Tip of the Iceberg: Do Tips Bunch at Kink Points?*

Emek Basker Lucia Foster Martha Stinson

April 2025

Abstract

Tip income is informal and relatively easy to conceal. Using tax reports at both the individual and the employer levels, we show that reported tip income varies strongly with three incentives to report this income. First, in many states, minimum-wage laws provide an incentive for tipped workers to report at least some of their tips. Second, restaurants above a certain size threshold are required to report aggregate tips equal to at least 8% of their annual revenue. Finally, third-party reporting of credit-card transactions increased transparency of restaurant revenue and tips after 2011. We show that all three incentives matter: workers in states with a minimum-wage incentive, working at larger restaurants, in the latter part of the sample, report substantially more tips than workers in states without a minimum-wage incentive, workers at smaller restaurants, and workers in all jobs prior to 2011. Finally, we show bunching of reported tips at the minimal required thresholds for both restaurants and their workers.

JEL Codes: J33, L82, H26

Keywords: Tipping, Restaurants, Tip Reporting

*Comments welcome. Author affiliation: Center for Economic Studies, U.S. Census Bureau. Author contact: emek.m.basker@census.gov, lucia.s.foster@census.gov, and martha.stinson@census.gov. Any opinions and conclusions expressed herein are those of the authors and do not represent the views of the U.S. Census Bureau. We thank Kristin McCue for her tremendous help early in the project. We also thank Saku Aura, Harley Frazis, Nathan Goldschlag, Nathaniel Hendren, Charles Hokayem, Mallick Hossain, Maggie Jones, Mark Klee, Rob Munk, Jonathan Rothbaum, Kristin Sandusky, Matthew Shapiro, Cristina Tello-Trillo, Sean Wang, Sammy Young, and seminar participants at the University of Missouri, University of Victoria, Third IRS-Census Workshop on Income Measurement (2023), the 10th Annual BLS-Census Workshop (2024), and the NBER-CRIW Summer Institute (2024) for helpful comments and conversations. The Census Bureau has ensured appropriate access and use of confidential data and has reviewed these results for disclosure-avoidance protection (project 7508369: CBDRB-FY23-CES020-003, CBDRB-FY24-0125, CBDRB-FY24-CES020-004, CBDRB-FY25-0015, CBDRB-FY25-0127). A prior version of this paper was circulated as CES Working Paper 24-68 and contains additional results.

1 Introduction

Tipping is ubiquitous. Survey evidence indicates that 80–90% of U.S. consumers leave tips at full-service (FS) restaurants, with average tip amounts ranging from 15% to 25%. Despite the prevalence of tipping, because tips represent a direct transaction between customers and workers, little is known about how well tips are reported in administrative data. Incentives to report tips vary by geography, due to variation in minimum-wage laws; by restaurant size, due to differential applicability of both minimum-wage laws and other regulations; and over time, due to a combination of increased payment-card transactions and the implementation of third-party reporting of payment-card transactions. We analyze tax reports at both the individual level and the employer level and show that reported tip income varies strongly with these incentives to report tip income and bunches at the minimum reporting thresholds.

We combine several large administrative datasets on both restaurants and workers, covering U.S. single-unit (SU) FS restaurants from 2005 through 2018. Restaurants are a natural setting to study tip reporting for several reasons. First, FS restaurants account for the lion's share of tips reported annually to the Internal Revenue Service (IRS): tips reported by FS restaurant jobs account for over 80% of total reported tips economy-wide. Second, tips comprise a large share of employee compensation at restaurants. Workers who report tips to the IRS report, on average, approximately the same level of tip income as wage income. At the restaurant level, reported tips accounted for more than 20% of employee compensation at FS restaurants, or about $90,000 per restaurant per year, compared to $330,000 in payroll for all workers. Third, as described below, some of the incentives to report tips apply particularly, and in some cases uniquely, in restaurant settings.

Three laws, as well as changing norms of payment methods, affect the incentive for workers and their employers to report tips. First, minimum-wage laws, as codified in a 1966 amendment to the Fair Labor Standards Act of 1938 (FLSA), allow employers in most states to pay tipped workers a lower, sub-minimum, hourly wage. Because tips are so prevalent in restaurants and most restaurant workers are paid hourly, there is widespread use of the

subminimum wage in this setting. Employers are required to ensure that workers paid the subminimum wage earn enough in tips to make up the difference between the subminimum wage and the standard minimum wage. If tips are too low to cover the gap, the employer is responsible for making up the deficit. In practice, this provides an incentive for employers to ensure that their tip-earning workers report tips up to the value of this gap.

Second, a provision in the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) requires restaurants employing more than ten workers on a typical business day to report tips equal to at least 8% of revenue. Small restaurants, with fewer than ten workers per day, are exempted from this requirement. To our knowledge, there is no equivalent regulation in other industries.

