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Time tracking in home care

Perceptions and reality*

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Abstract

We examine the implementation of digital time tracking in home care services in Swedish municipalities. Our study combines original survey data with external measures of quality and costs, allowing us to examine both the perceived and estimated effects of time tracking. According to the responding managers, time tracking has led to improvements in quality and reductions in costs. However, the estimated effects suggest that these managerial perceptions may need to be revised. We found that quality is unaffected or reduced while costs have increased due to the implementation of time tracking.

Keywords: Elderly care, Management accounting, Employee monitoring, Digitalization, Public sector productivity

JEL codes: H42, H45, L33

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1. Introduction

The use of time tracking systems to record the time use of employees is a topic of growing interest and importance. Time tracking has many potential advantages, such as increased productivity, accurate service delivery and billing, and compliance with labor laws. On the downside, time tracking gives rise to privacy concerns and can increase administrative burdens. A narrow focus on time could also entail a risk of shirking on service quality. For workers, both income and job satisfaction could take a hit.

While employee monitoring is as old as the workplace, new technologies have made it prevalent in the private sector. According to a survey conducted by the New York Times, eight of the ten largest private employers in the U.S. track productivity metrics at the worker level (Kantor & Sundaram, 2022). Productivity tracking has spread from lower-paying jobs, such as driver and warehouse worker, to white-collar jobs, e.g., in accounting and banking. Any person who uses a computer or a telephone can easily be monitored by software that tracks metrics such as keystrokes per minute and the number of calls.

This paper studies the introduction of time tracking – a type of electronic performance monitoring – in home care. Home care workers in an increasing number of Swedish municipalities use mobile phones (or tags) to log the beginning and end of visits in home care for the elderly. Municipalities use time tracking to monitor work and provided services, to analyze and try to increase worker productivity, and to determine the compensation to private providers.

Time tracking is essential in home care since home care workers spend much time outside their clients' homes, especially in remote areas with large distances between clients. A Swedish study of time tracking data from 15 municipalities found that workers spend, on average, 58 percent of their total working time in their clients' homes (Jordahl & Persson, 2018). A Norwegian study of driving routes in two municipalities found that 52 percent of total working time was spent with clients. Driving between the homes took 21 percent of the working time, leaving 27 percent for other activities, including required documentation (Holm & Angelsen, 2014).

The spread of electronic performance monitoring in the private sector suggests that it increases productivity and competitiveness. However, the empirical evidence has not kept up with the quickly developing practice. The literature is largely incoherent with various definitions and methods. In a study with a productivity focus, Bhave (2014) found a positive relationship between electronic performance monitoring and task performance in call centers. More generally, a meta-analysis by Ravid et al. (2023) came to the pessimistic conclusion that electronic performance monitoring increases worker stress without any effect on worker performance.

The effects of time tracking in the public sector has received less attention. In the mentioned Swedish study, Jordahl & Persson (2018) found that home care units with higher worker utilization (i.e., a higher share of working time with clients, referred to as “time use” in this

paper) had equally satisfied clients as care units with lower worker utilization. They also found a positive correlation between worker utilization and service delivery. While indicating that higher productivity need not come at the cost of lower quality, the study is descriptive and does not estimate any effect of introducing time tracking.

Other studies, e.g., Oliva & Sterman (2001), emphasize the difficulty of evaluating service quality in care services. Ambitious output goals will be met by workers “cutting corners” or having to work overtime. There is a risk of “service erosion” when narrow productivity measures based on limited quality information overstate “true” productivity. Blix & Jordahl (2021, p.100–101) summarize essential issues and challenges in measuring the quality of welfare services.

Based on interviews with managers and home care workers in two local authorities in England, Moore & Hayes (2017) stress that electronic monitoring has reduced worker income through zero-hour contracts and crowded out “downtime” activities such as travel between visits, staff meetings, and the sharing of practice. Workers face awkward situations at odds with performing good care at a reasonable cost. Workers sometimes spend additional time with clients to be fully paid. In other cases, they must stay longer than scheduled without pay to resolve an urgent situation. The underlying problem is that a client's needs vary daily and will never conform to a predetermined schedule.

