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Temporal Dynamics in Public Employee Regulation, Perceptions, and Motivation: The Importance of Context

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Abstract

Research finds strong correlations between how employees perceive regulation and their motivation, but we lack a full understanding of how these dynamics evolve over time and across regulatory contexts. This article addresses this gap by analyzing how changes over time in actual national regulation and teachers' individual perceptions of the regulation relate to their intrinsic task motivation. Empirically, we utilize variation over time in national regulation of primary and lower secondary schools in Denmark. Large teacher surveys from 2010, 2014, and 2023 inform us about teachers' perceptions of the varying regulation and their intrinsic task motivation. We find that teachers who perceive national regulation as supportive – rather than controlling – tend to have higher intrinsic task motivation. Additionally, teachers' intrinsic task motivation decreased over time as national regulation became more restrictive. Notably, the decrease continued even when regulation later became less restrictive, suggesting that restrictive regulation may have long-term negative consequences for motivation. While isolating individual context factors remains challenging, our analysis of employee perceptions and motivation indicates that national regulation can play a key role in shaping motivation. The results are interpreted based on qualitative responses from 1,724 teachers and deepen our understanding of temporal dynamics in regulation and motivation.

Keywords:
public employees;
regulation;
intrinsic motivation;
context;
panel data

Practical Relevance

- Employees' perceptions of regulation are related to their motivation, indicating that public managers can benefit from being aware of these perceptions.
- Practitioners and policymakers should not assume that the level of employee motivation in a given sector is constant over time.
- Motivation changes when the national regulative context changes, suggesting that practitioners and researchers should consider the regulative context if they aim to maintain or increase employee motivation.

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Introduction

Context is often the elephant in the room. "We all know it is there and hugely important, but on the whole, we don't do much to describe and analyze it" (Pollitt 2013:xviii). According to Ferlie and Ongaro (2015: 121), the diverse cultural, politico-institutional, and administrative contexts provide the frame in which public organizations act. Contributing to the literature on context in public policy and management (e.g. Ongaro et al. 2021; van der Hoek et al. 2021; Christensen and Lægreid 2025) ignited by the book edited by Pollitt (2013), we aim to describe and analyze how context can be important for regulation, perceptions, and motivation among public employees. While it is impossible to analyze all context factors at the micro, meso, and macro level simultaneously, defining and measuring specific aspects of context can be crucial. This article thus concerns the relationship between the regulative context and public employee motivation.

There is a balance to strike between achieving variation in contextual factors and maintaining research rigor. A key challenge is that changes in one context factor are often correlated with changes in others, making it difficult to determine whether and how context matters. For instance, if we compare two service areas, functional tasks and professional norms typically differ. Similarly, if we compare countries, several aspects of the cultural context vary. If we compare the same unit of analysis over time, they may have experienced changes in multiple aspects of the context. However, analyzing the same organizations or even the same individuals before and after important changes in the regulative context (i.e. variations in national regulations) can address the "context elephant" since this approach allows for a more focused analysis of the specific aspects that change.

In this article, we study the Danish national regulation of public employees, specifically teachers, and their motivation from 2010 to 2023. By comparing schools and teachers over time, we provide a rigorous study on the regulation of teachers and contribute to a better understanding of the temporal dynamics of regulation and motivation. Teachers are an important profession (Andersen, Heinesen, and Pedersen 2016), and the results can also inform our understanding of other welfare professions. The regulation of public employees, including legislation, administrative rules, and collective agreements, represents intentional interventions exercised by public sector actors involving binding standard setting, monitoring, and/or enforcing sanctions (Koop and Lodge 2017: 95). For example, Lynggaard, Pedersen, and Andersen (2018) suggest that variations in working hour regulation are relevant for both employee motivation and performance.

While the impact of employees' *perceptions* of national regulation on their motivation has already been studied extensively, most studies do not account for *actual changes in regulation* (Andersen, Boye, and Laursen 2018; Mikkelsen, Jacobsen, and Andersen 2017). So far, the core finding has been that perceived regulation and employee motivation are closely associated. However, we have limited knowledge about how these perceptions of regulation and motivation evolve over time, particularly when large changes in actual regulation occur. This article seeks to address this gap by analyzing variation in actual regulation as a major missing link (inspired by Pollitt 2013).

Theoretically, our core argument is that both actual regulation and perceptions of the regulation can influence motivation. Specifically, we expect that intrinsic task motivation decreases when restrictive regulation is implemented. We also expect individuals who, at a given time, perceive the regulation as more controlling – rather than supportive – to exhibit even lower intrinsic task motivation. In other words, we expect a motivational change over time parallel to the macro-level changes in actual regulation, combined with a consistent micro-level pattern of negative correlations between perceived regulation and motivation.