Both of these laws create incentives for workers in some jobs to report tips up to a specified threshold, but not necessarily beyond that threshold. In addition to these, a third law, the Housing and Economic Recovery Act of 2008 (HERA) established third-party reporting of credit-card transactions to the IRS. This act, combined with increased card transactions, has increased transparency in reporting of revenues and tips throughout the U.S. economy.

We show that these three incentives all matter. First, tip-reporting rates are lower in states without subminimum wages than in states with a subminimum wage, consistent with strategic reporting behavior by restaurants. Second, we document bunching of reported tips by workers in jobs subject to a two-tier minimum wage at precisely the level needed to meet minimum-wage requirements. Third, restaurants that are subject to the 8% revenue-share rule report substantially higher tips than smaller restaurants not subject to the requirement. Finally, tip-reporting rates have increased throughout the time period studied, likely due to both increased card payments and third-party reporting of card payments.

We also document an interaction between these incentives, which serve in some cases as substitutes. In the seven states in which the minimum-wage incentive does not apply, tip-reporting rates are much lower than in states with a large minimum-wage incentive, but this difference is attenuated for large restaurants, to which the revenue-share rule applies.

In addition, tip reporting has increased over time at all types of restaurants – regardless of minimum-wage and revenue-share reporting – but it increased most for restaurants to which neither the minimum-wage nor the revenue-share incentive applies. Finally, for restaurants subject to the revenue-share rule but not subject to minimum-wage incentives to report tips, we show that even in the later part of the sample period, there is some bunching of tips at precisely 8% of revenue.

Our paper is related to several recent papers showing bunching of reported income at minimum-wage thresholds. Bíró, Prinz, and Sándor (2022) document that reported incomes of workers in Hungary often bunch at the minimum wage, when, in fact, a substantial share earn at least twice that amount. Gavoille and Zasova (2023) also document substantial under-reporting of wage income among workers in Latvia. Most closely related to our paper, Feinmann, Hsu Rocha, and Lauletta (2024) use data from Brazil to document that a quarter of formal-sector workers report getting some of their wages "under the table," and demonstrate that both employers and employees are sensitive to reporting incentives. We focus on the United States and examine an infrequently studied source of income: tips paid to restaurant workers. In the U.S., evidence of bunching of reported income has previously been found only in self-employment income and not in wage and salary income (Saez, 2010; Imboden, Voorheis, and Weber, 2023). Similar to self-employment incentives, restaurant-industry reporting incentives create kink points at the worker level. In addition, another layer of incentives operates at the employer level, creating a different kink point that depends on employers' geography and size.

The rest of this paper is organized as follows. Section 2 details the institutional and legal environment that motivates our empirical exercises. Section 3 describes our data sources, with some omitted details presented in Appendix A. We document responses to the tip-credit incentive (FLSA) in Section 4, and responses to the revenue-share rule (TEFRA) in Section 5. Section 6 concludes with a discussion of the likely implications of proposed policy changes on reporting of tips.

2 Institutional Setting

The FS restaurant industry is defined as the set of "establishments primarily engaged in providing food services to patrons who order and are served while seated (i.e., waiter/waitress services) and pay after eating" (Executive Office of the President, Office of Management and Budget, 2022, p. 563). Published data from the Economic Census show the U.S. had approximately 250,000 FS restaurants in 2017, about 210,000 of them operated by SU firms (U.S. Census Bureau, 2017). We focus on SU restaurants because we have higher-frequency and higher-quality data for these restaurants.[1] Most importantly, we are able to match jobs to exact work locations.

A tip, or gratuity, is a direct payment from a customer to a worker. Legally, this payment bypasses the employer but represents job-related earnings for the worker. The employer is required to track worker tips, but this tracking relies in part on workers' reports of their tip earnings. If tips are left on a charge card, the employer processes the charge and is required under federal law to dispense the funds to the worker no later than the regular payday, whether or not the employer has received the funds from the credit- or debit-card company (U.S. Department of Labor, Wage and Hour Division, undated b).

We have a strong prior belief that tipping occurs at virtually all FS restaurants in the U.S. If an employee seats patrons, offers them menus, takes their orders, and brings the food to the table, a tip is generally expected; even if not all patrons leave tips, enough do that, at year's end, collectively, workers at the restaurant will have received some tips.[2]

We also have prior beliefs on the aggregate value of tips: the average tip rate is likely in the range of 10–20% of the bill, depending on the frequency of "stiffing" (leaving no tip). Azar (2020) cites various sources that recommend a tipping range of 15–25% of the check

[1] Our cursory examination of tip reporting at multi-unit restaurants suggested that reported tip rates are higher at these restaurants (see Basker, Foster, and Stinson, 2024, pp. 34–36).