In sum, previous research indicates that the introduction of digital time tracking in public services can affect service quality and economic efficiency either positively or negatively. In this paper, we aim to determine these effects. The investigation is made possible by a survey administered to home care managers in all municipalities in Sweden. The municipalities make up the most local level of government in Sweden and carry the primary responsibility for providing elderly care services, mainly financed through municipal income taxes. By combining the survey responses with external data on quality and costs, we can compare managers' perceived effects on quality and costs of services with estimated effects based on the staggered adoption of time tracking.

We find that the perceptions of the responding municipal managers differ *markedly* from our estimated effects of time tracking. While managers perceive that time tracking has led to improved quality and, on balance, also to cost reductions, the estimated effects suggest that quality is unaffected or reduced, whereas costs have increased.

2. Data and Methods

In November 2020, we sent email invitations to a web survey to all 290 Swedish municipalities.¹ The survey included closed and open-ended questions about the use of

¹ The web survey was set up using the tool SurveyGenerator, provided by the Swedish company Alstra.

performance information from ICT systems in home care for the elderly and assessment of the effects of analyzing this information. The number of responding municipalities was 129, a response rate of about 44 percent. The response rate could have been affected by the timing of the survey during the COVID-19 pandemic. We sent out up to four reminders to municipalities from which we had yet to receive a reply. The last reply was recorded on February 2, 2021.

In most cases, we invited the person in charge of home care or elderly care in the municipality. When we had no email address to such a person, we sent the invitation to someone with some kind of expert position in the area (for example, an analyst or a controller). If we had no email address to such a person either, we used the general email address of the municipality, asking for the invitation to be forwarded to the person best suited to reply. Almost all respondents were municipal managers with an overarching responsibility for the quality and costs of municipal home care (both publicly and privately provided). From their self-reported positions, 39% of respondents were head of unit, 21% head of operations, 10% head of department, 4% head of area, 3% head of social services, and 2% head of section. The rest of the respondents reported positions such as coordination manager, expert, developer, investigator, quality manager, and strategist.

The survey consisted of 14 questions about digital time tracking and related performance indicators in home care. Here, we focus on three questions. One question about the year digital time tracking was introduced, and two about the effects of using information from the time tracking system on quality and costs. For a fuller description of the survey, including the open-ended responses, see Persson et al. (2023).

We start, in Section 3.1, by analyzing the subjective assessments of the effects of introducing time tracking. For the 94 municipalities replying that they have introduced digital time tracking, we present their assessments of how home care quality and costs have been affected. The assessments are presented graphically in bar charts, one for quality and one for costs.

Then, in Section 3.2, we use the stated years in which the municipalities introduced time tracking to estimate the effects on quality and costs in home care.² The staggered adoption of time tracking allows us to estimate the effects on quality and costs in a generalized difference-in-difference setting with variable timing of treatment.

We estimate models with the following four outcome variables collected from external sources:

- *Staff continuity* is the average number of home care workers who serve one client in two weeks.
- *Staff treatment* is the share of clients who report that they are treated well by the home care workers.

² The municipalities were asked in what year time tracking was introduced in home care delivered by municipal employees and in home care delivered by private providers. It was never the case that time tracking was first introduced only for private providers.

- *Sufficient time* is the share of clients who report that the home care workers have sufficient time for them.
- *Costs* are the natural logarithm of the average costs per client receiving home care in the municipality.

We also use control variables to account for population density, age structure, the share of immigrants, and labor market participation. The data has a panel structure such that all of the outcome and control variables are observed yearly for each municipality. The variables are described in more detail in Appendix B.

We estimate variants of the following model:

$$Y_{i,t} = 1(t_i > t_i^*)\beta + \boldsymbol{\gamma}\mathbf{z}_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t} \quad (1),$$

Where Y is an outcome (quality or cost) and $1(t_i > t_i^*)$ is an indicator function that equals one in every year t_i after the year t_i^* , in which time tracking was introduced in municipality i . The model also contains a vector of control variables ($\mathbf{z}_{i,t}$), municipal and year effects (μ_i and λ_t), and an error term ($\varepsilon_{i,t}$). The effect of time tracking is lagged by one period since we do not know in which part of the year the implementation took place and since the municipalities will need some time to analyze the new information and make adjustments.