Empirically, we utilize variation in the restrictiveness of the actual national regulation of teachers in Danish primary and lower secondary schools over time. Specifically, we focus on the regulation of student plans, which was introduced in 2006, and the regulation of teachers' working hours, which changed in August 2014 and again in August 2021. In addition, our analyses also draw on large teacher surveys conducted in 2010, 2014, and 2023, providing data on the teachers' perceptions of the regulation and teachers' self-reported motivation. The

specific research question is how variations in actual national regulation and individual perceptions of this regulation relate to teacher motivation over time.

The paper proceeds as follows. First, the theoretical section introduces the key concepts and combines the insights into two hypotheses, especially drawing on self-determination theory and motivation crowding theory (MCT) (Frey and Jegen 2001). Second, we describe the contexts in which we analyze our expectations. This section also discusses the degree of restrictiveness of the regulation at each point in time. Third, the methods section explains how the surveys were conducted, how we measured the concepts, and how we analyzed the data. Fourth, we present the results, both comparing the survey waves over time and analyzing each wave individually. In the fifth and final section, we discuss our results and present our concluding answer to the research question.

Concepts and Theory

In addition to context, the core concepts are the actual regulation of public employees, the employees' perceptions of this regulation, and their intrinsic task motivation. Below, we discuss these concepts and their relationships.

Context is a crucial concept that is challenging to define (Ongaro et al. 2021: 6). Pollitt (2013) referred to it as "the missing link" in public policy and management in the title of the book that sparked new interest in context in the field. Contexts can be cultural, politico-institutional, and administrative, and Ongaro et al. (2021: 6) argue that context matters because organizational behavior will always take place in the broader fabric, referring to the Latin origin of the word context (*contextere*) that means "to weave together".

Since the book edited by Pollitt (2013), the literature has been very much aware that there is not just one context but rather multiple and intersecting contexts. National culture is important, although it does not vary within the case studied in this article. The political context (reflecting the main traits of politics in a democratic entity) may not vary much either, but it is still important when the focus is on the regulative context because national politicians have the ultimate power to affect regulation. For some research questions, the economic context (e.g. the state of the economy) can be crucial.

All these types of contexts may be temporal. The changes in regulative context seldom occur at "time equals zero" but take place in the temporal context of other reforms, which have occurred or are in progress in the country (Ongaro et al. 2021: 6). The relevant contexts thus analytically depend on the issue in question. As mentioned in the introduction, we handle the impossibility of analyzing all contextual factors at the micro, meso, and macro level simultaneously by focusing on specific aspects of the contexts as discussed more elaborately after the conceptual and theoretical section.

Motivation can be broadly defined as "the forces that energize, direct, and sustain behavior" (Perry, Hondeghem, and Wise 2010: 681). *Intrinsic motivation* is the most autonomous type of motivation where "people engage in activities freely, being sustained by the experience of interest and enjoyment" (Ryan and Deci 2002: 10). Intrinsic motivation occurs when "people [are] doing an activity because they find it interesting and derive spontaneous satisfaction from the activity itself" (Gagné and Deci 2005: 331). Existing research finds that it is related to a number of positive employee outcomes in public organizations, such as job preferences and performance (Bellé and Cantarelli 2018; Cerasoli, Nicklin, and Ford 2014; Kuvaas et al. 2017; Laksmana and Riana 2020). Intrinsic motivation is therefore a highly relevant concept.

Tønnesvang and colleagues (2023) argue that motivation can be categorized based on three components depending on how the motivation is regulated, how much potential energy the individuals are willing to exert based on the motivation, and the direction of the motivation. The first component corresponds to the distinction in self-determination theory (e.g. Gagné and Deci 2005: 336) between external, introjected, identified, and integrated regulation of the motivation compared to the absence of intentional regulation on one hand and doing an activity because it is interesting and satisfying in itself on the other. Given that intrinsic motivation is linked to a natural interest in an activity itself, it is also intrinsically regulated based on inherent satisfaction of the three basic needs for autonomy, competence, and relatedness (Breaugh, Ritz, and Alfes

2018: 1427; Ryan and Deci 2000). Intrinsic motivation is thus the most autonomous type of motivation, but it can still be vulnerable to changes in actual external regulation. Specifically, such changes can diminish the employees' feelings of autonomy and change their locus of causality from being internal to being external, undermining their intrinsic motivation (Gagné and Deci 2005: 332). The regulation component of motivation highlights the relevance of studying intrinsic motivation in relation to both actual and perceived regulation.

