female teachers between the two studies may be due to the social context and prevailing gender norms. Goldberg et al. (2008) conduct their study in a US city government, while my sample comes from Swedish private schools. Compared to the US society, the Swedish culture lays more emphasis on gender equality, thereby reducing differences in perceived social status of men and women. This would be consistent with predictions of a cultural shifts in social norms as put forward by Akerlof and Kranton (2010) in their Identity Economics framework (see Section 3.1.1).

Furthermore, my school fixed effects estimates, suggesting that female teachers do not perceive better their same-gender rector while male teachers do, contradict the results from Ballou and Podgursky in the US public school context (1995). The authors find that female teachers rate the performance of their same-gender rector much higher than rector of the opposite gender, while the effect is less marked for male teachers. One reason for these contradictory results may be that my study is conducted using data from Swedish schools in the 2010 and 2011 period, while Ballou and Podgursky (1995) use data from US schools dating from 1987-1988.

Finally, my results point towards a difference in satisfaction with and assessment of management of *both female and male rectors* depending on the teacher gender. This contrasts with the results from Lee et al. (1993) arguing that male and female teachers differ in their assessment of the leadership of *female rectors only*. Specifically, I show that in male-rector schools, male teachers are more satisfied with their rector as manager and perceive more

positively the management behaviour and skills of their rector than female teachers do. In schools directed by a female rector, satisfaction with manager and perception of manager behaviour is higher for female teachers than male teachers, yet teachers of both genders do not evaluate differently the management skills of a female rector. Discrepancy in results may again be due to the lower prevalence of gender stereotypes and the more gender equal culture of my dataset. In particular, the rector profession was mostly male-dominated in the 1980's in US public school, as demonstrated by the very small proportion of female rectors in the dataset of Lee et al. (1993) (only 10% of all 377 rectors).

7.1.3 Pupil and parent school satisfaction

Rector management on pupil/parent school satisfaction (*indirect* teacher-rector gender match effects)

In Section 6.1.3, I found no evidence for the impact of rector management as evaluated by teachers on pupil and parent satisfaction with the school (*indirect* teacher-rector gender match effects). Contrary to the fixed effects estimates, the OLS estimates are aligned with results found in previous studies which emphasize the key role of rectors' managerial skills for school outcomes (Grissom & Loeb, 2011; Marks & Printy, 2003; Murphy, 1998; Stronge, 1993).

In particular, the results can directly be compared with Grissom and Loeb (2011) and Lai et al. (2014) studies that both explicitly link school management with parent assessment of the school. In their paper, Grissom and Loeb (2011) emphasise the importance of the "Organization Management" skills of rectors for school performance, i.e. the extent to which rectors are effective in managing the functioning of the school. They demonstrate that this competency affects how parents assess the overall school performance for US public schools. Similarly, Lai et al. (2014) highlight that the time rectors allocate to organization management activities positively impacts parent assessments of the school in US public schools. This is consistent with my OLS estimates suggesting that pupils/parents are more satisfied by schools where teachers perceive better the management skills and behaviour of their rector. In my sensitivity analysis (Section 6.2.2), my OLS estimates also indicate that parents are more likely to be willing to recommend and have recommended such schools with better rector management, which also appear to be closer to their expectations and to the representation of their ideal schools.

However, my fixed effects estimates contradict these findings and thus point to possible unobserved school brand effects driving the results in the OLS regressions. My fixed effects estimates suggesting that rector management does not matter for pupil and parent school satisfaction are consistent with the results of Bloom et al. (2015) for the Swedish educational context. While the authors find that overall a higher management quality is positively linked to better pupils achievement, they fail to find such a significant effect for Swedish schools. The authors argue that one reason for the insignificant results in the Swedish context may be the small sample size in their dataset (82 schools). This may also apply to my fixed effects

estimates where only within school brand variation is captured.

Teacher-rector gender match on pupil/parent school satisfaction (*direct* gender match effects)

The findings of Section 7.1.3 of no evidence that teacher-rector gender match *directly* impacts pupil and parent school satisfaction cannot directly be compared to previous literature as this investigation is novel in the literature. Nevertheless, the results are not consistent with the perspective of employee-manager gender congruence leading to greater efforts of the employee. Arguably, if teacher-rector gender match mattered for teachers' efforts, a teacher with a same-gender rector would work harder and this increased teaching efforts would likely be rewarded by pupils and parents, who would in turn be more satisfied with the teacher. Marvel (2015) tests this hypothesis in US public schools by examining whether teachers work more overtime when they share the gender of their rector. The author finds a gender match effect only for female teachers. Contrary to this study, specifications (12) and (13) are not carried out at the teacher level, but at the school level. Aggregating the results to the school level may weaken the link between a teachers' efforts and his pupils' perception.

7.2 Limitations and validity

A major concern when studying teacher-rector gender matching effects is that estimates are confounded by unobserved school and rector characteristics. I address this risk by using school fixed effects and considering variation in teacher satisfaction and perception of rector management *within* a school. Nevertheless, further concerns remain. I first discuss the limitations related to the internal validity of the study (Section 7.2.1) before outlining the external validity of my results (Section 7.2.2). Thereby, I explain how these limitations open up new avenues for future research.

7.2.1 Internal validity

A first note of caution pertains to the difference between sex and gender. Scholars have long emphasised the distinction between the two (Bem, 1974; Spence, Helmreich, & Stapp 1975) arguing that gender is culturally and socially constructed while sex is biologically determined (Unger, 1979). In my thesis, I am not able to measure the social construction of gender and I therefore use sex as a proxy for gender. Thus, I acknowledge that the gender match effects found in my study may not be due to gender per se (i.e. simply being a woman as opposed to a man), but rather driven by the behavioural characteristics and traits of each gender. In particular, my gender measures may reflect the different leadership styles adopted by the two genders: there is indeed a large body of literature arguing that men and women manage differently (Bass, Avolio, & Atwater, 1996; Eagly & Carli, 2003; Eagly et al., 2003;

Eagly & Johnson, 1990; Van Engen & Willemsen, 2004). Yet, this shortcoming is shared by most previous studies on gender matching (Grissom et al., 2012; Hassan & Hatmaker, 2015; Pedersen & Nielsen, 2016). I argue though that sex is a sufficiently good proxy for gender, as large discrepancies from gender characteristics commonly associated to sex category would create a bias mitigating the observed gender match effects: if female rectors adopt traits typically attributed to the male gender, the link between gender congruence and e.g. teacher satisfaction would be even more difficult to detect (Grissom et al., 2012, p. 659).

Further limitations emerge from the survey data I use for the analysis. In particular, the validity of my variables rests on the truthfulness of survey respondents. Specifically, my rector management measures result from teachers' subjective assessment of their rector. There is the risk that teachers are not truthful when assessing their rector as they may fear retaliation if they believe that the survey responses are not anonymised. In that case, teachers may arguably overrate the management skills and behaviour of their rector, which would create an upward bias in the estimates.

Another shortcoming common with survey data refers to the non-random nature of the sample. Teachers, pupils and parents *chose* to take part in the employee and customer survey respectively. As the employee survey was conducted twice, several teachers faced twice the decision of participating in the survey. Given that not all teachers did the survey in the two years, it is possible that there is attrition from the panel as a result of teachers deciding to drop out.²⁴ If this choice is due to elements that systematically relate to the outcome variable also when controlling for the effects of the independent variables, there may be a *sample selection problem* (Wooldridge, 2010, p. 578). In particular, such a problem may arise if teachers who participated in the 2010 employee survey did not do so in the 2011 survey because they were not satisfied with their job or with their rector as manager and did not want to get involved in school initiatives anymore. Following this line of reasoning, the sample used for analysis would overestimate the satisfaction of teachers with their job or with their rector. However, this concern is mitigated by the fact that the employee survey has a high response rate among teachers. Also note that there is a *rotating panel* (Wooldridge, 2010, p. 577) for the employee survey data, as the 2010 and 2011 surveys do not include the exact same schools, although most of the schools are represented in the two surveys. This may be another reason why some teachers did not participate twice in the survey.

7.2.2 External validity and future research

I now discuss the external validity of my results by assessing their generalisability across countries and industries. I thereby point towards further directions for future research.

My results apply to the particular Swedish context of high gender equality and may not hold in countries with less gender equality. In particular, the discrepancy between my findings and those of previous studies carried out in the US context (further discussed in Section

²⁴Note that it is also possible that a teacher did not participate twice in the survey because she was not working at the school for the two years when the survey was conducted.

