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Please Wait, Help is on the Way:

Self-Checkout, Understaffing, and Customer Incivility in the Service Sector

Introduction

So called "self-checkout" machines have become one of the most ubiquitous, and one of the most fraught, forms of new technology in grocery stores, pharmacies, and retail stores generally. The journey of self-checkout technology began on an optimistic note. When the first machines were introduced at Kroger stores in Atlanta in 1986, they were celebrated as a "revolution in the supermarket," enthusiastically welcomed for the potential to reduce labor costs and shorten customer wait times (Puzo 1987). The adoption of self-checkouts skyrocketed during the Covid-19 pandemic, driven by public health concerns, and they remained a common fixture as the pandemic subsided (Food Industry Association 2023). However, as their presence grew, so did the challenges and frustrations associated with their use.

The manufacturers of self-checkout machines and the retailers that implement them often touted the benefits from both customer and business perspectives. For customers, the machines promise a speedy, convenient transaction that would enhance customer satisfaction (Toshiba 2024, Target 2024). For firms, the machines come with the prospect of cost-saving reductions in check-out personnel, enhanced flexibility in deploying labor elsewhere, and churning out customers faster (NCR 2019). Such technology could also shield workers from difficult customer interactions that can arise at checkout over bagging, forms of payment, and prices (Kinder and Lenhart 2019).

And yet anecdotes of customer frustration, dissatisfaction, and even rage in the face of self-checkout technology are easy to find. News articles indicate that during self-checkout, customers often encounter machine errors, experience significant frustration from the additional work required, and bemoan the lack of expected human touch in the service (Andrews 2018, Schulz 2023, Gibson 2024). Additionally, customers also express anger from increased accusations of theft, as shoplifting through

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intentional or accidental skipped scans is a prevalent and costly issue (Reuter 2023, Schulz 2023). Anti-theft measures on the machines further exacerbate these frustrations, as they often require workers to address constant false alarms, such as the notorious error of an "unexpected item in the bagging area" (Meyersohn 2022).

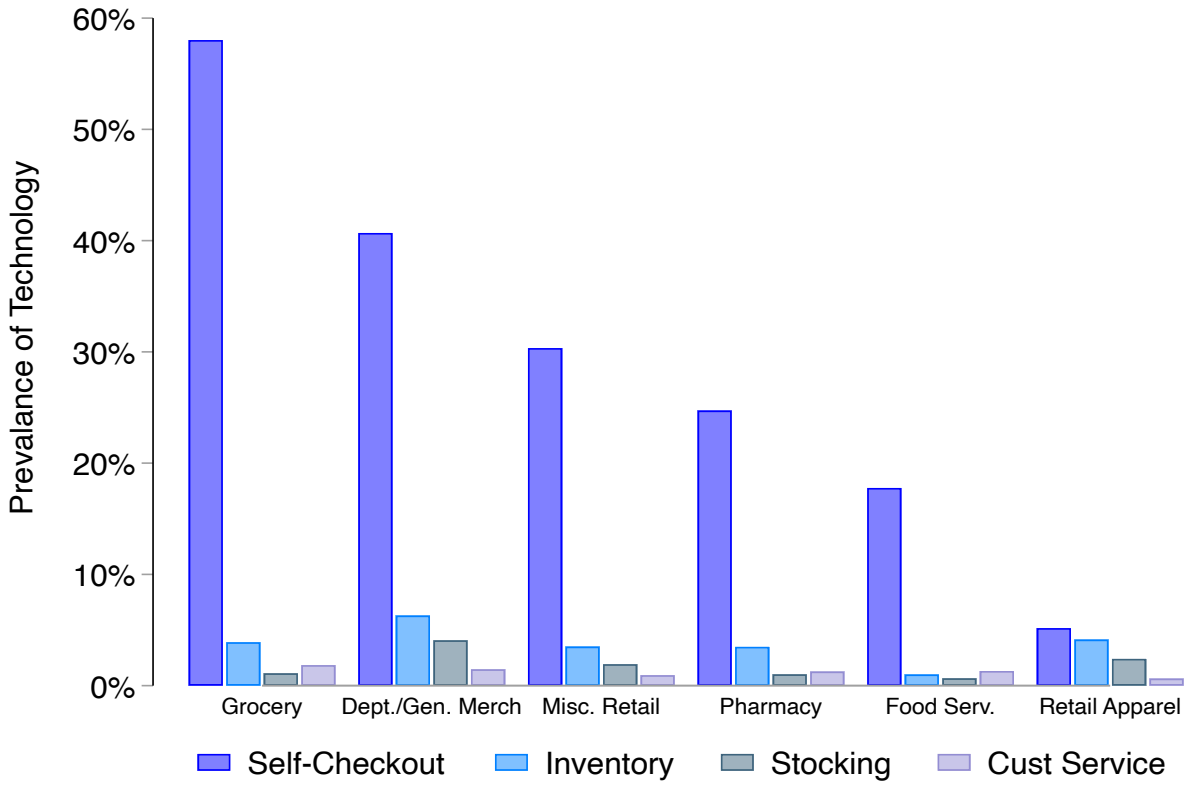
Due to frequent machine and human errors, self-checkout stations end up requiring regular maintenance and supervision by workers (Andrews 2018). When this technology goes wrong, it is often workers, potentially, depleted in their ranks, who are called on to fix it and to mollify irate customers (Kinder and Lenhart 2019). If self-checkout machines reliably substituted for human cashier workers, then reduced staffing would not necessarily be a problem. This kind of staffing reduction could reflect true technical substitution allowing a reduced workforce to still adequately meet business and customer needs. But, these anecdotes raise the question – have firms that have deployed self-checkout gone too far in reducing staffing, leading to understaffing?