[2] There are some FS restaurants that do not allow tipping, but casual observation suggests that they are exceedingly rare.

amount. Public data we obtain from two consumer surveys and a payment application are on the lower end of this distribution, much closer to 15% than 25%. The first consumer survey, FoodAPS, conducted by the U.S. Department of Agriculture, references nearly 2,000 meals, almost all of which took place in 2012; the average tip rate in that survey is 14.6% (public-use data files and documentation are available at U.S. Department of Agriculture, Economic Research Service, 2016). In another consumer survey from late 2019, shortly after the end of our sample period (but, importantly, before the beginning of the Covid-19 pandemic), 82% of respondents said they regularly tip waitstaff at restaurants (TD Ameritrade, 2020).[3] Among those who did leave a tip, the median reported tip rate is in the 19–25% bin, with only 11% tipping at higher rates. Finally, payment data from the Square payment app, published in 2014, when the app was used mostly by small businesses, show that about 57% of restaurant transactions include tips; among transactions that were tipped in the application, the average tip rate was approximately 16.5% (some of the transactions without a tip were likely tipped in cash).[4]

In contrast with our restaurant-level priors, we have very weak priors about the share of workers at FS restaurants who earn tips, and about the importance of these tips as a share of their earnings. We believe that most – perhaps all – servers earn tips, but not all FS workers are servers; some, but not all, other workers may receive tips. The value of tip receipts likely varies with time of day, clientele, and staffing. Many restaurants require or encourage tip pooling, whereby tipped workers put some or all of their tips into a common pool from which they are redistributed.[5]

[3]The survey included approximately 1,000 U.S. adults ages 23 and older who had assets of at least $10,000.

[4]Other evidence on tip rates from Ali, Olson, Pantzalis, Park, and Park (2023), who use data from 68.5 million transactions at 1,200 chain restaurants, belonging to 43 distinct chains, over a 36-month period from July 2013 to June 2016. Among transactions tipped on a credit card, they find an average tip rate of about 21%.

[5]Eisenberg and Williams (2015, p. 394) claim that most restaurants implement tip pooling. Mandatory tip pooling is allowed in most states and voluntary pooling is allowed in all states. During most of the study period, mandatory tip pools could include only workers who interacted directly with customers and could not include managers, but this rule was relaxed in March 2018, near the end of our sample period (Federal Register, 2021, p. 52975.) Mandatory tip pooling may not eat into the tip credit and may not

The tax liability on tip income is different for workers and employers, and creates asymmetric reporting incentives. Workers owe Federal Insurance Contributions Act (FICA) payroll taxes (7.65%) on all wages and tips, which creates an incentive to minimize tip reporting because of the tax implications of reporting more tips. In contrast, the employer's disincentive to report tips is smaller because the employer's tax liability generally does not increase with reported tips.[6]

The main incentive for workers to report their tips is a provision in the FLSA that allows employers to pay tipped workers a lower (subminimum) hourly base wage, provided the workers earn enough in tips to make up the difference between the subminimum wage and the standard minimum wage. Employers therefore have an incentive to ensure that their workers report that difference – called the tip credit – in tips for every hour of work. For workers whose tips fall short of the tip credit, the employer's incentive is to ensure all tips are reported, since they reduce the worker's applicable minimum wage one for one. As we detail in Section 4, this rule does not apply at all restaurants: some states do not allow any tip credit, and some small restaurants earning less than $500,000 in revenue may not be required to comply with any minimum-wage laws. A second incentive applies at the restaurant level: TEFRA requires that restaurants that employ more than ten workers on a typical business day report enough tips to equal 8% of revenue. This creates an incentive for restaurants to ensure their workers collectively report enough in tips to meet this 8% threshold. We discuss this regulation in more detail in Section 5.

Tip reporting may have changed over time for several reasons. One reason is that, as a larger share of transactions use credit and debit cards, and more tips are included

exceed a "customary and reasonable" percentage of an employee's tips, which the U.S. Department of Labor defined as no more than 15% until 2011 (Eisenberg and Williams, 2015, p. 398; that threshold was relaxed following litigation). Informal sharing of tips, which is unlimited and unregulated, may include kitchen staff and managers.

[6]Employers also owe FICA payroll taxes of 7.65% but can deduct their share of FICA taxes on "excess" tips from any business income taxes they owe, where excess tips are defined as that portion above what is needed for the worker to earn $5.15 an hour (U.S. Department of Treasury, Office of Tax Analysis, 2016).

on those transactions, tracking of tips has improved.[7] This means that there is less need for "guesstimating" tips and a paper trail exists that may, in and of itself, encourage tip reporting.