7.1.2) implies that the effects of gender matching on management satisfaction and perception may be contingent on cultural factors and prevailing gender stereotypes. This confirms the importance of the social and cultural setting as emphasised by the Identity Economics model (Akerlof & Kranton, 2000). Nevertheless, my findings may be applicable to countries with a similar gender equality as Sweden, such as Iceland, Norway and Finland (World Economic Forum, 2017). This could be tested by further research and would enrich the small body of literature studying gender matching effects in another context than the US one.

Furthermore, my results may likely be sensitive to the gender composition of the industry. Previous research has shown that men and women do behave and interact differently in female-dominated industries compared to male-dominated industries (Gardiner & Tigge-mann, 1999; Kanter, 1977). In my study, I consider the schooling sector that is characterised by a predominance of female workers, both in the teaching and rector occupations (Skolverket, 2016; Statistics Sweden, 2018). Results may generalise to some extent to other industries where women are numerically overrepresented in Sweden, such as nurses or “personal care providers” (Statistics Sweden, 2018, p. 66). Future research could investigate how these results vary in Swedish occupations in which men make up the majority of workers, e.g. “software and system developers”, “electrical engineers” or “vehicle mechanics and repairers” (ibid.). As gender stereotypes may be more pronounced in such industries, this would deepen our understanding of the effects of social norms on gender matching effects.

8 Conclusion

The purpose of this study is to test whether teacher-rector gender match impacts (1) teacher satisfaction, (2) rector management as evaluated by teachers and (3) pupil/parent school satisfaction for each gender separately. I am thereby interested in the *relative* effect of gender matching given by a ‘*difference-in-difference*’ estimate. In particular, I investigate whether teachers of a specific gender report relatively better outcomes (relative to teachers of opposite gender) when working for a same-gender rector as opposed to a rector of a different gender. For the analysis, I rely on 2010 and 2011 employee survey data from Swedish private schools. My empirical strategy accounts for the likely correlation of teacher responses within a school brand and within a school. Pooled OLS with clustered standard errors, school brand fixed effects and school fixed effects are the three main specifications I use to account for these unobserved cluster effects.

In all three regression models, the ‘*difference-in-difference*’ estimate points to consistent positive *gender similarity effects* (in relative terms) on measures of teacher satisfaction and perception of rector management. Specifically, teachers sharing the gender of their rector report a relatively greater motivation, relatively better employee experience, and relatively higher job satisfaction than teachers working for a rector of opposite gender (relative to teachers of opposite gender). Likewise, teachers working for a same-gender rector are relatively more satisfied with their rector as manager and assess relatively more positively the management skills and behaviour of their rector than teachers with a rector of different

gender (relative to teachers of opposite gender).

Moreover, I do not find that male teachers are less satisfied or rate more negatively the management of their female rector compared to female teachers towards their male rector. I interpret this finding as no evidence of social norm effects.

Finally, connecting employee with customer survey data at the school level, I do not find that teacher-rector gender similarity *directly* or *indirectly* (mediated by how teachers perceive the management of their rector) affects pupil and parent school satisfaction.

These results have the potential to inform Human Resources policies within Swedish private schools in several ways. First, there is an upside for employees to work for a supervisor of a same gender, as they tend to be relatively more satisfied by their job and supervisor and to be more motivated²⁵. Second, my findings call for caution in using subjective evaluations in e.g. recruitment, promotion and retention decisions: the average evaluation a supervisor receives may be biased by the proportion of same-gender employees completing the feedback. Lastly, my results suggest that these subjective performance measures are not prone to discrimination against female managers within Swedish schools as opposed to US schools.

Hence, my paper sheds light on important ramifications that gender similarity has for the manager-employee relationship within the Swedish school context. An interesting avenue for future research would be to investigate whether teacher-rector gender match also influences *objective* performance measures such as student test scores and school dropout rates.

²⁵I never find a statistically significant absolute negative effect of moving employees to a manager of same gender. The relative gender match effect given by the difference-in-difference estimate is always positive.

9 References

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Appendix

A Additional summary and sample statistics

A.1 Distribution of survey respondents across schools and school brands

Table A1: Distribution of survey respondents across schools and school brands

School brands & schools	ES 2010	ES 2011	CS 2010
<i>Didaktus Skolor AB</i>	<i>54</i>	<i>44</i>	<i>409</i>
Didaktus Jakobsberg	13	10	81
Didaktus Praktiska/Liljeholmen	23	20	178
Didaktus Teoretiska	18	14	150
<i>Drottning Blankas Gymnasium</i>	<i>52</i>	<i>70</i>	<i>448</i>
Drottning Blankas Gymnasium Borås	N/a	3	N/a
Drottning Blankas Gymnasium Falkenberg	13	10	72
Drottning Blankas Gymnasium Göteborg	N/a	5	N/a
Drottning Blankas Gymnasium Halmstad	5	12	98
Drottning Blankas Gymnasium Helsingborg	N/a	2	N/a
Drottning Blankas Gymnasium Kungsbacka	21	22	193
Drottning Blankas Gymnasium Malmö	3	8	13
Drottning Blankas Gymnasium Varberg	10	8	72
<i>Fenestra</i>	<i>61</i>	<i>53</i>	<i>730</i>
Fenestra centrum	17	16	271
Fenestra S:t Jörgen	44	37	459
<i>Framtidsgymnasiet Sverige AB</i>	<i>102</i>	<i>80</i>	<i>645</i>
Framtidsgymnasiet Göteborg	23	22	138
Framtidsgymnasiet Kristianstad	26	15	197
Framtidsgymnasiet Linköping	4	6	56
Framtidsgymnasiet Malmö	25	15	55
Framtidsgymnasiet Norrköping	6	7	48
Framtidsgymnasiet Nyköping	12	8	75
Framtidsgymnasiet Stockholm	2	1	29
Framtidsgymnasiet Västerås	4	6	47
<i>IT-gymnasiet</i>	<i>137</i>	<i>134</i>	<i>1739</i>
IT-gymnasiet Åkersberga	8	8	73
IT-gymnasiet Göteborg	21	16	373
IT-gymnasiet Helsingborg	2	5	68
IT-gymnasiet Örebro	11	11	151
IT-gymnasiet Skövde	19	20	191
IT-gymnasiet Södertörn	15	17	241
IT-gymnasiet Sundbyberg	16	15	238
IT-gymnasiet Uppsala	31	28	290
IT-gymnasiet Västerås	14	14	114
<i>Ljud- och Bildskolan</i>	<i>112</i>	<i>113</i>	<i>1032</i>
Ljud- och Bildskolan Borås	18	20	195
Ljud- och Bildskolan Halmstad	19	19	187

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Table A1 – continued from previous page

	ES 2010	ES 2011	CS 2010
Ljud- och Bildskolan Helsingborg	3	6	32
Ljud- och Bildskolan Kristianstad	7	5	41
Ljud- och Bildskolan Kungsbacka	13	15	162
Ljud- och Bildskolan Lund	17	18	180
Ljud- och Bildskolan Motola	N/a	2	N/a
Ljud- och Bildskolan Nyköping	N/a	4	N/a
Ljud- och Bildskolan Trollhättan	9	6	83
Ljud- och Bildskolan Varberg	20	18	131
Ljud- och Bildskolan Skövde	6	N/a	21
<i>Mikael Elias Teoretiska Gymnasium</i>	<i>107</i>	<i>92</i>	<i>1043</i>
Mikael Elias Teoretiska Gymnasium Eskilstuna	5	9	62
Mikael Elias Teoretiska Gymnasium Falun	6	7	32
Mikael Elias Teoretiska Gymnasium Göteborg	19	17	225
Mikael Elias Teoretiska Gymnasium Karlskrona	4	5	62
Mikael Elias Teoretiska Gymnasium Lund	8	3	42
Mikael Elias Teoretiska Gymnasium Malmö	11	9	113
Mikael Elias Teoretiska Gymnasium Norrköping	7	3	20
Mikael Elias Teoretiska Gymnasium Örnköldsvik	5	8	26
Mikael Elias Teoretiska Gymnasium Sollentuna	8	6	56
Mikael Elias Teoretiska Gymnasium Stockholm	21	21	307
Mikael Elias Teoretiska Gymnasium Sundsvall	8	4	79
Mikael Elias Teoretiska Gymnasium Uppsala	5	N/a	19
<i>Norrskenet</i>	<i>N/a</i>	<i>65</i>	<i>N/a</i>
Norrskenet Boden	N/a	19	N/a
Norrskenet Kalix	N/a	14	N/a
Norrskenet Luleå	N/a	32	N/a
<i>NTI</i>	<i>170</i>	<i>176</i>	<i>1932</i>
NTI Annan	N/a	6	N/a
NTI Eskilstuna	14	13	124
NTI Falun	10	8	95
NTI Karlskrona	11	11	89
NTI Luleå	18	16	206
NTI Lund	12	13	152
NTI Malmö	21	17	246
NTI Norrköping	1	4	27
NTI Södertälje	3	4	46
NTI Sollentuna	4	5	45
NTI Stockholm	26	29	347
NTI Sundsvall	16	14	109
NTI Umeå	7	8	84
NTI MP Göteborg	10	15	179
NTI EC Göteborg	14	N/a	165
NTI-gymnasiet IT/data Göteborg	N/a	13	N/a
NTI Borås Handelsgymnasiet	3	N/a	18
<i>Petersvenskolan</i>	<i>N/a</i>	<i>15</i>	<i>N/a</i>
Petersvenskolan i Ästorp	N/a	10	N/a
Petersvenskolan i Höganäs	N/a	5	N/a
<i>Rytmus</i>	<i>63</i>	<i>63</i>	<i>580</i>
Rytmus Göteborg	5	5	53
Rytmus Malmö	10	9	56