As noted in recent research, the generalized difference-in-differences model relies not only on parallel trends but also on the assumption that the treatment effect is constant between groups and over time (e.g., Sun & Abraham, 2021). Unfortunately, as de Chaisemartin & D'Haultfœuille (2023) discussed, the latter assumption is often unlikely to hold. In our case, one potential problem is that the effects of time tracking could differ between densely and sparsely populated municipalities. To handle heterogenous treatment effects, we use the estimator suggested by Callaway & Sant'Anna (2021) for a staggered design with binary treatment; municipalities switch from untreated to treated at different points in time. For inference, we use wild bootstrap standard errors clustered on municipalities.

3. Results

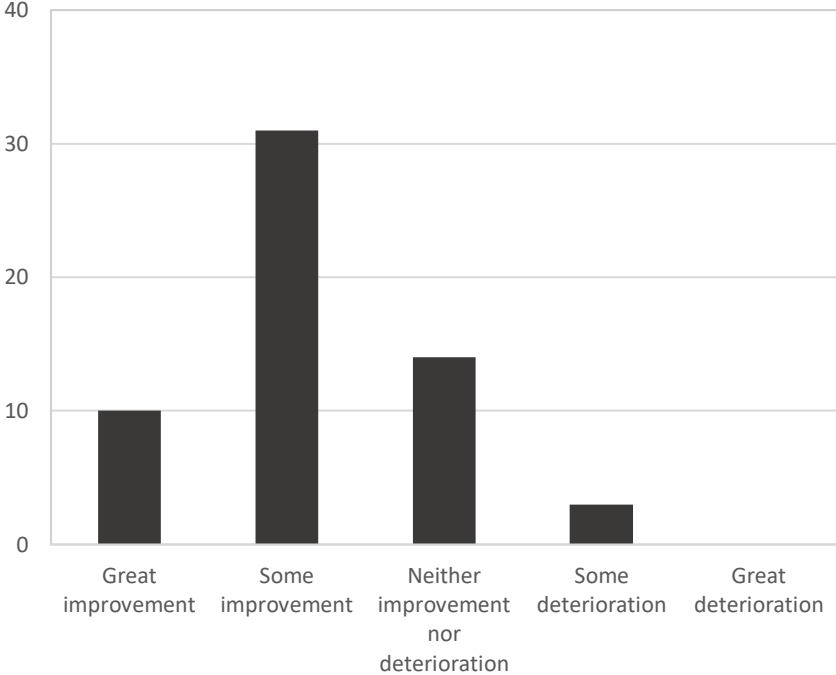
We start by presenting the perceived effects of time tracking on quality and costs in home care. This graphical analysis is presented in Section 3.1. The estimated effects are then presented in Section 3.2. Finally, we compare the perceived and estimated effects in Section 3.3.

3.1 Perceived effects

How do municipal managers perceive the effects of time tracking? This section presents their assessments of the effects on quality and costs. Figure 1 shows that the quality effects are overall perceived to be positive. Most respondents (61 percent) replied that the follow-up and

analysis of time use (share of working time spent with clients) has led to some improvement in the quality of home care, with an additional 4 percent perceiving a great improvement. A substantial minority of 33 percent perceived the effect as neither an improvement nor a deterioration. Only 2 percent saw any deterioration in quality.