In addition to these gradually increasing incentives, there may have been a discontinuity in restaurants' incentive to report tips in 2011. That year, a provision of the Housing and Economic Recovery Act (HERA) went into effect, requiring that third-party network transactions, including tips, be reported to the IRS on Form 1099-K. Similar to the other reporting incentives, Form 1099-K is only required if the network processed a minimum number of transactions and a minimum value.[8] Form 1099-K is filed by the credit-card processor and includes the gross amount processed through the network. Research has shown that this type of third-party reporting can increase income reporting. For example, Garin, Jackson, Koustas, and Miller (2023) show that self-employed workers who receive payments from online platforms such as ride-sharing apps are more likely to report self-employment income on their tax returns if they receive a Form 1099-K from the platform. Although Form 1099-K does not separately report tips, it still may affect incentives to report tips accurately to the IRS for restaurants that accept credit and debit cards, due to increased transparency. Form 1099-K may also increase *revenue* reporting by restaurants.

3 Data Sources

A key reason for the dearth of prior studies on tipping and tip reporting is a lack of high-quality data. We overcome this hurdle by combining several large administrative and survey

[7]The Survey of Consumer Payment Choice shows a decrease in the percentage of payments made in cash from about 30% in 2009 to under 25% by 2018 (Federal Reserve Bank of Atlanta, 2021). Gerdes, Hamburg, and Liu (2017) report that between 2000 and 2015, consumer non-cash payments grew by 4.5% per year, with the majority of that growth coming from increased use of debit cards.

[8]From 2011 to 2018, the thresholds for a 1099-K were $20,000 in reportable transactions and more than 200 such transactions (Internal Revenue Service, 2013, 2019b). Some states have lower thresholds; for example, in Vermont starting in tax year 2017, the value threshold was reduced to $600 and the transaction count threshold was removed altogether (Vermont Agency of Administration, Department of Taxes, 2017).

datasets on both restaurants and workers, covering U.S. SU FS restaurants from 2005 through 2018. In 2017, SU restaurants accounted for about 84% of FS restaurants, 62% of FS restaurant employment, 63% of FS restaurant payroll, and 65% of FS restaurant revenue.[9]

We start with data on restaurants from the Census Bureau's Business Register (BR), Longitudinal Business Database (LBD), and Economic Census (EC). Each of these datasets includes detailed North American Industry Classification System (NAICS) codes that allow us to distinguish FS restaurants from other restaurants.[10] The EC, conducted in 2007, 2012, and 2017, includes questions directed at restaurants about service levels, which allow us to refine the assignment of industry designations.

The datasets also include other pertinent information about restaurants. First, both the EC and the BR include the business address, which we use to determine the applicable minimum wages. (We link minimum wages based on state, and in some cases city or county, as well as business size. More details on our minimum-wage data are in Appendix A.) Second, for most SU restaurants, the LBD includes annual revenue, also derived from IRS tax filings.

Once we identify records associated with SU FS restaurants in the BR and LBD, we use data from IRS Form W-2 records to identify workers at those restaurants. Filed annually by employers, Form W-2 provides a breakdown, by worker-job-year, of wage earnings and reported tips.

Table 1 shows summary statistics for restaurants with and without reported tips. The first two rows show two measures of employment – employment at a point in time (we use the

[9]We restrict our sample to SU restaurants because our data linking workers to firms do not assign a job to a particular restaurant location. Consequently, for workers employed by multi-unit (chain) firms, it is not possible to know which minimum-wage laws apply to which jobs, nor is it possible to know which restaurant locations within the firm report tips. We also have annual revenue at the restaurant level only for SU firms. The SU designation is based on ownership information; therefore, an SU restaurant may be a franchise of a familiar name brand, as long as the restaurant's owner does not operate other restaurants. These statistics can be derived from data at U.S. Census Bureau (2017).

[10]Although the NAICS code for FS restaurants changed during the period of our sample, from 722110 before 2012 to 722511 in 2012 and thereafter, the definition of the industry did not change substantively. Non-FS restaurants include fast-food (limited-service) restaurants, bars, coffee shops, food trucks, catering services, and more. We discuss concerns about misclassification of establishments as restaurants in Appendix A.

pay period that includes March 12) and flow employment (the number of workers who receive a Form W-2 from the restaurant). Both measure counts of individual workers, not adjusting for hours worked. The third row shows annual revenue.[11] The last two rows show payroll and tips, two size measures that may be endogenous to tip-reporting incentives. Restaurants that report tips have on average approximately 20 employees on March 12, and approximately 35 employees who work at the restaurant at some point during the calendar year. The respective numbers for restaurants with no reported tips are six and 11 employees. Consistent with these numbers, the average revenue for restaurants with reported tips is approximately 2.5 times the average revenue for restaurants that do not report tips, and payroll is four times larger.