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Table A1 – continued from previous page

	ES 2010	ES 2011	CS 2010
Rytmus Norrköping	7	8	99
Rytmus Stockholm	41	41	372
<i>Vittra För- och Grundskolor</i>	<i>547</i>	<i>466</i>	<i>4788</i>
Vittra Fram	N/a	11	N/a
Vittra Härryda	N/a	1	N/a
Vittra i Brotorp	15	13	105
Vittra i Forsgläntan	25	16	254
Vittra i Frösunda	25	17	190
Vittra i Halmstad	14	11	N/a
Vittra i Jakobsberg	32	24	331
Vittra i Katrineberg	10	4	70
Vittra i Kronhusparken	28	22	275
Vittra i Lambohov	16	15	141
Vittra i Luma park	25	15	147
Vittra i Östertälje	28	19	298
Vittra i Röda Stan	19	14	137
Vittra i Saltsjö-boo	20	19	116
Vittra i Sjöstaden	36	20	297
Vittra i Sollentuna	22	16	235
Vittra i Törnskogen	19	15	113
Vittra i Vallentuna	27	14	266
Vittra i Väsby	24	18	195
Vittra i Västra Hamnen	16	14	118
Vittra Kungshagen	N/a	19	N/a
Vittra Mölnlycke	N/a	7	N/a
Vittra Östersund	24	4	309
Vittra på Adolfsberg	9	12	270
Vittra på Landborgen	23	17	194
Vittra på Lidingö	23	19	205
Vittra på Raus	5	9	32
Vittra på Södermalm	22	14	243
Vittra Stab	1	1	N/a
Vittra Vid Gerdsken	24	25	257
Vittra Vid Mariatorget	16	15	97
Vittra Vid Nytorget	11	9	60
Vittra Vid Rösjötorp	12	17	142
<i>Vittragymnasiet</i>	<i>82</i>	<i>87</i>	<i>1406</i>
Vittragymnasiet fram Ängelholm	N/a	12	N/a
Vittragymnasiet Östersund	N/a	18	N/a
Vittragymnasiet Sickla	8	14	263
Vittragymnasiet Södermalm	24	21	412
Vittragymnasiet Vasastan	26	22	422
All Schools	1487	1458	14752

Note: Figures refer to the number of survey respondents (teachers for the two employee surveys, and pupils or parents for the customer survey) that are included in my dataset. ES stands for employee survey, and CS for customer survey. N/a indicates that this school (school brand) did not take part in the corresponding employee or customer survey. School brands are written in bold italic.

A.2 Employee surveys 2010 and 2011

Table A2: Proportion of teacher-rector gender pairs in 2010 employee survey

	Male rector	Female rector	All rectors
Male teacher	336 (22%)	249 (17%)	585 (39%)
Female teacher	327 (22%)	575 (39%)	902 (61%)
All teachers	663 (45%)	824 (55%)	1,487

Note: Figures refer to the number of teachers. The basis of the percentages is the total number of teachers participating in employee survey 2010.

Table A3: Proportion of teacher-rector gender pairs in 2011 employee survey

	Male rector	Female rector	All rectors
Male teacher	375 (26%)	224 (15%)	599 (41%)
Female teacher	322 (22%)	537 (37%)	859 (59%)
All teachers	697 (48%)	761 (52%)	1,458

Note: Figures refer to the number of teachers. The basis of the percentages is the total number of teachers participating in employee survey 2011.

Table A4: Summary statistics of teacher responses by school type

	Preschool		Comp. w. preschool		Compulsory		Upp. secondary	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
<i>Employee surveys 2010 and 2011</i>								
<i>Teacher satisfaction</i>								
Employee experience	8.02	1.52	7.61	1.75	7.09	1.99	7.16	1.85
Job satisfaction	7.91	1.52	7.53	1.89	6.89	2.17	6.99	1.99
Motivation	8.80	1.40	8.62	1.46	8.38	1.66	8.19	1.73
<i>Rector management</i>								
Satisfaction with manager	7.94	2.37	8.74	1.87	8.01	2.54	8.12	2.31
Manager behaviour	7.91	2.03	7.99	2.01	7.27	2.40	7.35	2.20
Manager skills	7.64	2.24	8.38	1.85	7.71	2.30	7.56	2.19
Management climate	7.72	1.64	7.53	2.01	7.12	2.19	6.42	2.36

Note: Variables are defined in Table 1. The different school types include respectively: preschools, compulsory schools with integrated preschools, compulsory schools without integrated preschools and upper secondary schools.

A.3 Customer survey 2010

Table A5: Sample statistics of pupil/parent responses across school and rector characteristics

	Pupils & parents		Parents only		Pupils only	
	#	%	#	%	#	%
<i>School type</i>						
Preschools	340	2%	340	5%	0	0%
Compulsory schools with int. preschool	2,627	18%	2,422	39%	205	2%
Compulsory schools	2,551	17%	2,373	38%	178	2%
Upper secondary schools	9,234	63%	1,069	17%	8,165	96%
<i>Rector gender</i>						
Male rector schools	7,054	48%	1,600	26%	5,454	64%
Female rector schools	7,698	52%	4,604	74%	3,094	36%
<i>Rector school tenure</i>						
Rector 3m-1y school tenure	3,855	26%	1,685	27%	2,170	25%
Rector 2-3y school tenure	4,788	32%	2,037	33%	2,751	32%
Rector 4-5y school tenure	2,153	15%	1,148	19%	1,005	12%
Rector more than 5y school tenure	3,956	27%	1,334	22%	2,622	31%
All schools	14,752	100%	6,204	100%	8,548	100%

Note: Figures refer to number of pupils and/or parent responses to the 2010 customer survey. The basis of the percentages is respectively the total number of pupil and parent responses, the number of parent responses, and the number of pupil responses. Percentages thus reflect the proportion of pupil and/or parent responses for each school/rector characteristic. Variables are defined in Tables 1 and 2.

B Detailed regression results of main analysis

B.1 Teacher satisfaction

Table A6: Teacher-rector gender match on motivation (full regression table)

	(1) OLS	(2) School brand FE	(3) School FE	(4) Teacher FE
Female teacher * Female rector	0.262* (0.148)	0.286** (0.128)	0.280** (0.130)	-0.177 (0.369)
Female teacher	0.0972 (0.107)	0.0573 (0.0923)	0.0548 (0.0925)	
Female rector	-0.0309 (0.140)	-0.0913 (0.107)	0.152 (0.211)	0.445 (0.275)
y2011	-0.297*** (0.0675)	-0.325*** (0.0620)	-0.304*** (0.0639)	-0.461*** (0.0556)
Preschool	-0.000234 (0.178)	-0.00407 (0.187)		
Compulsory school	-0.257 (0.193)	-0.216** (0.108)		-0.237 (0.928)
Upper secondary school	-0.332** (0.154)	-0.153 (0.822)		-0.436 (1.229)
Nb employees	-0.00344 (0.00337)	-0.00794*** (0.00267)		-0.0249 (0.0218)
RECTOR working 2-3y	0.00298 (0.114)	0.132 (0.0857)	0.0568 (0.113)	-0.117 (0.101)
RECTOR working 4-5y	0.116 (0.148)	0.241** (0.112)	0.248 (0.157)	0.00710 (0.139)
RECTOR working more 5y	0.130 (0.126)	0.133 (0.0932)	0.0857 (0.163)	-0.0450 (0.141)
TEACHER working 2-3y	-0.288*** (0.0889)	-0.281*** (0.0795)	-0.325*** (0.0807)	
TEACHER working 4-5y	-0.283*** (0.108)	-0.251** (0.0981)	-0.303*** (0.101)	
TEACHER working more 5y	-0.111 (0.111)	-0.129 (0.0905)	-0.208** (0.0940)	
Theoretical subject	-0.0682 (0.0879)	-0.0919 (0.0682)	-0.143** (0.0680)	
Intercept	8.842*** (0.233)	8.877*** (0.509)	8.486*** (0.152)	9.492*** (1.296)
N	2942	2942	2942	2942