FIGURE 1. PERCEIVED EFFECT OF TIME TRACKING ON QUALITY

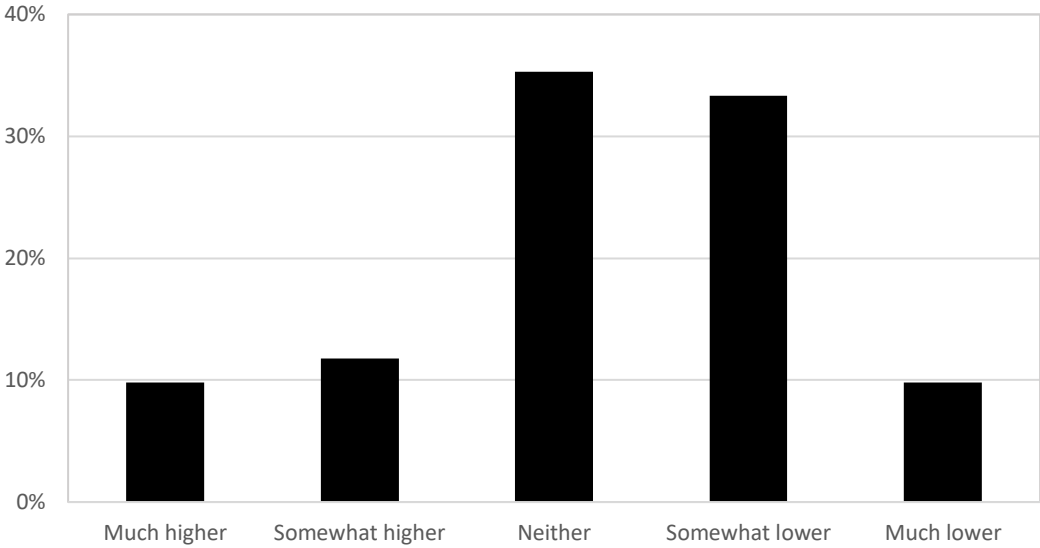


Note: Replies to the question “Has the follow-up and analysis of time use led to a change in the quality of home care in your municipality?”, excluding the responses “Don’t follow up time use” and “Don’t know”. 58 included responses.

The perceived effects on costs are, as seen in Figure 2, more mixed, but with a tendency to reply that costs are lower because of time-use follow-up. A large share of managers (43 percent) replied that home care costs are somewhat or much lower due to the follow-up and analysis of time use. The share of managers perceiving that costs are higher (somewhat or much) is considerably smaller (22 percent). Notably, 35 percent of the managers replied that costs are neither lower nor higher.³

³ The survey also included questions about the frequency of follow-up and time-use targets. There are no relationships between, on the one hand, the perceived effect on quality and costs and, on the other, the frequency of follow-up and the presence of a target for time use (according to chi-square tests of independence).

FIGURE 2. PERCEIVED EFFECT OF TIME TRACKING ON COSTS



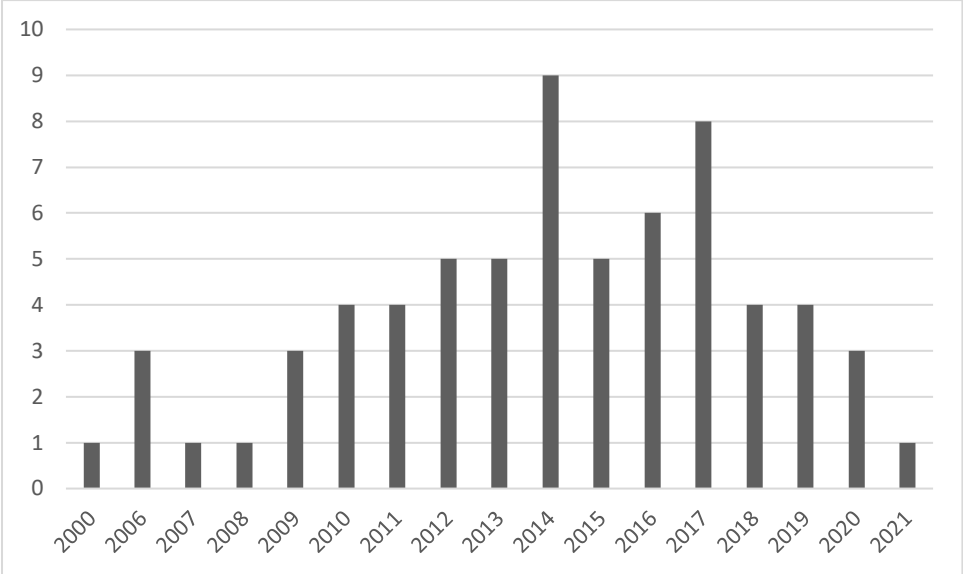
Note: Replies to the question “Has the follow-up and analysis of time use led to a change in the costs of home care in your municipality?”, excluding the responses “Don’t follow up time use” and “Don’t know”. 51 included responses.