Figure 1 shows the share of SU FS restaurants that report tips by year. The solid blue line shows the unweighted share, and the dashed black line shows the job-weighted share. In 2005, two thirds of SU FS restaurants, accounting for about 87% of jobs, reported tips for at least one worker at that restaurant; by 2018, three quarters reported tips, accounting for about 91% of SU FS jobs. On average across all years, 72% of restaurants, accounting for 89.6% of all jobs, have at least some tips reported.

Figure 2 shows the time series of the mean ratio of tips to revenue. This mean increased from about 7% in 2005 to about 9% by 2018, and shows little evidence of stabilizing. The ratio could be increasing because the rate at which consumers tip is increasing, but it could also be increasing because reporting rates are higher holding actual tips at a fixed level.

We distinguish between a *worker* and a *job*: the former is an individual; the latter is a worker-employer pair. Our analysis in this paper is at the job-year level. Workers can have multiple restaurant jobs in a year. Table 2 shows average total reported earnings for non-tip reporting and tip-reporting jobs. Restaurant jobs with reported tips have average reported earnings of nearly $9,000 annually, just over half of which is earned in tips. Jobs

[11] We use propensity-score weighting to adjust for nonrandom missing revenue. See Appendix A for details.

with no reported tipped earn slightly less, about $8,300. For context, a full-time, full-year worker who is paid an hourly rate equal to the federal minimum wage would have earned a total of about $15,000 in 2018. If she reported tips exactly equal to the federal tip credit, her reported tip earnings would be approximately $10,500 of this amount. However, many of the jobs in this sample are neither full-time nor full-year; a large share of workers in our sample have one or more additional jobs in the same year.

The solid blue line in Figure 3 shows a steady increase in the share of jobs that report at least some tips to the IRS, from about 46% to about 51%, over the period 2005–2010. After 2010, the share stabilizes at between 50% and 51%. The dashed black line shows the share of jobs with some reported tips, but restricts the sample to jobs at restaurants where at least one worker reported tips. The pattern is the same in both cases, but the dashed line is shifted up by a few percentage points, and – because the share of restaurants with reported tips increases over the sample period – the two lines converge by a couple of percentage points by 2018.

4 Minimum-Wage Incentives for Tip Reporting

4.1 Incentive Structure and Identification

In most U.S. states, minimum-wage policy codified in the FLSA creates incentives for tip reporting. During the period we study, workers in tipped jobs in 43 states and the District of Columbia were subject to lower, subminimum, wages, if they earned at least $30 a month in tips. The difference between the standard minimum wage and the tipped-subminimum wage is called the "tip credit"; it is a credit from the point of view of employers. Employers are required to ensure that tipped workers' wages and tips sum to at least the full minimum wage. In many cases, the tip credit is substantial: In 19 states and the District of Columbia, the tip credit in 2018 exceeded 70% of the minimum wage. In these states, the hourly subminimum wage for tipped workers is $2.13/hour; if a worker earning this subminimum

reports less than $5.12/hour in tips, the employer is required to make up the difference (to reach the federal minimum wage of $7.25). The two-tier minimum-wage system creates an incentive for many employers to ensure that workers report as much as possible in tips up to the tip credit.[12]

In many states, the very smallest businesses are exempt from minimum-wage laws. The FLSA, which specifies the federal minimum and subminimum wages and some worker rights, exempts enterprises that have annual gross volume of sales of $500,000 or less and those with only one employee. However, workers handling credit-card transactions are deemed to be engaged in interstate commerce, which is covered under FLSA (U.S. Department of Labor, Wage and Hour Division, 2009, 2016). Consequently, the tip-reporting incentives for small restaurants are less clear than for larger ones, with FLSA coverage possibly varying by employee.

Seven states had no tip credit throughout the period we study: Alaska, California, Minnesota, Montana, Nevada, Oregon, and Washington. In states with a tip credit, the tip credit over our sample period ranges from 3.4% of the minimum wage (in Hawaii in 2007–2016) to 76.3% of the minimum wage (in Nebraska in 2016–2018). In states in which the federal minimum wages are binding, the tip credit ranges from 58.6% (until July 23, 2007) to 70.6% (starting July 24, 2009).[13] In some of the exercises that follow, we contrast tip reporting from jobs in these states to tip reporting in states subject to the federal tip credit, which is very high. The federal tip credit applied continuously from 2005 through 2018 in 12 states.[14] Two additional states, Nebraska and South Dakota, used the federal tip credit continuously from 2005 through 2010 but diverged from it during the second part of the

[12]This is somewhat reminiscent of incentives to report self-employment income to meet Earned Income Tax Credit (EITC) income thresholds (Saez, 2010; Imboden, Voorheis, and Weber, 2023). Unlike self-employment income, tip income is reported to the employer on a flow basis (see Internal Revenue Service, undated a). For this reason, we do not believe EITC thresholds are an important incentive for tip reporting.