Note: Variables are defined in Tables 1 and 2. The first column refers to OLS regression with standard errors clustered at the school level. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector and teacher school tenure is respectively 'RECTOR working 3m-1y' and 'TEACHER working 3m-1y'. Note that 'Preschool' is omitted in the teacher fixed effects regression because of collinearity: teachers who participated in the survey twice and who were working in a preschool in 2010 also worked in a preschool in 2011. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A7: Teacher-rector gender match on employee experience (full regression table)

	(1) OLS	(2) School brand FE	(3) School FE	(4) Teacher FE
Female teacher * Female rector	0.400** (0.156)	0.436*** (0.141)	0.351** (0.139)	-0.166 (0.386)
Female teacher	-0.114 (0.124)	-0.155 (0.102)	-0.0945 (0.0993)	
Female rector	-0.199 (0.179)	-0.291** (0.118)	0.165 (0.226)	0.122 (0.288)
y2011	-0.419*** (0.0870)	-0.436*** (0.0687)	-0.371*** (0.0687)	-0.444*** (0.0581)
Preschool	0.198 (0.287)	0.0918 (0.207)		
Compulsory school	-0.571** (0.265)	-0.613*** (0.119)		-0.377 (0.970)
Upper secondary school	-0.457** (0.215)	0.142 (0.911)		-0.265 (1.286)
Nb employees	-0.00491 (0.00514)	-0.0111*** (0.00296)		-0.0324 (0.0228)
RECTOR working 2-3y	0.0547 (0.136)	0.143 (0.0949)	0.143 (0.122)	0.0951 (0.105)
RECTOR working 4-5y	0.0383 (0.186)	0.193 (0.124)	0.185 (0.169)	0.149 (0.145)
RECTOR working more 5y	0.184 (0.161)	0.303*** (0.103)	-0.0511 (0.175)	0.00390 (0.147)
TEACHER working 2-3y	-0.173 (0.108)	-0.127 (0.0880)	-0.210** (0.0868)	
TEACHER working 4-5y	-0.0689 (0.153)	0.0169 (0.109)	-0.0981 (0.109)	
TEACHER working more 5y	0.189 (0.155)	0.217** (0.100)	0.105 (0.101)	
Theoretical subject	-0.0515 (0.102)	-0.104 (0.0755)	-0.197*** (0.0731)	
Intercept	7.992*** (0.310)	7.817*** (0.564)	7.421*** (0.163)	8.634*** (1.356)
N	2945	2945	2945	2945

Note: Variables are defined in Tables 1 and 2. The first column refers to OLS regression with standard errors clustered at the school level. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector and teacher school tenure is respectively 'RECTOR working 3m-1y' and 'TEACHER working 3m-1y'. Note that 'Preschool' is omitted in the teacher fixed effects regression because of collinearity: teachers who participated in the survey twice and who were working in a preschool in 2010 also worked in a preschool in 2011. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A8: Teacher-rector gender match on job satisfaction (full regression table)

	(1) OLS	(2) School brand FE	(3) School FE	(4) Teacher FE
Female teacher * Female rector	0.448** (0.185)	0.495*** (0.153)	0.529*** (0.151)	0.264 (0.404)
Female teacher	-0.0255 (0.125)	-0.0923 (0.111)	-0.0979 (0.108)	
Female rector	-0.171 (0.176)	-0.326** (0.128)	0.0991 (0.246)	0.0568 (0.301)
y2011	-0.352*** (0.0967)	-0.374*** (0.0744)	-0.301*** (0.0748)	-0.476*** (0.0610)
Preschool	0.0805 (0.280)	-0.0110 (0.223)		
Compulsory school	-0.681** (0.323)	-0.742*** (0.129)		0.681 (1.016)
Upper secondary school	-0.517** (0.223)	-1.047 (0.984)		1.861 (1.346)
Nb employees	-0.00750 (0.00614)	-0.0129*** (0.00320)		-0.0187 (0.0238)
RECTOR working 2-3y	0.153 (0.153)	0.277*** (0.103)	0.201 (0.132)	0.0682 (0.110)
RECTOR working 4-5y	0.0931 (0.225)	0.230* (0.134)	0.212 (0.183)	-0.0103 (0.152)
RECTOR working more 5y	0.263 (0.193)	0.349*** (0.112)	-0.00628 (0.191)	-0.0371 (0.154)
TEACHER working 2-3y	-0.363*** (0.105)	-0.339*** (0.0953)	-0.435*** (0.0945)	
TEACHER working 4-5y	-0.303** (0.140)	-0.223* (0.117)	-0.337*** (0.118)	
TEACHER working more 5y	-0.162 (0.165)	-0.155 (0.109)	-0.269** (0.110)	
Theoretical subject	-0.102 (0.109)	-0.110 (0.0818)	-0.189** (0.0796)	
Intercept	8.007*** (0.321)	8.509*** (0.609)	7.361*** (0.177)	6.556*** (1.419)
N	2931	2931	2931	2931

Note: Variables are defined in Tables 1 and 2. The first column refers to OLS regression with standard errors clustered at the school level. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector and teacher school tenure is respectively 'RECTOR working 3m-1y' and 'TEACHER working 3m-1y'. Note that 'Preschool' is omitted in the teacher fixed effects regression because of collinearity: teachers who participated in the survey twice and who were working in a preschool in 2010 also worked in a preschool in 2011. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

B.2 Rector management

Table A9: Teacher-rector gender match on satisfaction with manager (full regression table)

	(1) OLS	(2) School brand FE	(3) School FE	(4) Teacher FE
Female teacher * Female rector	0.483** (0.231)	0.565*** (0.182)	0.637*** (0.174)	-1.351** (0.531)
Female teacher	-0.200 (0.180)	-0.338** (0.133)	-0.387*** (0.125)	
Female rector	0.100 (0.239)	-0.218 (0.152)	-0.801*** (0.281)	0.0652 (0.402)
y2011	-0.403*** (0.130)	-0.362*** (0.0889)	-0.301*** (0.0866)	-0.518*** (0.0799)
Preschool	-0.975 (0.611)	-1.152*** (0.262)		
Compulsory school	-0.640 (0.398)	-0.734*** (0.154)		-1.535 (1.269)
Upper secondary school	-0.409* (0.234)			-2.888* (1.698)
Nb employees	0.00260 (0.00893)	-0.000745 (0.00393)		-0.0422 (0.0329)
RECTOR working 2-3y	-0.138 (0.262)	-0.0228 (0.125)	0.0453 (0.160)	0.158 (0.155)
RECTOR working 4-5y	-0.148 (0.304)	-0.120 (0.162)	0.284 (0.214)	0.0880 (0.205)
RECTOR working more 5y	0.203 (0.280)	0.197 (0.134)	-0.334 (0.218)	-0.259 (0.200)
TEACHER working 2-3y	-0.415*** (0.152)	-0.404*** (0.114)	-0.488*** (0.109)	
TEACHER working 4-5y	-0.413** (0.170)	-0.387*** (0.140)	-0.462*** (0.136)	
TEACHER working more 5y	-0.272 (0.185)	-0.340*** (0.131)	-0.432*** (0.128)	
Theoretical subject	-0.187 (0.118)	-0.254*** (0.0980)	-0.310*** (0.0918)	
Intercept	9.008*** (0.417)	9.100*** (0.197)	9.384*** (0.205)	12.18*** (1.880)
N	2656	2656	2656	2656

Note: Variables are defined in Tables 1 and 2. The first column refers to OLS regression with standard errors clustered at the school level. The sample only includes teachers who explicitly stated their rector as their immediate manager. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector and teacher school tenure is respectively 'RECTOR working 3m-1y' and 'TEACHER working 3m-1y'. Note that 'Preschool' is omitted in the teacher fixed effects regression because of collinearity: teachers who participated in the survey twice and who were working in a preschool in 2010 also worked in a preschool in 2011. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A10: Teacher-rector gender match on manager behaviour (full regression table)