The second component – energy – captures the strength of the motivation (Tønnesvang et al. 2023). How much is the individual willing to do based on this type of motivation? In this article, we measure how strongly the employees are motivated based on their interest in and enjoyment of their work tasks. Following Jacobsen et al. (2014: 791), we conceptualize intrinsic task motivation as the enjoyment and interest in one's everyday work. Existing theory often uses the more general term "intrinsic motivation," and our addition of "task" highlights that it is linked to the tasks performed at the workplace. The energy component highlights that the strength of intrinsic task motivation is linked to interest in and enjoyment of the tasks, which is different from engaging in these tasks because they lead to specific outcomes. This also means that intrinsic task motivation is in the temporal present and differs from public service motivation, which is forward looking (Breaugh et al. 2018).

The third component concerns the direction of the motivation. Compared to public service motivation and prosocial motivation, which are clearly other-oriented (Grant 2008; Perry et al. 2010: 682), intrinsic task motivation emphasizes pleasure and enjoyment as drivers of effort. Although Breaugh, Ritz, and Alfes (2018) argue that public service motivation can be seen as a combination of rational self-interested and altruistic motives, we follow Vandenabeele and Schott (2020) in arguing that intrinsic motivation is self-oriented (hedonistic as expressed by Grant 2008), while public service motivation concerns an orientation to deliver services with the purpose of doing good for others and society. This implies that intrinsic task motivation is not a substitute for public service motivation, nor an essential part of it. While there are many studies of public service motivation in the public administration literature, intrinsic task motivation is less studied in this literature. Given that there is much regulation in the public sector, and this regulation often changes, this highlights the relevance of studying how variations in actual national regulation and individual perceptions of this regulation relate to intrinsic task motivation over time.

Actual regulation can be defined as "the intentional intervention in the activities of a target population" (Koop and Lodge 2017: 105). The regulator can either be a public sector or private sector actor, just as the regulatee can be a public or private sector actor as well. In the context of public employee regulation, the regulators and regulatees are both within the public sector, yet they are separate actors as demanded by Koop and Lodge (2017: 100). In legislative regulation, the regulator is the parliament, while the regulatees are entities such as municipalities, schools, and teachers. In the case of collective agreements, the regulators might include national negotiators like Local Government Denmark (KL, the interest organization of the 98 Danish municipalities) and the teachers' union, while the regulatees again are the municipalities, schools, and teachers. In this sense, regulation qualifies as an external intervention in the terminology of MCT, which we will discuss further below.

There has been awareness of the relationship between actual regulation and motivation for many years. For example, reinforcement theory (Skinner 1953) expects individuals to be motivated by positive or negative reinforcement and to be deterred from undesired behaviors through punishment such as fines or disciplinary actions. Skinner (1953: 345) argued that government agencies have historically relied on punishment and have been slow in adopting other forms of control, like financial incentives (positive reinforcements such as bonuses) and educational or social control (affecting norms and knowledge). Although Skinner (1953: 345) considered it theoretically possible to induce soldiers to fight solely based on coercion – by making the alternative punishment worse than battle itself – he argued that such hard regulation would ultimately harm the soldiers' motivation to fight. In other words, scholars have long expected a negative relationship between employee motivation and restrictive actual regulation.

MCT formalizes the intuition that external regulation affects motivation. MCT is based on Ryan and Deci's (2000) argument that external regulation represents the least autonomous type

of extrinsic motivation. When individuals comply with regulation, they act primarily to obtain rewards or avoid punishments. Consequently, "external regulation is considered controlling, and externally regulated behaviors are predicted to be contingency dependent in that they show poor maintenance and transfer once contingencies are withdrawn" (Deci and Ryan 2000: 236). In this way, the actual regulation, as an external intervention, can have a direct (disciplining) effect on employee motivation and performance.

Employees' perception of the regulation is relevant because employees' feelings of autonomy depend on their perceptions, and the change in their locus of causality from being internal to being external (and the consequent decrease in intrinsic motivation) is only expected to happen if they begin to perceive the regulation as controlling (Gagné and Deci 2005: 332). Individuals' intrinsic motivation is therefore expected to increase or decrease (be crowded in or out) depending on their perception of the given external intervention (Frey 1997; Frey and Jegen 2001). One empirical study has shown that these individual perceptions can matter even more for intrinsic motivation than the restrictiveness of the actual external intervention (Jacobsen and Andersen 2014). Similar to other perceptions (Penning de Vries 2021), public employees within the same organization can have very different perceptions of the same actual regulation (see for example Mikkelsen et al. 2017). Therefore, we treat the actual regulation and the perceptions hereof as two distinct phenomena in the development of our two hypotheses.