[13]The federal tip credit was 63.6% of the minimum wage from July 24, 2007 to July 23, 2008, and 67.5% from July 24, 2008 to July 23, 2009.

[14]These states are Alabama, Georgia, Indiana, Kansas, Louisiana, Mississippi, South Carolina, Tennessee, Texas, Utah, Virginia, and Wyoming.

sample period. Two other states, Kentucky and North Carolina, diverged from the federal tip credit at some point in the early part of the sample but adhered to the federal tip credit continuously from 2011–2018. Thus, our comparison set in the early part of the sample is slightly different from the later part.

Despite their very different minimum-wage laws, there is no evidence that patrons behave differently in states with and without a tip credit. Data released in 2014 by the payment service Square on state-level average tip rates showed an average tip rate of 16.4% for transactions with tips in the seven states that had no tip credit, and 16.3% on average in the 17 states that used the federal minimum wage that year. In addition, although travel and etiquette guides highlight differences in tipping norms between the U.S. and European countries, they do not single out states without a tip credit to suggest that patrons tip less there (Azar, 2020).

Next, we examine how differences in minimum-wage rules affect incentives to report tips, both by workers and by the restaurants that employ them.

4.2 Job-Level Tip Reporting

We begin by comparing the share of jobs with reported tips on their Form W-2 in states with a large tip credit and those in states without any tip credit. We compare jobs in states without a tip credit to those in states with the federal tip credit because the federal credit is close to the maximal level. Many more states had a tipped-submininum wage above the federal level than had a minimum wage above the federal level. Consequently, few states have a higher difference between their minimum wages (i.e., a larger tip credit) than the federal level.

In the first column of Table 3 we compare the share of jobs with reported tips in the 14 states with continuously binding federal minimum wages to the share reporting tips in the seven states with no tip credit, where all jobs were paid at least the state minimum wage, for the period 2005–2010. In states with no tip credit, 43% of jobs reported earning tips,

compared to almost 47% in states with a federal tip credit. This difference is consistent with the tip credit creating reporting incentives for workers, although it could also be explained by differences in occupational distributions across minimum-wage regimes.

The second column shows a similar calculation for the second part of the time series, 2011–2018, after the establishment of third-party reporting of credit-card transactions to the IRS. During this period, the federal tip credit was fixed at 70.6% and applied in 14 states. The share of jobs with reported tips in these two types of states is almost identical: 49.3% in states without a tip credit, and 49.5% in states with the federal tip credit.

The pattern suggests that the tip-credit incentive may have weakened over time, and is consistent with the pattern observed in Figure 3, which shows that the share of jobs with reported tips stablized after 2010. This weakening incentive may be due to increased card transactions and third-party reporting on Form 1099-K starting in 2011.

Next, we examine the *amount* of tips reported by workers. If a worker in a job with a two-tier minimum wage reports tips exactly equal to the applicable tip credit in every hour of every shift throughout the year, her ratio of tips to total earnings equals the ratio of the tip credit to the minimum wage:

$$\frac{\text{tips}}{\text{wages} + \text{tips}} = \frac{\text{tip credit}}{\text{minimum wage}}$$

To examine reporting incentives, we normalize the tip share of earnings by the tip-credit ratio:

$$\frac{\left(\frac{\text{tips}}{\text{wages+tips}}\right)}{\left(\frac{\text{tip credit}}{\text{minimum wage}}\right)}$$

This normalization allows us to pool jobs in states subject to the federal tip credit with jobs in other states with a tip credit; restaurants in approximately half of all U.S. states are subject to tip-credit ratios that are lower than the federal ratio due to higher state subminimum wages.

Figure 4 shows the distribution of the normalized tips-to-earnings ratio for jobs with

reported tips in all states with a tip credit.[15] The bunching of the normalized tips-to-earnings ratio at 1 is consistent with many workers employed in these jobs misreporting their tips to their employer and the IRS. A disproportionate share of jobs report exactly enough tips to cover the tip credit: in both periods, approximately 12% of observations lie between 0.95 and 1.05. Moreover, there is no evidence that the share of observations close to 1 is reduced over time.

In summary, at the job level, we find that the share of workers reporting tips responds to the tip-credit incentive only in the early part of the sample, but the dollar amount of tips reported continues to respond to the tip-credit incentive in the second part of the sample.

4.3 Restaurant-Level Tip Reporting

For the purposes of tip reporting, restaurants are aggregations of jobs, so it is not surprising that the tip-credit incentive affects restaurant-level tip reporting as well as job-level reporting.