	(1) OLS	(2) School brand FE	(3) School FE	(4) Teacher FE
Female teacher * Female rector	0.526** (0.242)	0.565*** (0.175)	0.692*** (0.171)	-0.266 (0.484)
Female teacher	-0.191 (0.161)	-0.299** (0.128)	-0.393*** (0.123)	
Female rector	0.0588 (0.231)	-0.175 (0.146)	-0.611** (0.275)	-0.264 (0.366)
y2011	-0.424*** (0.121)	-0.372*** (0.0853)	-0.339*** (0.0848)	-0.478*** (0.0724)
Preschool	-0.356 (0.468)	-0.560** (0.252)		
Compulsory school	-0.713* (0.379)	-0.834*** (0.147)		-1.080 (1.156)
Upper secondary school	-0.517** (0.241)			-2.167 (1.546)
Nb employees	-0.00648 (0.00645)	-0.0104*** (0.00376)		-0.0256 (0.0300)
RECTOR working 2-3y	-0.199 (0.223)	-0.0840 (0.120)	-0.122 (0.157)	-0.127 (0.140)
RECTOR working 4-5y	-0.389 (0.250)	-0.415*** (0.155)	-0.0861 (0.209)	-0.194 (0.185)
RECTOR working more 5y	-0.0129 (0.245)	-0.133 (0.129)	-0.462** (0.214)	-0.462** (0.182)
TEACHER working 2-3y	-0.278** (0.134)	-0.285*** (0.109)	-0.359*** (0.106)	
TEACHER working 4-5y	-0.379** (0.171)	-0.355*** (0.134)	-0.423*** (0.133)	
TEACHER working more 5y	0.00648 (0.166)	-0.0862 (0.126)	-0.149 (0.125)	
Theoretical subject	-0.0555 (0.107)	-0.109 (0.0940)	-0.155* (0.0899)	
Intercept	8.519*** (0.385)	8.562*** (0.189)	8.474*** (0.201)	10.39*** (1.711)
N	2672	2672	2672	2672

Note: Variables are defined in Tables 1 and 2. The first column refers to OLS regression with standard errors clustered at the school level. The sample only includes teachers who explicitly stated their rector as their immediate manager. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector and teacher school tenure is respectively 'RECTOR working 3m-1y' and 'TEACHER working 3m-1y'. Note that 'Preschool' is omitted in the teacher fixed effects regression because of collinearity: teachers who participated in the survey twice and who were working in a preschool in 2010 also worked in a preschool in 2011. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A11: Teacher-rector gender match on manager skills (full regression table)

	(1) OLS	(2) School brand FE	(3) School FE	(4) Teacher FE
Female teacher * Female rector	0.433* (0.223)	0.486*** (0.172)	0.529*** (0.161)	-0.182 (0.487)
Female teacher	-0.199 (0.161)	-0.319** (0.125)	-0.361*** (0.116)	
Female rector	0.0709 (0.243)	-0.212 (0.143)	-0.659** (0.259)	-0.687* (0.368)
y2011	-0.427*** (0.131)	-0.370*** (0.0836)	-0.328*** (0.0800)	-0.473*** (0.0728)
Preschool	-0.923 (0.604)	-1.142*** (0.247)		
Compulsory school	-0.615 (0.404)	-0.734*** (0.144)		-2.582** (1.163)
Upper secondary school	-0.681*** (0.252)			-4.120*** (1.555)
Nb employees	-0.000271 (0.00816)	-0.00248 (0.00369)		-0.0456 (0.0301)
RECTOR working 2-3y	-0.0965 (0.263)	-0.0150 (0.118)	-0.00139 (0.148)	0.0761 (0.141)
RECTOR working 4-5y	-0.127 (0.287)	-0.163 (0.152)	0.118 (0.197)	-0.0412 (0.187)
RECTOR working more 5y	0.181 (0.278)	0.129 (0.127)	-0.255 (0.202)	-0.299 (0.184)
TEACHER working 2-3y	-0.414*** (0.141)	-0.392*** (0.107)	-0.502*** (0.100)	
TEACHER working 4-5y	-0.394** (0.162)	-0.381*** (0.132)	-0.467*** (0.125)	
TEACHER working more 5y	-0.289* (0.174)	-0.377*** (0.123)	-0.439*** (0.118)	
Theoretical subject	-0.133 (0.112)	-0.200** (0.0922)	-0.273*** (0.0847)	
Intercept	8.779*** (0.415)	8.692*** (0.185)	8.872*** (0.189)	12.73*** (1.721)
N	2670	2670	2670	2670

Note: Variables are defined in Tables 1 and 2. The first column refers to OLS regression with standard errors clustered at the school level. The sample only includes teachers who explicitly stated their rector as their immediate manager. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector and teacher school tenure is respectively 'RECTOR working 3m-1y' and 'TEACHER working 3m-1y'. Note that 'Preschool' is omitted in the teacher fixed effects regression because of collinearity: teachers who participated in the survey twice and who were working in a preschool in 2010 also worked in a preschool in 2011. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A12: Teacher-rector gender match on overall management climate
(full regression table)

	(1) OLS	(2) School brand FE	(3) School FE	(4) Teacher FE
Female teacher * Female rector	0.172 (0.218)	0.181 (0.187)	0.265 (0.183)	-0.630 (0.615)
Female teacher	0.0990 (0.159)	0.0683 (0.136)	0.0143 (0.131)	
Female rector	-0.135 (0.225)	-0.203 (0.155)	0.126 (0.294)	0.109 (0.452)
y2011	-0.570*** (0.127)	-0.533*** (0.0911)	-0.493*** (0.0907)	-0.600*** (0.0917)
Preschool	-0.115 (0.350)	-0.272 (0.264)		
Compulsory school	-0.395 (0.328)	-0.469*** (0.156)		-0.403 (1.372)
Upper secondary school	-1.132*** (0.273)			0.703 (1.840)
Nb employees	-0.00618 (0.00609)	-0.0104** (0.00403)		-0.0411 (0.0358)
RECTOR working 2-3y	0.235 (0.194)	0.292** (0.128)	0.267 (0.168)	0.320* (0.177)
RECTOR working 4-5y	0.0727 (0.237)	0.0732 (0.165)	0.157 (0.223)	-0.178 (0.234)
RECTOR working more 5y	0.303 (0.212)	0.272** (0.138)	0.0605 (0.229)	0.102 (0.231)
TEACHER working 2-3y	-0.612*** (0.140)	-0.616*** (0.118)	-0.651*** (0.115)	
TEACHER working 4-5y	-0.375** (0.166)	-0.362** (0.143)	-0.497*** (0.142)	
TEACHER working more 5y	-0.440** (0.173)	-0.511*** (0.135)	-0.561*** (0.135)	
Theoretical subject	-0.297*** (0.112)	-0.345*** (0.100)	-0.432*** (0.0958)	
Intercept	8.348*** (0.402)	7.893*** (0.201)	7.466*** (0.215)	8.019*** (2.032)
N	2488	2488	2488	2488

Note: Variables are defined in Tables 1 and 2. The first column refers to OLS regression with standard errors clustered at the school level. The sample only includes teachers who explicitly stated their rector as their immediate manager. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector and teacher school tenure is respectively 'RECTOR working 3m-1y' and 'TEACHER working 3m-1y'. Note that 'Preschool' is omitted in the teacher fixed effects regression because of collinearity: teachers who participated in the survey twice and who were working in a preschool in 2010 also worked in a preschool in 2011. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

B.3 Pupil and parent school satisfaction

Indirect teacher-rector gender match effect on pupil/parent satisfaction

Table A13: Satisfaction with manager, manager skills, manager behaviour and management climate on overall pupil and parent satisfaction (full regression table)

	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE	(7) OLS	(8) FE
Satisfaction with manager	0.166** (0.0637)	0.0871 (0.0677)						
Manager skills			0.169** (0.0643)	0.0872 (0.0742)				
Manager behaviour					0.191** (0.0748)	0.0933 (0.0874)		
Management climate							0.201*** (0.0718)	0.116 (0.0816)
Nb employees	-0.00864 (0.00652)	-0.00937 (0.00526)	-0.00798 (0.00643)	-0.00904* (0.00485)	-0.00742 (0.00660)	-0.00855 (0.00478)	-0.00348 (0.00731)	-0.00647 (0.00399)
Preschool	0.527* (0.304)	0.433*** (0.0457)	0.527 (0.321)	0.433*** (0.0415)	0.474* (0.279)	0.404*** (0.0605)	0.459* (0.244)	0.396*** (0.0706)
Compulsory school	-0.402** (0.177)	-0.492*** (0.0591)	-0.399** (0.178)	-0.493*** (0.0620)	-0.336* (0.191)	-0.469*** (0.0908)	-0.428*** (0.159)	-0.501*** (0.0359)
Upper secondary school	-0.878*** (0.198)		-0.851*** (0.205)		-0.843*** (0.202)		-0.703*** (0.231)	
Female rector	-0.109 (0.183)	-0.211 (0.137)	-0.111 (0.183)	-0.216 (0.132)	-0.127 (0.181)	-0.223 (0.138)	-0.0514 (0.196)	-0.197 (0.115)
RECTOR working 2-3y	-0.185 (0.192)	0.0105 (0.142)	-0.183 (0.191)	0.0132 (0.143)	-0.177 (0.194)	0.00923 (0.155)	-0.152 (0.192)	0.0325 (0.141)
RECTOR working 4-5y	-0.436 (0.283)	-0.239 (0.234)	-0.397 (0.302)	-0.213 (0.228)	-0.364 (0.291)	-0.201 (0.229)	-0.369 (0.298)	-0.199 (0.193)
RECTOR working more 5y	-0.318 (0.205)	-0.0499 (0.191)	-0.279 (0.198)	-0.0283 (0.190)	-0.294 (0.203)	-0.0274 (0.198)	-0.235 (0.207)	-0.00735 (0.218)
Intercept	7.144*** (0.733)	7.113*** (0.498)	7.146*** (0.728)	7.138*** (0.534)	6.995*** (0.792)	7.099*** (0.619)	6.790*** (0.790)	6.920*** (0.557)
School brand fixed effects	NO	YES	NO	YES	NO	YES	NO	YES
N	97	97	97	97	97	97	97	97