While the idea of crowding effects is a general expectation, several studies in public administration support the notion that public sector regulation can indeed have crowding effects (Jacobsen and Andersen 2014; Jacobsen et al. 2014; Resh, Marvel, and Wen 2019). When the employees' perception of regulation is supportive, it can enhance their intrinsic motivation, a phenomenon known as motivation crowding in. For example, Kolk and colleagues (2019) found that personnel and cultural management controls perceived as supportive are positively associated with employees' intrinsic motivation. Conversely, when employees perceive regulation as controlling, and thereby linked to pressure and obligation from external factors, it is expected to reduce their self-determination and have negative consequences for intrinsic motivation, a phenomenon known as motivation crowding out (Jacobsen et al. 2014: 792). This translates into an expectation of a negative relationship between how controlling teachers have perceived various regulation to be over time and their level of intrinsic motivation. Hypothesis 1 specifically expresses this expectation for teachers and their intrinsic task motivation.

> H1: Teachers who perceive national regulation as more controlling at a given time have lower intrinsic task motivation than teachers who perceive the same regulation as more supportive.

Additionally, Frey's theory (1997) implies that actual regulation that restricts teachers' activities can lead to a reduction in intrinsic motivation. First, teachers tend to have a relatively close personal relationship with their direct supervisor, which heightens the importance of intrinsic motivation and increases the risk of shifting the locus of control from intrinsic to extrinsic motivation (Frey 1997: 26). Second, teachers engage in tasks that are relatively interesting and have high potential for intrinsic motivation, i.e. there is something to crowd out (ibid.: 28; see also Weibel, Rost, and Osterloh 2009). Third, opportunities for teacher participation can be seen as having decreased over time (Sauer 2023), which might further shift the locus of control outwards (Frey 1997: 29). Fourth, relatively uniform national regulation makes it difficult to differentiate between individuals (ibid., 29). Fifth, external interventions via regulation are expected to have a stronger negative association with intrinsic motivation compared to rewards used for the same purpose (ibid.: 31). Sixth, when regulation seeks to change behavior by involuntary means, the locus of control is likely to shift outward, potentially decreasing intrinsic motivation (Frey 1997: 32; Mikkelsen et al. 2017). In sum, this implies that when the actual regulation is more restrictive, teachers' intrinsic task motivation will be lower compared to periods with less restrictive regulation, as expressed in Hypothesis 2.

> H2: Teachers' intrinsic task motivation is lower in periods with more restrictive regulation.

Temporal Contexts for Changes in Actual Regulation

Given that the relevant contexts analytically depend on the issue in question, we now describe the specific aspects of the temporal contexts for the changes in actual regulation for Danish teachers over time. We also discuss the degree of restrictiveness of regulation at each point in time.

Institutionally, Danish public teachers have been municipal employees since 1993, and the municipal councils are responsible for the schools within the national law on public schooling. Working hour regulation is normally agreed upon between KL and the teachers' union, but if they cannot reach an agreement, the national government can pass legislation in parliament (if a majority support it). This goes against the strong collective bargaining tradition in the Danish public sector, but legislation can, for example, be used if collective bargaining is perceived to stand in the way of larger political reforms (Høgedahl and Ibsen 2017).

Before 1999, the working hour regulation for teachers was an agreement with detailed allocations to teaching, preparation, and other tasks. Teachers' working hours had been very debated, but the agreement in 1999 decreased the level of conflict. As such, in the beginning of the studied time period (wave 1 in 2010), working hour regulation for teachers was non-restrictive, and it was decided through collective agreements rather than legislation. As discussed by Lynggaard et al. (2018), the working hour regulation in place in 2010 allowed teachers considerable individual autonomy in allocating their working hours to different job tasks with few restrictions on when to perform non-teaching tasks. This regulation was the result of an agreement between the teachers' union and employer representatives (KL). Each municipality could choose between two versions of this agreement. One version (called A08) distributed a fixed number of hours to a set of specific and predefined tasks, for example 375 hours for individual preparation. The other version (called A05) broadly categorized the teachers' working hours into teaching and non-teaching tasks with no fixed time allocation. Overall, this regulation was flexible, non-uniform, and not very salient. At that time, the national regulation that required teachers to create individual student plans for all students across all courses was more relevant for intrinsic task motivation (as documented by Jacobsen et al. 2014).