3.2 Estimated effects

Next, we will estimate the effects on quality and costs of introducing time tracking. The staggered introduction of time tracking in Swedish municipalities makes the estimation possible. The municipalities are autonomous and can introduce new work methods or technology at their discretion. As displayed in Figure 3, the introduction of time tracking spans a period from 2000 to 2021. There was an increasing trend of adoption until 2014–2017 and a decreasing trend after that.

We use a staggered difference-in-differences model to estimate the effects of time tracking in terms of quality and costs of home care. The outcome measures are available for different periods: staff continuity from 2007 to 2021, two subjective quality assessments from 2012 to 2020, and costs from 2014 to 2020. In addition to the 69 municipalities that have given a year for the introduction of time tracking, we have a control group of 27 municipalities that had not introduced time tracking at the end of the period.

FIGURE 3. INTRODUCTION OF TIME TRACKING



Note: Replies to the question “Which year did you start tracking time use in your municipality?”

The estimation results are reported in Table 1, with a different outcome variable in each column.

TABLE 1. ESTIMATED EFFECTS OF TIME TRACKING ON QUALITY AND COST

	1	2	3	4
	Staff continuity	Staff treatment	Sufficient time	Costs
ATE (β)	-0.002 (0.537)	-1.959* (1.178)	-0.960 (1.236)	.118** (0.041)
Controls	Yes	Yes	Yes	Yes
No. obs.	624	695	699	434

Notes: Dependent variable indicated in column headers. The average treatment effect, ATE (β), is the effect of time tracking on the outcomes as specified in equation (1). All specifications contain the control variables Population density, Share 65+, Share foreign, and Share working, as well as municipality and year fixed effects. Costs are in logs. Wild bootstrap standard errors clustered on municipalities in parentheses. * $p < 0.1$, ** $p < 0.05$.

Table 1 shows that the quality effects tend to be negative. The coefficient for Staff continuity is close to zero and statistically insignificant. The treatment from staff, as perceived by the clients, gets worse with time tracking; about two percentage points decrease in clients who respond that they are always treated well by staff. The estimated effect on the share of clients who report that the staff has sufficient time for them is also negative, a reduction of about one percentage point. While the Staff treatment coefficient is statistically significant at the ten percent level, the coefficient for Sufficient time is not statistically significant. Finally, the estimated effect on costs is positive and statistically significant at the five percent level. The introduction of time tracking appears to increase costs by about 10 percent.

3.3 Comparison

Comparing the perceived effects with the estimates, it is clear that the managerial perceptions need not be accurate. The tendency to perceive cost reductions is inconsistent with the negative estimate of this effect. Similarly, the widespread perception of positive quality effects is not mirrored in the estimated quality effects (which are negative or statistically insignificant). We conclude that municipal managers perceive benefits from time tracking that are not distinguishable in our estimated effects.

4. Discussion

The differences between the perceived and estimated effects of time tracking can be interpreted in several ways. At face value, managers have misperceived the benefits of time tracking, painting a rosier picture than what is warranted. Such misperceptions could arise for several reasons, for example, if managers are out of touch with day-to-day operations. Psychological factors, such as cognitive dissonance or self-serving bias, could also be involved.

One interpretation is thus that the differences in perceived and estimated effects show that time tracking is ineffective in improving the efficiency and quality of home care services. It is also possible, however, that new technology on its own may underperform unless matched by good management (Blix & Jordahl, 2021 pp. 155–170), suggesting that time tracking could be potentially effective – if only handled appropriately in the implementing organization. The true potential of time tracking is difficult to assess, given that our study does not examine the underlying organizational mechanisms.

An alternative view is that the managers are correct. Our estimated effects may not fully capture the quality and costs of services, at least not according to what managers have in mind. It is also the case that quality is multi-dimensional and difficult to measure. Our three indicators of quality are all used in official evaluations, but we have not used any measure of health as an indicator of quality. Still, it is unlikely that a general quality improvement would not show up in any of our three indicators. Our measure of home care costs is more debatable in that it captures the average cost per client. The average cost per client depends both on the cost per hour and the number of hours delivered. We have different interpretations depending on which factor is driving the increase. While an increase in the cost per hour reduces productivity, an increase in the number of delivered hours could be an adjustment to existing needs.