The first row of Table 4 shows the fraction of restaurants that report tips: first, for all states by time period (2005–2010 and 2011–2018) and next, for the second part of the sample, in states with no tip credit vs. states with the federal tip credit. As in the case of workers, the share reporting tips increases over time. Focusing on the second part of the sample, the share reporting tips is 6pp higher in states with a tip-credit incentive.

The first row of Table 5 shows the same breakdown, but for the *amount* of tips reported, normalized by restaurant revenue.[16] The same pattern emerges: the ratio of tips to revenue is higher in the later part of the sample, and highest at restaurants located in states with the federal tip credit. However, even in those restaurants in the period 2011–2018, the mean ratio of tips to revenue is under 10% – well below conventional tipping rates.

[15] We show the distribution using a kernel density because Census Bureau disclosure-avoidance rules prohibit us from displaying a histogram.

[16] We use propensity-score weighting to adjust for nonrandom missing revenue. See Appendix A for details.

The 1938 FLSA did not include any specific provisions about tips, but subsequent court cases allowed tips to be used to fulfill part of an employer's minimum-wage obligation. A 1966 amendment to the FLSA codified the use of tips to meet part of employer minimum-wage obligations (Eisenberg and Williams, 2015; Meyer, 2017). Although the FSLA tip credit was not intended to impact tip reporting, we find that it creates reporting incentives for both workers and restaurants. For restaurants, the presence of a tip credit increases the value of tips the restaurant reports, collectively across all workers. For workers in states with a tip credit, the tip credit also induces a kink in reported tip income, leading workers in those states to bunch their reporting at precisely the amount needed to cover the tip credit.

5 Revenue-Share Incentive for Tip Reporting

5.1 Incentive Structure and Identification

Restaurants also face a tip-reporting threshold. A provision in the Tax Equity and Fiscal Responsibility Act (TEFRA) of 1982 requires restaurants report tips equal to at least 8% of revenue or face penalties (Robertson, Quinn, and Carr, 2006; Newman, 1988). An analysis of tax reports for 600 restaurants firms by the U.S. General Accounting Office found that these firms doubled their reporting of tips following the implementation of this revenue-share rule (U.S. General Accounting Office, 1986, p. 25).

This 8% revenue-share rule only applies to restaurants with at least ten employees, collectively working a total of at least 80 hours, on a typical business day, and where tipping is customary (Internal Revenue Service, undated b). Because we cannot observe how many workers a restaurant has on a typical business day, we proxy for the applicability of this law using the number of employees with a Form W-2 from the restaurant. Specifically, we use a threshold of 20 employees: if a restaurant has fewer than 20 employees in a calendar year, it is likely to have fewer than 10 employees on a typical business day.

5.2 Restaurant-Level Tip Reporting

Rows 2 and 3 of Table 4 compare the share of small and large SU FS restaurants that report tips. Only slightly more than half of restaurants with fewer than 20 Form W-2 employees report any tips. This fraction is slightly higher in the later period than in the early period (57% vs. 53%) and, cross-sectionally in the later part of the sample, it is slightly higher for restaurants in states with a federal tip credit than in states with no tip credit (57% vs. 51%). In contrast, approximately 90% of restaurants with 20 or more Form W-2 employees report tips; this fraction also varies in the predictable way by period and state minimum-wage incentives. The differences between small and large restaurants are dramatically greater than the differences over time and by state minimum-wage regime.

Table 5 shows means of tips/revenue for the same subsamples, and shows very similar patterns: conditional on reporting tips, reported tips at small restaurants average 6–7% of revenue, and 9–11% at large restaurants. The differences of 3–4pp between small and large restaurants exceed the differences of 1–2pp within a size class, by time period or state miminum-wage regime.

To examine the salience of the 8% threshold specified by law, Figure 5 shows the distribution of the ratio of tips to revenue by time period. *Ex ante*, the 8% threshold may be less salient than the FLSA tip-credit threshold because of the way tips are reported. Whereas the FLSA reporting threshold is relatively easy for workers to observe and meet – it is specified on an hourly basis, and they can tally up their hours to determine the reporting level required by shift or week – it is less obvious how their reporting could be tailored to meet an aggregate threshold that also depends on the restaurant's revenue, which they do not observe. The solid blue line in Figure 5 shows the distribution of the (tips/revenue) ratio using data from 2005–2010, and shows a small spike at 8%. The dashed black line in Figure 5 shows the distribution of (tips/revenue) after the implementation of the Housing and Economic Recovery Act (HERA) in 2011. Consistent with the Act's increased reporting incentives, the distribution shifts to the right and the mass point at 8% diminishes, consis-

tent with Table 5: reported tips grew faster than restaurant revenue between the two time periods. Because HERA also provided an incentive for restaurants to report more revenue, the shift represents a disproportionate increase in the reporting of tips, over and above the increased revenue reporting.