The working hour regulation underwent the first big change during the bargaining round in 2013, one of the rare occasions in which a major conflict took place (Mailand 2019). This was linked to the government's high-profile school reform that was presented days before KL and the teachers' union exchanged demands concerning the negotiations about working hour regulation (Høgedahl and Ibsen 2017: 603). They did not come to an agreement, and the conflict was resolved by government intervention, which shifted the nature of the regulation from a collective agreement to legislation, effective from August 2014. Given that the government had introduced the school reform prior to the bargaining round, many teachers perceived the changes in working hour regulation as a way to finance this reform by forcing the teachers to work longer hours (Hansen 2021). The conflict escalated into a lockout of approximately 67,000 teachers for 25 days, occurring with no prior strike or strike warning (Mathiasen 2017). The conflict was connected to employer demands to let school principals allocate the teachers' working hours, thereby abolishing all existing local agreements on working hours for teachers. The employers argued that this would strengthen the management prerogative and facilitate the implementation of the school reform. As such, it introduced new terms for collective action in the Danish public sector (Høgedahl and Ibsen 2017), and the changes in the regulative context also took place in the temporal context of the school reform, which changed more aspects of the teaching at one time than normally in Denmark.

The second and most recent change in working hour regulation took effect in August 2021 when a new collective agreement replaced the legislation from 2014. This new regulation can be categorized as less restrictive and more flexible than the regulation in 2014 but more restrictive than the regulation in effect in 2010. In terms of Frey's (1997) theory about motivation crowding (see the theory section), the differences in restrictiveness of the actual regulation relate to (1) teachers' participation possibilities in relation to the regulation, (2) the uniformity of the regulation, and (3) whether the regulation is hard, i.e. uses involuntary means to change behavior. The regulation in 2010 clearly allowed for more participation, was less uniform and was softer than the regulation introduced in both 2014 and 2023. The actual

regulation thereby became more restrictive from 2010 to 2014, while the regulation implemented in 2021 was less restrictive than the regulation in 2014.

According to H2, this implies that intrinsic motivation is expected to decrease from 2010 to 2014 due to the increased restrictiveness of the 2014 regulation. The shift from legislation to collective agreement in 2021 might have stopped or even reversed this decrease, as some aspects of the regulation in 2021 were less restrictive than in the regulation in 2014. In a given year, H1 implies that teachers who perceive the regulation (in this year) as more controlling than other teachers in the same year have lower intrinsic task motivation. Below, the methods section discusses how this is tested among Danish teachers over time.

Research Design and Methods

The research design uses an unbalanced panel of teachers consisting of data from three large teacher surveys with variations in national teacher regulation at the times of the data collection as explained above. We focus on working hour regulation, but our questions about perceptions of regulation are tied to the most salient type of regulation at the time of the wave. Specifically, in 2010, we asked about the perception of student plan regulation, while the focus shifted to working hour regulation in 2014 and 2023 because this type of regulation became more salient. Below, we discuss first the data sources, then our measures, and finally the analytical approach.

Data sources

We utilize survey data from three large surveys sent to teachers at Danish primary and lower secondary schools in 2010, 2014, and 2023. The surveys were part of separate projects but contained similar questions. Almost no schools overlapped across the surveys in 2010 and 2014. For the third survey in 2023, we collected data from all the schools that had participated in the respective surveys in 2010 and 2014. Thus, our panel of schools is an unbalanced sample.

Table 1 shows the number of schools and individuals that participated in the three surveys. We invited the highest number of schools and individuals in 2023 since all schools included in 2010 and 2014 were also included in this survey. The response rates are based on the number of individuals invited for each wave and the number of individuals responding either partially or fully to the surveys. It is important to note that the data collection method differed over time, which may have systematically influenced the response rates. In 2010, responses were collected by people physically present at the schools using paper questionnaires, with very few teachers refraining from participation. In contrast, the surveys in 2014 and 2023 were distributed digitally via email, leading to lower response rates for these surveys.

Table 1. Number of schools, invited individuals, responses, and response rates

	2010	2014	2023
Schools	85	104	171
Invited individuals	3,424*	7,319	7,199
Responses	3,422	2,872	2,314
Response rate (%)	99.9	39.2	32.1

Note: *Responses were collected physically at pedagogic council meetings, and only a few teachers refrained from responding. The calculation assumes that all relevant teachers participated in the meeting (meaning all teachers who were not sick on the given day) and were invited to answer the survey.

As Table 2 displays, we received responses from teachers at 180 unique schools. Teachers from 85 schools responded in 2010, teachers from 104 schools responded in 2014, and teachers from 171 schools responded in 2023. Table 2 shows the number of schools that participated in each of the three survey waves. Schools that had been closed or merged with other schools after 2014

were not invited to take part in the 2023 survey and are only included in the separate analyses of the 2010 and 2014 waves.