Regarding applicability, our study is relevant for management accounting (costs and benefits) but less for technical aspects of time tracking, such as design and implementation. From a broader perspective, we have not considered softer organizational aspects of time tracking relating to culture, trust, privacy, and resistance to change. User acceptance, crucial for successfully adopting new technologies, is at risk if workers fail to see productivity increases.

In addition to positive attitudes towards surveillance and monitoring, increases in labor productivity are vital to obtaining acceptance of tracking technologies (Abraham et al., 2019).

5. Conclusions

By examining the relationship between time tracking, quality, and costs, we have contributed to a better understanding of the benefits and challenges of using time tracking systems in the home care industry. Managers perceive that time tracking has improved efficiency by increasing quality and reducing costs. The estimated effects are markedly different: reduced or unaffected quality and increased costs.

The discrepancy between the perceived and estimated effects speaks for a careful approach toward implementing time tracking in home care or similar services. Both further studies and dialogue between research and management are needed to understand the underlying mechanisms and close the gap between subjective perceptions and empirical estimates.

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Appendix A. Survey questions

The survey contained 13 questions in Swedish about the use of performance information from ICT systems in home care for the elderly and assessment of the effects of analyzing this information. Here, we provide English translations of the questions used in this paper.

1. Which municipality do you represent?

3. Which providers in your municipality use a digital tool to track time use in home care services?

- The municipal providers
- The private providers
- Both the municipal and the private providers
- No providers
- Do not know

Comments:

4. What year did you start tracking time use digitally in your municipality?

- In home care provided by the municipality:
- In home care provided by private providers:

Comments:

6. How often do you follow up and analyze time use in your municipality?

- Monthly or more often
- Every quarter
- Every year
- Less often than once a year
- Never / Do not track time use
- Do not know

Comments (for example, you can indicate how long you have been tracking time use digitally and by other means, or what analyses you are conducting):

7. Have the measurement and follow-up of time use led to a change in the quality of care in home care services in your municipality?

- Great improvement
- Some improvement
- Neither improvement nor deterioration
- Some deterioration
- Great deterioration
- Do not track time use
- Do not know

Comments:

8. Have the measurement and follow-up of time use led to change in costs of home care in your municipality?

- Much higher costs
- Somewhat higher costs
- Neither higher nor lower costs
- Somewhat lower costs
- Much lower costs
- Do not track time use
- Do not know

Comments:

9. Do you have a target for time use in your municipality?

- Yes
- No
- Do not know

If "Yes", state the target as it is formulated, for example in % (and in any case you can also leave a comment):

Appendix B. Variable descriptives

TABLE B1. VARIABLE DESCRIPTIONS AND SOURCES

Variable	Type	Definition	Mean	Std. Dev.	No. obs.	Source
Staff continuity	Outcome (quality)	The average number of home care workers who serve one client during two weeks	14.45	3.39	2832	Kommunens kvalitet i korthet, accessed at Kolada.se
Staff treatment	Outcome (quality)	Percentage share of clients who report that they are treated well by the home care workers.	76.84	6.06	2572	National Board of Health and Welfare, accessed at Kolada.se
Sufficient time	Outcome (quality)	Percentage share of clients who report that the home care workers have sufficient time for them.	83.77	5.80	2588	National Board of Health and Welfare, accessed at Kolada.se
Costs	Outcome (costs)	The average costs in SEK of a client receiving home care in the municipality (included as the natural logarithm in the analysis).	287 020	74 883	1915	Statistics Sweden and National Board of Health and Welfare, accessed at Kolada.se
Population density	Control	Population divided by land area.	146.18	521.67	4350	Statistics Sweden
Share 65+	Control	Share in percent of people aged 65 years or older of the municipality's total population.	23.06	4.24	3480	Statistics Sweden
Share foreign	Control	Share in percent of people with foreign background of the municipality's total population. Foreign background is defined as being born abroad or having two parents born abroad.	16.18	8.47	4350	Statistics Sweden
Share working	Control	Share in percent of gainfully employed of the municipality's population in the age group 16–64.	74.14	4.01	4060	Statistics Sweden