We draw on novel data collected from over 14,000 workers at 135 of the largest service sector firms in the United States to provide one of the first examinations of the relationship between self-checkout machines, understaffing, and workers' experiences of customer incivility.

Technology at Work

Self-checkout machines are one of the most commonly reported forms of technology at work in grocery, pharmacy, and other retail stores. Figure 1 shows that compared with technology that is used to take inventory (such as RFID scanning machines), to provide customer service, or to do stocking, self-checkout is far more prevalent, with 30% of workers reporting self-checkout machines in their workplace. This technology appears across sub-sectors, but is by far most commonly reported in the grocery sub-sector, with 58% of workers reporting self-checkout in their stores, against just 5% in retail apparel, 18% in food service (including fast food and casual dining), 25% in pharmacy, 41% in department/general merchandise, and 30% in miscellaneous retail.

Figure 1. Prevalence of Workplace Technology by Type and Sub-Sector



Self-Checkout and Understaffing

Companies are clear that self-checkout machines are designed to reduce labor costs by substituting technology for cashiers. Yet as customers know well, self-checkout machines can be imperfect substitutes and can require troubleshooting from workers. The question then is not only if self-checkout machines reduce staffing, but whether firms over-adjust, reducing staffing more than the technology's autonomous capabilities really warrant.

We asked workers directly about staffing levels at the establishments at which they work: *"how often are there not enough people or staff to get all the work done?"* Overall, the majority of workers, 53%, reported that their stores were "always" or "often" understaffed, including 25% of workers who said such understaffing occurred "always." But, there was substantial variation in the prevalence of frequent understaffing across firms, especially those in grocery and pharmacy. For instance, while 22% of Costco workers, 14% of HEB workers, and just 3% of Trader Joe's workers reported that their stores were "always" understaffed, the shares were far higher at Rite Aid (35%), Safeway (37%), Target (45%), Dollar General (46%), and CVS (47%).

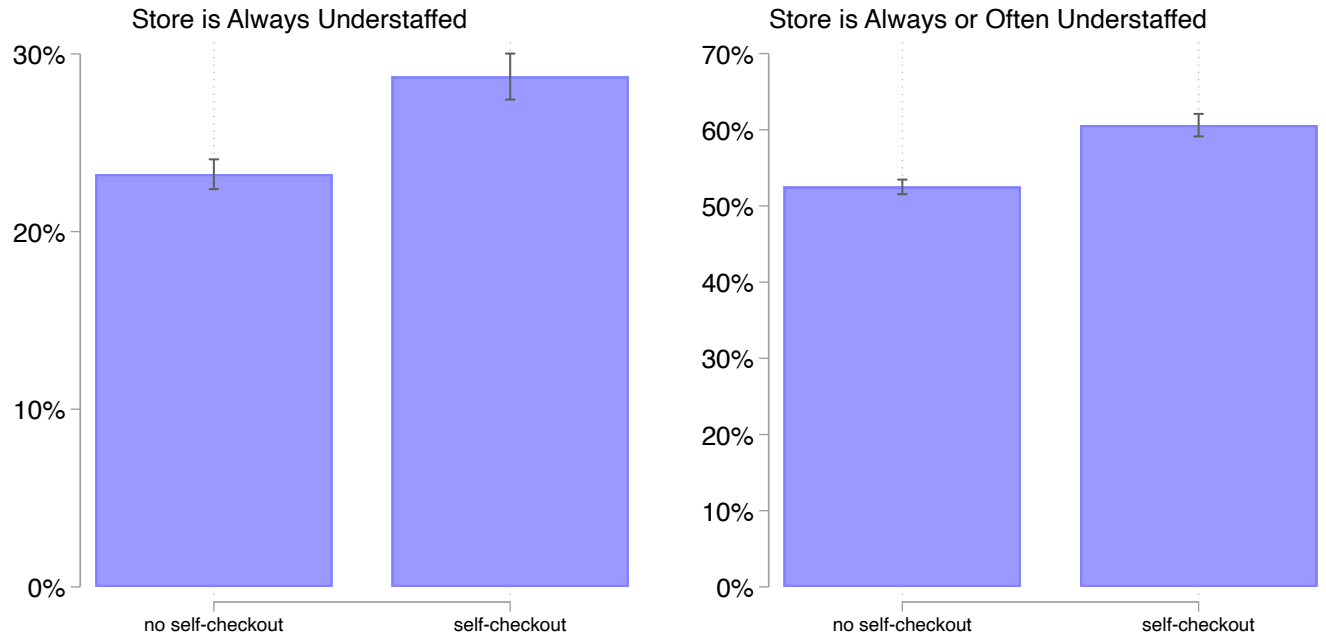
It would not be surprising to find lower levels of staffing in stores that have deployed self-checkout machines. But, does this technological deployment lead to *understaffing* rather than just to *less* staffing?