Note: Variables are defined in Tables 1 and 2. Odd columns refer to OLS specifications, while even columns correspond to school brand fixed effects specifications. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Direct teacher-rector gender match effect on pupil/parent satisfaction

Table A14: Proportion of teacher-rector gender matches on overall pupil and parent satisfaction (full regression table)

	(1)	(2)
	OLS	School brand FE
Proportion teacher-rector gender matches	-0.372 (0.416)	-0.61 (0.574)
Nb. employees	-0.008 (0.75)	-0.010* (0.57)
Preschool	0.443* (0.227)	0.415*** (0.124)
Compulsory school	-0.632*** (0.166)	-0.664*** (0.648)
Upper secondary school	-1.113*** (0.221)	
Female rector	-0.0836 (0.21)	-0.204 (0.165)
RECTOR working 2-3y	-0.233 (0.26)	0.0257 (0.22)
RECTOR working 4-5y	-0.460 (0.287)	-0.270 (0.192)
RECTOR working more 5y	-0.256 (0.225)	0.0181 (0.27)
Intercept	8.928*** (0.48)	8.215*** (0.288)
<i>N</i>	97	97

Note: Variables are defined in Tables 1 and 2. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

C Regression results of sensitivity analysis

C.1 Rector management on alternate measures of pupil and parent school satisfaction

Table A15: Satisfaction with manager, manager skills, manager behaviour and management climate on would recommended school

	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE	(7) OLS	(8) FE
Satisfaction with manager	0.215*** (0.0738)	0.113 (0.0808)						
Manager skills			0.204*** (0.0756)	0.0976 (0.0973)				
Manager behavior					0.253*** (0.0868)	0.127 (0.103)		
Management climate							0.282*** (0.0953)	0.159 (0.105)
Nb employees	-0.0126 (0.00817)	-0.0140** (0.00528)	-0.0117 (0.00819)	-0.0137** (0.00478)	-0.0110 (0.00823)	-0.0129** (0.00486)	-0.00540 (0.00898)	-0.0100** (0.00438)
Preschool	0.598 (0.372)	0.482*** (0.0447)	0.587 (0.386)	0.468*** (0.0470)	0.531 (0.338)	0.447*** (0.0527)	0.514* (0.294)	0.436*** (0.0611)
Compulsory school	-0.412* (0.232)	-0.524*** (0.0712)	-0.425* (0.231)	-0.543*** (0.0851)	-0.319 (0.247)	-0.485*** (0.110)	-0.429** (0.208)	-0.528*** (0.0626)
Upper secondary school	-0.958*** (0.261)		-0.939*** (0.271)		-0.907*** (0.262)		-0.696** (0.310)	
Female rector	-0.208 (0.245)	-0.331* (0.152)	-0.209 (0.248)	-0.341** (0.150)	-0.232 (0.244)	-0.347** (0.151)	-0.128 (0.264)	-0.311** (0.130)
RECTOR working 2-3y	-0.395 (0.253)	-0.0733 (0.181)	-0.397 (0.254)	-0.0731 (0.186)	-0.383 (0.256)	-0.0741 (0.196)	-0.342 (0.250)	-0.0422 (0.179)
RECTOR working 4-5y	-0.612* (0.362)	-0.295 (0.324)	-0.564 (0.385)	-0.263 (0.311)	-0.518 (0.371)	-0.243 (0.313)	-0.519 (0.380)	-0.241 (0.259)
RECTOR working more 5y	-0.476* (0.271)	-0.0557 (0.183)	-0.425 (0.268)	-0.0251 (0.181)	-0.446* (0.268)	-0.0272 (0.183)	-0.365 (0.275)	0.000219 (0.196)
Intercept	7.218*** (0.854)	7.261*** (0.563)	7.351*** (0.876)	7.427*** (0.679)	6.972*** (0.920)	7.200*** (0.705)	6.561*** (1.056)	6.950*** (0.733)
School brand fixed effects	NO	YES	NO	YES	NO	YES	NO	YES
N	97	97	97	97	97	97	97	97

Note: Variables are defined in Tables 1 and 2. Odd columns refer to OLS specifications, while even columns correspond to school brand fixed effects specifications. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A16: Satisfaction with manager, manager skills, manager behaviour and management climate on have recommended school

	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE	(7) OLS	(8) FE
Satisfaction with manager	0.183*** (0.519)	0.0523 (0.698)						
Manager skills			0.165*** (0.557)	0.0368 (0.822)				
Manager behavior					0.183*** (0.68)	0.0206 (0.83)		
Management climate							0.294*** (0.13)	0.145 (0.956)
Nb employees	-0.00818 (0.893)	-0.00727 (0.663)	-0.00745 (0.895)	-0.00715 (0.662)	-0.00692 (0.96)	-0.00714 (0.677)	-0.000859 (0.936)	-0.00357 (0.715)
Preschool	0.666* (0.383)	0.523*** (0.11)	0.651* (0.381)	0.510*** (0.16)	0.598* (0.359)	0.489*** (0.956)	0.609* (0.33)	0.525*** (0.939)
Compulsory school	-0.0484 (0.263)	-0.227** (0.88)	-0.0696 (0.259)	-0.246** (0.823)	-0.0116 (0.273)	-0.260** (0.951)	-0.0195 (0.262)	-0.172* (0.795)
Upper secondary school	-1.271*** (0.295)		-1.265*** (0.298)		-1.260*** (0.3)		-0.960*** (0.357)	
Female rector	-0.0482 (0.259)	-0.338* (0.183)	-0.0487 (0.261)	-0.343* (0.183)	-0.0637 (0.262)	-0.347* (0.19)	0.0317 (0.27)	-0.309* (0.149)
RECTOR working 2-3y	-0.327 (0.276)	-0.0401 (0.218)	-0.332 (0.278)	-0.0417 (0.218)	-0.328 (0.284)	-0.0463 (0.226)	-0.257 (0.275)	-0.00263 (0.23)
RECTOR working 4-5y	-0.633* (0.36)	-0.208 (0.34)	-0.594 (0.376)	-0.194 (0.294)	-0.563 (0.368)	-0.193 (0.291)	-0.539 (0.375)	-0.171 (0.235)
RECTOR working more 5y	-0.518 (0.312)	-0.0120 (0.288)	-0.475 (0.39)	0.00334 (0.29)	-0.489 (0.311)	0.00623 (0.293)	-0.413 (0.38)	0.0184 (0.28)
Intercept	6.26*** (0.628)	6.349*** (0.535)	6.453*** (0.657)	6.493*** (0.581)	6.331*** (0.727)	6.629*** (0.65)	5.23*** (1.14)	5.627*** (0.65)
School brand fixed effects	NO	YES	NO	YES	NO	YES	NO	YES
N	97	97	97	97	97	97	97	97

Note: Variables are defined in Tables 1 and 2. Odd columns refer to OLS specifications, while even columns correspond to school brand fixed effects specifications. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A17: Satisfaction with manager, manager skills, manager behaviour and management climate on school relative to expectations