Table 2. Number of schools according to their repeated participation in the three waves

Only 2010	Only 2014	2010 and 2014	2010 and 2023	2014 and 2023	2010, 2014, and 2023	Total
2	6	1	74	89	8	180

Measures

We measured intrinsic task motivation and perceptions of regulation in all three surveys inspired by operationalizations from existing research (Andersen et al. 2018; Jacobsen et al. 2014). Intrinsic task motivation was measured using three items with a Cronbach's alpha of 0.84. The three items were combined into a sum index. In 2010, the survey focused on perceptions of student plan regulation, the most salient national regulation at the time. These perceptions were measured using six items reflecting the same dimension. The items were combined into a sum index with a Cronbach's alpha of 0.90 (Jacobsen et al. 2014). For the 2014 and 2023 surveys, we measured perceptions of national working hour regulation with three items, which were also combined into a sum index. Factor analysis confirmed that these three items reflect the same dimension, and the measure has a Cronbach's alpha of 0.81.

To ease interpretation, all measures are rescaled to continuous measures ranging from 0 to 1. A full list of survey items is included in Appendix A. In addition to the quantitative measures, the 2023 survey included an open-ended question asking teachers to describe what they considered the most important context factors for succeeding as teachers. These qualitative responses are described by Hansen and Andersen (2023) and are used here to strengthen the interpretation of the quantitative findings.

Analytical approach

We combine ordinary least square (OLS) regressions for 2010, 2014, and 2023, respectively, with panel regression analyses using either random- or fixed-effects. All models include school fixed-effects, except in the analyses with teacher fixed-effects where it is irrelevant. The school and teacher fixed-effects account for time-invariant, unobserved heterogeneity at both the organizational and individual levels. Using official institutional codes, we are able to accurately link the schools over time. If two or more schools were merged between 2010 and 2023, they are coded as the same institution in the analysis. Between 2014 and 2023, we can link individual teacher responses over time by using information on their organizational affiliation and names. If a teacher's name has changed between surveys (e.g. due to marriage), we link them only if the first name and at least one last name (along with the organizational affiliation) remain the same. We identified 257 teachers with valid responses about intrinsic task motivation in both 2014 and 2023, and the statistical power of the individual fixed-effects models is thus limited because only individuals who answered both surveys can be included.

Results

The results section is structured by the two hypotheses, with all regression analyses displayed in Table 3 and Table 4. The mean levels of intrinsic task motivation, employee perception of regulation, and the bivariate correlations between these two measures for each year are provided in Appendix B.

H1 expects that teachers who perceive national regulation as more controlling at a given time will exhibit lower intrinsic task motivation compared to teachers who perceive the same regulation as more supportive.

First, Models 3.1 to 3.3 in Table 3 all show significant positive correlations between perceived regulation and teachers' intrinsic task motivation, providing support for H1 across the differences in actual regulation in 2010, 2014, and 2023. The random-effects panel regression

in Model 4.2 in Table 4 underlines this result, showing that perceptions of the regulation as more supportive is associated with higher intrinsic task motivation. However, in the fixed-effects panel regression in Model 4.4, we do not find a similar positive relationship. The coefficient remains positive, but it is small and not statistically significant.

Table 3. Perception of regulation and intrinsic task motivation (OLS regressions)

	Model 3.1 2010 OLS regression	**Model 3.2 2014 OLS regression**	**Model 3.3 2023 OLS regression**
Perception of regulation	0.116***	0.139***	0.193***
	(0.011)	(0.021)	(0.023)
Constant	0.772***	0.747***	0.598***
	(0.029)	(0.030)	(0.039)
School fixed-effects	YES	YES	YES
Teacher fixed-effects	NO	NO	NO
Observations	3140	1597	1889
R-squared (overall)	0.071	0.131	0.162

Note: Standard errors in parentheses. † p <0.1; * p<.05; ** p<.01; *** p<.001.

Table 4. Regulation, perception of regulation, and intrinsic task motivation (panel regressions)

	Model 4.1 2010–2023 random-effects panel regression	**Model 4.2 2010–2023 random-effects panel regression**	**Model 4.3 2014–2023 fixed-effects panel regression**	**Model 4.4 2014–2023 fixed-effects panel regression**
Perception of regulation	-	0.141***	-	0.016
		(0.0088)		(0.046)
Dummy 2010 (ref. 2023)	0.123***	0.107***	-	-
	(0.0053)	(0.0054)		
Dummy 2014 (ref. 2023)	0.059***	0.080***	0.044***	0.048**
	(0.0056)	(0.0064)	(0.011)	(0.018)
Constant	0.702***	0.611***	0.740***	0.734***
	(0.024)	(0.024)	(0.0080)	(0.023)
School fixed-effects	YES	YES	Not relevant	Not relevant
Teacher fixed-effects	NO	NO	YES	YES
Observations	8260	6836	514	422
Number of ID	8003	6625	257	211
R-squared (within)	0.056	0.034	0.056	0.055
R-squared (between)	0.124	0.175	-	0.116
R-squared (overall)	0.122	0.172	0.018	0.027
Sigma_u	0.099	0.086	0.134	0.132
Sigma_e	0.129	0.130	0.129	0.130
Rho	0.370	0.305	0.521	0.508