The left panel of Figure 2 compares workers' reports of frequent understaffing ("always") from workers who reported self-checkout in their stores versus those who did not and the right panel does the same, except with "always" or "often" as the outcome variable.

Defined either way, significantly more workers report understaffing when working in stores with self-checkout. Where 23% of workers in stores without self-checkout report that there are always insufficient workers to get all the work done, the share is 26% higher, at 29% in stores with self-checkout. Similarly, while the majority of workers in stores without self-checkout report there are always or often insufficient workers to get the work done (52%), significantly more, 61%, of workers report that to be the case when the stores have self-checkout.

These results adjust for other differences that may exist between workers in stores with self-checkout and those without, including worker demographics

Figure 2. Self-Checkout and Understaffing



(gender, race/ethnicity, age, education, and marital status), worker characteristics (covered by collective bargaining, being a manager, job tenure) and other aspects of job quality (hourly wage, amount of advanced schedule notice, last minute timing changes to schedule, and access to paid sick leave).

Understaffing and Customer Incivility

So what? Do workers' reports of understaffing correspond with in-store consequences for the workplace environment and customer service experience? To understand the stakes of understaffing, we examined the relationship between a store not having enough workers and two kinds of worker-customer interactions: (1) how often workers feel **bullied**, including things like being humiliated, constantly criticized, or excessively teased, at work by customers vs. (2) how often workers feel **respected** at work by customers.

We find clear evidence that workers **are more frequently bullied** and **less likely to be treated with respect** when they work in stores that are always understaffed. The differences across these staffing contexts are striking. Among the workers whose workplaces were always understaffed, 26% reported that customers never or rarely treated them with respect and 25% often or always felt bullied by customers in their interactions, against 12% and 11% of workers, respectively, in workplaces that were less consistently understaffed. As above, these estimates are adjusted to account for a wide variety of potential differences between workplaces and workers including demographics, job characteristics, and job quality.

Figure 3. Understaffing and Customer Disrespect and Bullying

Self-Checkout and Customer Incivility

We can put these puzzle pieces all together to examine how self-checkout then shapes workplace climate and the customer service experience. While there are many sources of customer disrespect and bullying in the service sector, we find that self-checkout plays a significant role.

Workers who report self-checkout machines in their workplace are 14 percent more likely to never or rarely be treated with respect by customers and 12 percent more likely to always or often be bullied in customer interactions.

Conclusions

The deployment of self-checkout machines in retail settings, particularly in grocery stores, is a ubiquitous technological advancement aimed at reducing labor costs and improving customer satisfaction. However, we find significant negative consequences related to staffing levels and customer interactions. Self-checkout machines are most common in grocery stores, with 58% of workers in this sub-sector reporting their presence, compared to lower percentages in other retail areas. In stores that deploy self-checkout machines, significantly more workers report frequent understaffing in stores with the technology, highlighting the drawbacks of relying too heavily on this technology without ensuring adequate staffing levels to deal with its errors. Workers in "always" understaffed settings experienced more bullying and are treated with less respect from customers compared to those in better-staffed settings.

When we integrate these findings, we can better understand how self-checkout affects the workplace environment and customer interactions. Simply put, the deployment of self-checkout machines often leads to understaffed workplaces, resulting in more frequent occurrences of customer disrespect and bullying.