	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE	(7) OLS	(8) FE
Satisfaction with manager	0.177** (0.0677)	0.0846 (0.0793)						
Manager skills			0.185*** (0.0674)	0.0896 (0.0851)				
Manager behavior					0.212*** (0.0780)	0.100 (0.0990)		
Management climate							0.252*** (0.0838)	0.152 (0.100)
Nb employees	-0.0135* (0.00750)	-0.0147** (0.00611)	-0.0128* (0.00739)	-0.0144** (0.00568)	-0.0122 (0.00754)	-0.0138** (0.00560)	-0.00717 (0.00827)	-0.0109** (0.00479)
Preschool	0.517 (0.387)	0.415*** (0.0451)	0.519 (0.408)	0.419*** (0.0420)	0.463 (0.361)	0.392*** (0.0613)	0.453 (0.324)	0.392*** (0.0758)
Compulsory school	-0.438** (0.204)	-0.542*** (0.0652)	-0.431** (0.202)	-0.537*** (0.0668)	-0.356 (0.216)	-0.505*** (0.0954)	-0.436** (0.182)	-0.518*** (0.0534)
Upper secondary school	-1.026*** (0.235)		-0.993*** (0.239)		-0.981*** (0.236)		-0.779*** (0.272)	
Female rector	-0.186 (0.217)	-0.291 (0.169)	-0.189 (0.216)	-0.295 (0.165)	-0.207 (0.215)	-0.302 (0.170)	-0.117 (0.227)	-0.266* (0.138)
RECTOR working 2-3y	-0.297 (0.226)	-0.0472 (0.170)	-0.293 (0.224)	-0.0436 (0.169)	-0.285 (0.227)	-0.0470 (0.179)	-0.244 (0.223)	-0.0133 (0.154)
RECTOR working 4-5y	-0.471 (0.320)	-0.225 (0.332)	-0.429 (0.336)	-0.199 (0.324)	-0.392 (0.326)	-0.185 (0.323)	-0.389 (0.323)	-0.179 (0.273)
RECTOR working more 5y	-0.388 (0.238)	-0.0490 (0.198)	-0.346 (0.232)	-0.0288 (0.197)	-0.363 (0.235)	-0.0285 (0.203)	-0.292 (0.240)	-0.00517 (0.222)
Intercept	7.203*** (0.802)	7.156*** (0.550)	7.170*** (0.781)	7.141*** (0.578)	6.971*** (0.840)	7.064*** (0.663)	6.486*** (0.930)	6.653*** (0.674)
School brand fixed effects	NO	YES	NO	YES	NO	YES	NO	YES
N	97	97	97	97	97	97	97	97

Note: Variables are defined in Tables 1 and 2. Odd columns refer to OLS specifications, while even columns correspond to school brand fixed effects specifications. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A18: Satisfaction with manager, manager skills, manager behaviour and management climate on school relative to ideal school

	(1) OLS	(2) FE	(3) OLS	(4) FE	(5) OLS	(6) FE	(7) OLS	(8) FE
Satisfaction with manager	0.163*** (0.0605)	0.0795 (0.0661)						
Manager skills			0.168*** (0.0618)	0.0821 (0.0716)				
Manager behavior					0.187** (0.0729)	0.0834 (0.0845)		
Management climate							0.238*** (0.0787)	0.147 (0.0852)
Nb employees	-0.0123* (0.00726)	-0.0126* (0.00675)	-0.0116 (0.00716)	-0.0123* (0.00641)	-0.0111 (0.00733)	-0.0119* (0.00633)	-0.00628 (0.00788)	-0.00890 (0.00555)
Preschool	0.338 (0.353)	0.256*** (0.0633)	0.339 (0.371)	0.258*** (0.0598)	0.286 (0.327)	0.229** (0.0769)	0.281 (0.296)	0.235** (0.0868)
Compulsory school	-0.421** (0.188)	-0.517*** (0.0502)	-0.417** (0.187)	-0.515*** (0.0531)	-0.358* (0.199)	-0.498*** (0.0787)	-0.415** (0.168)	-0.492*** (0.0399)
Upper secondary school	-0.850*** (0.222)		-0.822*** (0.227)		-0.816*** (0.224)		-0.612** (0.259)	
Female rector	-0.155 (0.208)	-0.272 (0.158)	-0.157 (0.208)	-0.276 (0.154)	-0.172 (0.207)	-0.283 (0.161)	-0.0890 (0.217)	-0.248* (0.130)
RECTOR working 2-3y	-0.288 (0.218)	-0.0652 (0.167)	-0.285 (0.216)	-0.0622 (0.167)	-0.281 (0.221)	-0.0666 (0.178)	-0.237 (0.215)	-0.0320 (0.154)
RECTOR working 4-5y	-0.481 (0.296)	-0.244 (0.281)	-0.443 (0.313)	-0.220 (0.273)	-0.411 (0.302)	-0.209 (0.272)	-0.404 (0.304)	-0.200 (0.225)
RECTOR working more 5y	-0.416* (0.238)	-0.114 (0.193)	-0.378 (0.231)	-0.0943 (0.191)	-0.393* (0.236)	-0.0929 (0.199)	-0.327 (0.237)	-0.0721 (0.211)
Intercept	6.934*** (0.715)	6.942*** (0.437)	6.922*** (0.716)	6.944*** (0.471)	6.797*** (0.783)	6.944*** (0.554)	6.218*** (0.880)	6.436*** (0.577)
School brand fixed effects	NO	YES	NO	YES	NO	YES	NO	YES
N	97	97	97	97	97	97	97	97

Note: Variables are defined in Tables 1 and 2. Odd columns refer to OLS specifications, while even columns correspond to school brand fixed effects specifications. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

C.2 Proportion of teacher-rector gender matches on alternate measures of pupil and parent school satisfaction

Table A19: Proportion of teacher-rector gender matches on would recommend school

	(1) OLS	(2) School brand FE
Proportion teacher-rector gender matches	-0.257 (0.63)	-0.577 (0.48)
Nb employees	-0.12 (0.888)	-0.147** (0.73)
Preschool	0.466 (0.629)	0.439 (0.465)
Compulsory school	-0.684 (0.445)	-0.723** (0.328)
Upper secondary school	-1.214*** (0.44)	
Female rector	-0.183 (0.247)	-0.331* (0.196)
RECTOR working 2-3y	-0.463* (0.276)	-0.639 (0.227)
RECTOR working 4-5y	-0.623* (0.37)	-0.318 (0.289)
RECTOR working more 5y	-0.47 (0.3)	0.216 (0.249)
Intercept	9.36*** (0.71)	8.576*** (0.381)
<i>N</i>	97	97

Note: Variables are defined in Tables 1 and 2. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A20: Proportion of teacher-rector gender matches on have recommended school

	(1)	(2)
	OLS	School brand FE
Proportion teacher-rector gender matches	-0.166 (0.668)	-0.416 (0.477)
Nb employees	-0.00767 (0.00942)	-0.00769 (0.00699)
Preschool	0.550 (0.668)	0.518 (0.462)
Compulsory school	-0.273 (0.472)	-0.337 (0.326)
Upper secondary school	-1.477*** (0.429)	
Female rector	-0.0292 (0.262)	-0.332* (0.195)
RECTOR working 2-3y	-0.386 (0.293)	-0.0281 (0.226)
RECTOR working 4-5y	-0.637 (0.393)	-0.231 (0.287)
RECTOR working more 5y	-0.462 (0.318)	0.0319 (0.247)
Intercept	8.040*** (0.754)	7.044*** (0.378)
<i>N</i>	97	97

Note: Variables are defined in Tables 1 and 2. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A21: Proportion of teacher-rector gender matches on school relative to expectations

	(1)	(2)
	OLS	School brand FE
Proportion teacher-rector gender matches	-0.504 (0.554)	-0.748* (0.442)
Nb employees	-0.0134* (0.00781)	-0.0155** (0.00648)
Preschool	0.437 (0.554)	0.413 (0.428)
Compulsory school	-0.698* (0.391)	-0.727** (0.302)
Upper secondary school	-1.301*** (0.355)	
Female rector	-0.155 (0.217)	-0.278 (0.180)
RECTOR working 2-3y	-0.344 (0.243)	-0.0240 (0.209)
RECTOR working 4-5y	-0.507 (0.326)	-0.268 (0.266)
RECTOR working more 5y	-0.316 (0.264)	0.0261 (0.229)
Intercept	9.192*** (0.625)	8.325*** (0.350)
<i>N</i>	97	97

Note: Variables are defined in Tables 1 and 2. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

Table A22: Proportion of teacher-rector gender matches on school relative to ideal school

	(1)	(2)
	OLS	School brand FE
Proportion teacher-rector gender matches	-0.349 (0.535)	-0.608 (0.429)
Nb employees	-0.0120 (0.00753)	-0.0132** (0.00628)
Preschool	0.254 (0.534)	0.245 (0.415)
Compulsory school	-0.646* (0.378)	-0.681** (0.293)
Upper secondary school	-1.078*** (0.343)	
Female rector	-0.130 (0.209)	-0.263 (0.175)
RECTOR working 2-3y	-0.335 (0.234)	-0.0482 (0.203)
RECTOR working 4-5y	-0.504 (0.314)	-0.277 (0.258)
RECTOR working more 5y	-0.356 (0.255)	-0.0482 (0.222)
Intercept	8.677*** (0.603)	7.985*** (0.340)
<i>N</i>	97	97

Note: Variables are defined in Tables 1 and 2. The observations are 97 schools where both the customer survey and the employee survey 2010 were conducted. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. Note that 'Upper secondary school' is omitted in the school brand fixed effects regressions because of collinearity: upper secondary schools are grouped together under school brands that do not operate other school types. Standard errors are written in parentheses. Significance levels are reported as * p<0.10, ** p<0.05, *** p<0.01.