Note: Standard errors in parentheses. † p <0.1; * p<.05; ** p<.01; *** p<.00

H2 expects that teachers' intrinsic task motivation is lower in periods with more restrictive regulation. The fixed-effects panel regressions in Models 4.3 and 4.4 show a decrease in intrinsic task motivation from 2014 to 2023 as the level was significantly higher in 2014 than in 2023. This provides some support for H2. Similarly, the random-effects panel regression in Model 4.1 shows a decline in intrinsic task motivation from 2014 to 2023, and the model indicates that the decrease had already begun in 2014 as the level was even higher in 2010. Finally, Model 4.2 indicates that intrinsic task motivation continued to decrease over time, even when accounting for perceptions of the national regulation.

Discussion

This study contributes to addressing the gap in our understanding of the dynamics in motivation and perceptions in different regulative contexts by analyzing how variations over time in actual national regulation and individual perceptions of these different contexts relate to teacher motivation. We find that teachers who perceive national regulation at a given time as supportive – rather than controlling – have higher intrinsic task motivation, which supports H1. However, we should be careful in giving this association a causal interpretation as the fixed-effects regressions indicate that a change in individual motivation for a teacher is not significantly associated with a change in the teacher's perception of regulation over time. Regarding H2, which expects more restrictive actual regulation to be associated with lower intrinsic task motivation among teachers over time, we find partial support. Specifically, we find that the introduction of more restrictive national regulation in 2014 was associated with a decrease in intrinsic motivation from 2014 to 2023. However, contrary to our expectations, this negative development did not stop or reverse with the introduction of less restrictive regulation in 2021. Instead, intrinsic task motivation was even lower in 2023 than in 2014 despite the regulatory relaxation.

These results may imply that restrictive regulation can have long-term consequences for intrinsic motivation. The continued drop in teachers' intrinsic motivation may have other causes than the restrictiveness of the working hour regulation, but the result is not due to an erroneous assessment of how restrictive the teachers perceive the present regulation to be. We know that the teachers perceived the regulation as less restrictive in 2023 compared to 2014 (see Appendix B). However, the fact that the school reform – which was implemented alongside the 2014 changes in working hour regulation – was still in effect in 2023 may partially explain the continued decrease in intrinsic task motivation. We find indications of moral stress (as defined by Vaaben, Olesen, and Gylling 2023) in the teachers' qualitative answers to the open questions in the 2023 survey. The teachers were asked to describe what they considered the most important context factors to succeed as teachers (Hansen & Andersen 2023). These answers can generally help us interpret the quantitative results. Specifically, many teachers mention the lack of time to prepare individually and that many children with mental and physical difficulties are included in regular schools without sufficient resources. The teachers also see certain aspects of the school reform as negative (e.g. children are required to spend more hours in school than before the reform).

Based on these qualitative answers, three interpretations of the puzzling, continued decrease in intrinsic task motivation stand out. First, the increased focus on including all children in normal classes could be an alternative explanation to the more restrictive working hour regulation. The statements from the teachers suggest that this might be the case, but they also suggest that challenges linked to student inclusion may still be linked to the working hour regulation since many teachers argue that they need more time for preparation to be able to include all children. Second, other forms of regulation related to schools might remain restrictive, and the perceived lack of resources could contribute to moral stress among teachers, further lowering intrinsic task motivation (Vaaben, Olesen, and Gylling 2023). Third, intrinsic task motivation may recover slowly after being crowded out by restrictive regulation, which could explain why motivation did not bounce back after the implementation of the less restrictive working hour regulation in 2021. If regulation has these long-term effects on

motivation, it highlights the importance of continuing to study the temporal dynamics in public employee regulation, perceptions, and motivation in different contexts.

In 2024, Danish national politicians decided to deregulate the contents of Danish primary and lower secondary schooling (Folketinget 2024). Most of these changes will take effect from August 2025, illustrating the continued development in school regulation and the relevance of continuing to study this area, both to understand public employee regulation, perceptions, and motivation in general and because the regulation of schools (and therefore teachers) is important in itself due to the big role primary and secondary schools play in society. A study of the new situation after the changes have been in effect for some years might also shed light on the three abovementioned explanations of the continued decrease in motivation among Danish teachers.