Early self-checkout machines in the late 1980s were lauded as "a giant leap forward" (Puzo 1987). However, there is nothing inevitable about the continual expansion of self-checkout machines, or any technology in the workplace. In the past year, large retailers such as Walmart have scaled back their self-checkout options nationwide, following the lead of Target, Safeway, and Dollar General, which have also reduced or even removed them altogether in some cases (Gibson 2024, Gordon 2024). These retailers cite customer satisfaction as the primary reason, aiming to offer a "more personalized and efficient service" by reinstating human cashiers (Gordon 2024).

Now may be the time to step back and rethink the use of self-checkout machines, not just for the benefit of customers and firms, but also for the workers who must deal with the technology's daily glitches and customer frustrations. Cutting back on the machines is a start, but more importantly, we must turn our attention to the frustrations that the technology exposes, such as reduced staffing and customer incivility, to create better experiences for workers and customers alike.

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Methodological Appendix

The Shift Project has collected survey data from hourly service-sector workers employed at large retail and food establishments since the fall of 2016. The data are collected twice annually in repeated cross-sections.

The Shift Project recruits survey respondents using online Facebook and Instagram advertisements, targeted to workers employed at large retail and food-service employers. Those who responded to the Shift survey invitation were automatically routed to a survey landing page where they were asked to consent to participate in the study, then began the online self-administered survey using the Qualtrics platform. As an incentive, those who completed the survey and provided contact information were entered into a lottery for a $500 Amazon gift card. The survey included modules on job characteristics, work schedules, demographics, economic stability, health, parenting, and child outcomes. To screen out invalid survey responses, we used an attention filter (a question that instructed respondents to select a particular response category to verify the accuracy of their responses). In addition to the survey core, special modules are rotated on and off the survey.

There are three sets of survey measures at the core of our analysis in this research brief:

Presence of self-checkout

Does your [EMPLOYER NAME] workplace use any of the following technologies to complete or assist with orders and sales? Customers use self-checkout registers or apps in the store.

1 Yes
2 No

Customer respect and bullying

How often do you feel respected by.... Customers?

1 Never
2 Rarely
3 Sometimes
4 Often
5 Always

How often are you bullied, including things like being humiliated, constantly criticized, or excessively teased, at work by... Customers?

1 Never
2 Rarely
3 Sometimes
4 Often
5 Always

Understaffing

At [EMPLOYER NAME], how often are there not enough people or staff to get all the work done?

1 Always
2 Often
3 Sometimes
4 Rarely
5 Never

These questions are not in the survey core and so appear only in some waves of the Shift Project data collection. The table below indexes at which waves each set of items is asked.

Wave	Self-Checkout	Customer Respect/Bullying	Understaffing
7	X		X
8	X		X
9	X		
10	X		
11	X	X	
12	X		
13	X		
14	X	X	
15		X	X
16	X	X	X

To maximize sample size, we draw on Waves 7-14 and 16 for the analyses of the presence of technology by subsector from a sample of 95,355 workers. We then draw on Waves 7, 8, and 16 for the analysis of self-checkout and understaffing from a sample of 14,778 workers with complete data on outcome, key predictor, and covariates. For our analysis of understaffing and customer respect and bullying, we deploy data from Waves 15 and 16 from 12,313 workers with complete data. Finally, for the analysis of self-checkout and customer respect and bullying, we use data from 15,362 workers with complete data collected in Waves 11, 14, and 16.

The survey recruitment approach yields a non-probability sample of workers, which may differ from the broader population of service-sector workers. To mitigate potential bias, we construct survey weights that adjust our sample to reflect the universe of service-sector workers in the U.S. These weights are constructed in two stages.

First, we construct survey weights to adjust the demographic characteristics of the Shift survey sample to match the demographic characteristics of service-sector workers in the American Community Survey (ACS) for the years 2012-2021. We align the ACS sample with the Shift sample by selecting workers in the ACS who are employed in the same occupations and industries as the Shift sample. These weights are constructed using age, gender, race/ethnicity, and educational attainment.

Second, to ensure that our sample accurately reflects the distribution of employment types among large retail and food-service employers, we use data from the Reference USA database of U.S. establishments. The RefUSA database contains a detailed listing of all retail and food establishments nationally. RefUSA contains the size of the workforce for each establishment, which we aggregate up to the industry level. Then, using the aggregated RefUSA employer data, we create weights to align our Shift survey sample to the distribution of workers by industry within state.

The results we present in this report are unweighted, but in supplementary analyses we applied these ACS demographic and RefUSA employer weights and find that the results are not sensitive to weighting.

For a detailed discussion of The Shift Project data collection, methodology, and data validation, see Schneider and Harknett (2022).