D Additional analysis: pupil-rector gender match effects on pupil/parent school satisfaction

D.1 Empirical strategy

While the rest of the paper focuses on the effects of *teacher-rector* gender similarity, I now consider *pupil-rector* gender match. In particular, I am interested in whether pupils and parents of pupils who share the gender of their rectors are more satisfied by the school, than those with a different gender. I am also interested in studying whether *rector gender* matters for pupil and parent satisfaction with the school. This would complement the literature arguing that rector characteristics matter for school outcomes, which has focused on student achievements and school performance (Coelli & Green, 2012; Dhuey & Smith, 2014). Considering the effect of rector gender on pupil and parent school satisfaction is, to my knowledge, novel.

The analysis is conducted at the pupil level and on the observations from the customer survey 2010 where the gender of pupils could have been inferred.²⁶

OLS regression with standard errors clustered at the school level

The first model corresponds to an OLS regression with standard errors clustered at the school level:

$$PS_{icjk} = \alpha + \beta_1 FP_{icjk} * FR_{jk} + \beta_2 FP_{icjk} + \beta_3 FR_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \varepsilon_{icjk} \quad (15)$$

The outcome variable PS_{icjk} corresponds to the school satisfaction measure of pupil or parent of pupil i in class c in school j from school group k . Contrary to PS_{jk} in specifications (4) to (13), here pupil/parent school satisfaction is not aggregated to the school level. PS_{icjk} reflects the satisfaction at the individual level, i.e. of pupil or parent of pupil i . FR_{jk} is a dummy variable equal to 1 when the pupil's rector is female, and 0 when the pupil's rector is male. FP_{icjk} is a dummy variable taking the value of 1 when the pupil is female, and 0 when the pupil is male. Note that this variable always refer to the gender of the pupil, also when the parent of the pupil takes part in the survey. Control variables include vector of school characteristics SCH_{jk} and rector characteristics REC_{jk} as in specification (1). Section 4.2 describes the content of these vectors.

The coefficients of interest are β_1 and β_3 . Failing to reject $\beta_1 = 0$ would suggest that pupil-rector gender match does not matter for pupil and parent school satisfaction. Rejecting that $\beta_3 = 0$ would imply that the gender of the rector impacts pupil and parent satisfaction with the school.

²⁶Note that the sample used here does not include all the responses to the customer survey, as the gender of pupils could not have been inferred for some schools. Please refer to Section 4.1 for more details.

School brand fixed effects

The second model adds school brand fixed effects δ_k to specification (15):

$$PS_{icjk} = \alpha + \beta_1 FP_{icjk} * FR_{jk} + \beta_2 FP_{icjk} + \beta_3 FR_{jk} + SCH_{jk}\Omega + REC_{jk}\Upsilon + \delta_k + \varepsilon_{icjk} \quad (16)$$

This specification holds school brand fixed effects constant, similar to specifications (9), (10), (11), (12) and (14). Arguments for using school brand fixed effects are the same.

School fixed effects

The third model adds school fixed effects \emptyset_j to specification (15):

$$PS_{icjk} = \alpha + \beta_1 FP_{icjk} * FR_{jk} + \beta_2 FP_{icjk} + \emptyset_j + \varepsilon_{icjk} \quad (17)$$

Note that by adding school fixed effects, the variables constant at the school level are removed from the regression. Thus, the effect of rector gender on pupil and parent school satisfaction cannot be studied with this specification. Only the pupil-rector gender match can be investigated. The coefficient of interest is β_1 .

It is likely that pupil and parent satisfaction are affected by unobserved school effects which may bias the estimates in specifications (15) and (16). If, e.g. male rectors are more likely to be assigned to schools with greater student discipline problems, then pupils and parents from these schools arguably will display a lower school satisfaction, which is due to the student discipline problems, and not the rector gender. In that case, estimates of rector gender, and of the interaction term would be biased.

Class fixed effects

The fourth model adds class fixed effects σ_c to specification (15):

$$PS_{icjk} = \alpha + \beta_1 FP_{icjk} * FR_{jk} + \beta_2 FP_{icjk} + \sigma_c + \varepsilon_{icjk} \quad (18)$$

As for specification (17), factors constant at the class level, which are by definition also constant at the school level are excluded from the regressions. The effect of rector gender can thus with this specification not be analysed either.

Elements at the class level which are likely to influence pupil and parent school satisfaction include e.g. class size, quality of teachers and pupils discipline from the class. This specification allows for *within-class* comparisons of pupil-rector gender match.

D.2 Results and discussion

For all specifications and at any conventional significance level, I fail to reject the null hypothesis of a pupil-rector gender match effect on customer satisfaction (Table A23). This

implies that pupils and parents of pupils who are sharing the same gender as the school rector are not more satisfied by the school than when the rector gender differs.

Table A23: Pupil-rector gender match on overall pupil and parent satisfaction

	(1)	(2)	(3)	(4)
	OLS	School brand FE	School FE	Class FE
Female pupil * Female rector	-0.157 (0.147)	-0.0297 (0.0810)	-0.0184 (0.0839)	0.0128 (0.0885)
Female pupil	0.378*** (0.104)	0.148** (0.0578)	0.112* (0.0581)	0.0623 (0.0624)
Female rector	-0.259 (0.217)	-0.289*** (0.0596)		
Is pupil	-0.829*** (0.178)			
Nb employees	-0.00414 (0.00700)	-0.00888*** (0.00170)		
Compulsory school	-0.605*** (0.192)	-0.630*** (0.0785)		
Upper secondary school	-0.0803 (0.301)			
RECTOR working 2-3y	-0.122 (0.233)	0.230*** (0.0604)		
RECTOR working 4-5y	-0.222 (0.239)	0.00782 (0.0731)		
RECTOR working more 5y	-0.0409 (0.227)	0.372*** (0.0641)		
Intercept	8.316*** (0.459)	7.601*** (0.0798)	7.299*** (0.0263)	7.315*** (0.0266)
<i>N</i>	10641	10641	10641	10611

Note: Variables are defined in Tables 1 and 2. Is pupil is a dummy variable equal to 1 if the survey respondent is a pupil, and to 0 if it is a parent. The first column refers to an OLS regression with standard errors clustered at the school level. There are fewer observations in the class fixed effects observations as only the subsample where the class of the pupil was indicated could be used. The omitted category for school types is 'Compulsory school with integrated preschool'. The omitted category for rector school tenure is 'RECTOR working 3m-1y'. 'TEACHER working 3m-1y'. Standard errors are written in parentheses. Significance levels are reported as * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Furthermore, the OLS estimate (column (1) of Table A23) indicates no significant difference in pupil and parent satisfaction with the schools depending on the gender of the school rector. Yet, overall customer satisfaction is found to be significantly lower for schools led by female rectors when school brand fixed effects are included (column (2) of Table A23). Holding school characteristics and rector school tenure constant, the overall customer satisfaction of a school managed by a female rector is lower by 0.289 point compared to a school whose

rector is male.²⁷

These results cannot be compared to previous studies, since, to my knowledge, this study is the first to investigate pupil-rector gender congruence. However, the findings relating to the impact of rector gender on pupil/parent school satisfaction can be put into perspective with the literature arguing that rector characteristics influence student performance. Dhuey and Smith (2014) show that fixed rector characteristics (including gender) affect math and reading scores. My school brand fixed effects estimate suggesting a lower customer satisfaction when the school is directed by a female rector is consistent with this finding: they provide further evidence that rector characteristics, namely gender, matter for school outcomes, here pupil/parent school satisfaction as opposed to pupils' achievement. Note however, that Dhuey and Smith (2014) do not analyse the impact of rector gender separately, but grouped with the other unchanging rector characteristics, such as leadership ability and personality.

²⁷Due to the categorical variables included as controls in the regression, this interpretation refers to a compulsory school with an integrated preschool with a rector working at the school since 3 months – 1 year and evaluated by a male pupil or a parent of a male pupil.