As mentioned in the introduction, understanding context in relation to perceptions and motivation is inherently complex due to a multitude of relevant factors at the micro, meso, and macro levels. Despite this challenge, the national regulatory context of Danish teachers seems important if we want to understand their motivation over time, and this may apply to many other public employees. The balance between achieving variation in contextual factors and maintaining research rigor remains difficult to strike, and this article illustrates that while we aimed to isolate the changes in national teacher regulation over time, multiple other contextual aspects changed over time. Nevertheless, ignoring the context is hardly the solution as our case illustrates. Therefore, we encourage future research to continue pursuing rigorous research designs that can test specific context effects while keeping an eye on all the other ways context matters.

We also encourage future research to compare regulative contexts across countries. Comparing Denmark and Norway, Mailand (2019), for example, shows that while relations between employers and employee unions in Denmark are normally perceived as relatively consensual, unilateral regulation happened through legislative intervention in 2013. Mailand's specific comparison to Norway shows the importance of context given that the Norwegian process was not embedded in politics and policy reform to the same extent as in Denmark. His more general comparison to the rest of Europe and other regions adds the broader context perspective by pointing out that Denmark might be part of a broader trend towards unilateralism. In that way, analyses over time in one country (such as our analysis) can benefit from insights from comparisons between different national contexts, while studies within one country are able to focus more specially on some context factors (within the same national culture and broad institutional context).

Conclusion

The research question was how variations in actual national regulation and individual perceptions of this regulation relate to teacher motivation over time, and we used two hypotheses to structure the answer. First, we found clear evidence that teachers who perceived national regulation as more controlling at a given time had lower intrinsic task motivation than teachers who perceived the same regulation as more supportive. This was the case for all three investigated years and therefore both for regulation related to student plans and working hours. Second, we found that teachers' intrinsic task motivation was lower in 2014 when the regulation was more restrictive, but we did not – contrary to our expectations – find that the motivation was higher in 2023 compared to 2014.

Overall, these conclusions imply that both actual regulation and perceived regulation can be important for employee intrinsic task motivation, and we therefore urge future research to continue to study the three phenomena, thereby strengthening our understanding further through research designs with stronger causal identification and less variation in other context factors. By combining analyses over time in one country with insights from comparisons between different national contexts, we can obtain a better understanding of temporal dynamics in public employee regulation, perceptions, and motivation in different contexts. Importantly, changes in regulative contexts take place in the temporal context of other reforms, occurring or being on the way in the given country. That makes rigorous causal identification difficult. The relevant contexts do, in other words, depend on the issue in question.

Our specific analysis of Danish schools illustrates how variations in actual national regulation and individual perceptions of this regulation as controlling rather than supportive relate negatively to employee motivation. Moreover, the analysis shows that motivation continued to decrease even after the regulation became less restrictive again. These findings can inform other context-specific analyses, implying that we can expect employes who perceive regulation as more controlling to have lower intrinsic task motivation and that employees' intrinsic task motivation will decrease when the regulation becomes more restrictive.

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The authors declare that they have no competing interests.

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Appendix A. Full List of Survey Items

Item	Question
Intrinsic task motivation 1	I very much enjoy my daily work.
Intrinsic task motivation 2	My work is very exciting.
Intrinsic task motivation 3	I like performing most of my work processes.
Regulation perception 1 (student plans)	Student plans make me feel that I am not trusted to do my work.
Regulation perception 2 (student plans)	Student plans are good tools for continuous assessment of individual student learning.
Regulation perception 3 (student plans)	Student plans contribute to make the work interesting.
Regulation perception 4 (student plans)	Student plans create a good overview of the students' progress.
Regulation perception 5 (student plans)	Person A says: Student plans are useful tools, helping me in my daily work as a teacher. Person B says: Student plans are unnecessary, and I only fill them out because it is obligatory.
Regulation perception 6 (student plans)	Person A says: The time I use filling out student plans is well spent. Person B says: It is a waste of time to fill out student plans.
Regulation perception 1 (working hours) – supportive perception	[The new working hour rules will help] / [The current working hour agreement helps] teachers use their time in an optimal way.
Regulation perception 2 (working hours) – supportive perception	[The new working hour rules] / [The current working hour agreement] will enable teachers to deliver good education.
Regulation perception 3 (working hours) – controlling perception	[The new working hour rules] / [The current working hour agreement] signal[s] mistrust in the work I perform.

Appendix B. Means, Standard Deviation, and Bivariate Correlations for Intrinsic Task Motivation and Employee Perception of Regulation

	Intrinsic task motivation	Regulation perception	Bivariate correlations
2010	0.844	0.526	0.202***
	(0.147)	(0.253)	
2014	0.782	0.349	0.294***
	(0.173)	(0.192)	
2023	0.719	0.503	0.313***
	(0.175)	(0.186)	