Because this rule only applies at large restaurants, Figure 6 repeats this exercise, using only the later time period, by restaurant size. Consistent with the results from Table 5, the mass of the distribution for small restaurants, represented by the solid blue line, is well below the vertical line at 8%, and the mass of the distribution for large restaurants is slightly above 8%. Neither set of restaurants bunches tips at 8% of revenue.

5.3 Interaction with Tip Credit

The salience of the 8% threshold may also vary with the tip credit.

Table 4 shows the share of restaurants reporting tips in twelve different bins. The first two columns show reporting shares by restaurants in the seven states without a tip credit, first for the early part of the sample (2005–2010) and then for the later part (2011–2018). In each column, we show the overall reporting share, as well as the share reporting tips among restaurants with fewer than 20 employees and the share reporting with 20 or more employees. The last two columns provide the same information for states with the federal tip credit. Note that the set of states differs slightly between the early and late parts of the sample (as does the federal tip credit).

Reporting rates increase for all categories in the later period: 68% of restaurants in states with no tip credit report tips, as do 74% of restaurants in states with the federal tip credit. The differences between small and large restaurants shrink slightly, as do differences across tip-credit regimes, but the general pattern remains: restaurants with more incentives to report tips are more likely to report tips.

In the later time period, only 68% of restaurants in the seven states with no tip credit, where reporting incentives are lower, reported tips. This compares with 74% of restaurants in

the 14 states with the federal tip credit, where the large tip credit creates a strong reporting incentive for restaurants. In both sets of states, restaurants with 20 or more employees are very likely to report tips, and small restaurants are much less likely to report tips. The difference between restaurants in the two sets of states are attenuated for large restaurants.

The incentives are strongest for large restaurants in states with a federal tip credit in the second part of the sample period: here, all three incentives – the tip credit, the IRS rule, and increased reporting transparency – all operate in the same direction. The lower-right cell in Table 4 shows that the reporting rate for these businesses is 91%.

Figure 7 shows the distribution of the ratio of tips to revenue for four sets of restaurant-year observations. The left panel shows restaurants with fewer than 20 employees. As noted above, these restaurants likely do not have the minimum employment for the IRS revenue-share rule to bind and are also less likely to receive Form 1099-Ks, so we do not expect to see a mass point at 8%, and in fact the vast majority of the mass is well below the 8% line, consistent with Table 5. For restaurants located in states without a tip credit, represented by the solid blue line, the incentive to report tips is particularly low, and the mass point is shifted even lower than for restaurants subject to the federal tip credit, represented by the dashed black line. The contrast between these two distributions suggests that even small restaurants, not all of which are subject to FLSA minimum wages (as discussed in Sections 2 and 4.1), seem responsive to the tip-credit incentive.

The right panel shows restaurants with 20 or more employees, for which the revenue-share rule is much more likely to apply. However, it may not bind: restaurants subject to the high federal tip credit may already be reporting sufficient tips to comply with the revenue-share rule because of FLSA incentives. Indeed, the dashed black line shows there is virtually no spike at 8% for these restaurants. In contrast, the IRS revenue-share rule is likely to be much more salient for large restaurants not subject to a tip credit, and the solid blue line shows that for this subset of restaurants, there is still a mass point around 8% even in the second part of the sample period. This mass point is obscured in the previous graphs

because it applies only to restaurants in a small number of states.

Unlike FLSA, the tip-reporting provision in TEFRA was specifically designed to increase tip reporting by restaurants (Connor and Dole, 1982), but TEFRA's impact on tip reporting is more complicated and subtle than the impact of FLSA. TEFRA induces behavior both on the extensive margin and on the intensive margin of tip reporting, but given limitations in a business's span of control, it is less likely to be able to report tips at the level that precisely meets compliance. Nevertheless, among businesses that are bound by TEFRA but no other reporting incentive, we do see some bunching of aggregate tips at the required threshold.

6 Concluding Remarks

The traditional framing of the relationship between tipping and incentives is that tips act as an incentive for workers to provide better service. In this paper, we explore a different side of tips and incentives: the incentives of workers and businesses to accurately report tips. Although responsiveness of income reporting to incentives has been observed in other settings (see, e.g., Saez, 2010; Imboden, Voorheis, and Weber, 2023), our paper is the first to document such a pattern in the reporting of tip income. Moreover, we document responsiveness to two different thresholds that operate at different levels: one at the job (or shift) level, and one at the employer level. We show that reported tip income is responsive to reporting incentives that vary by employer characteristics.

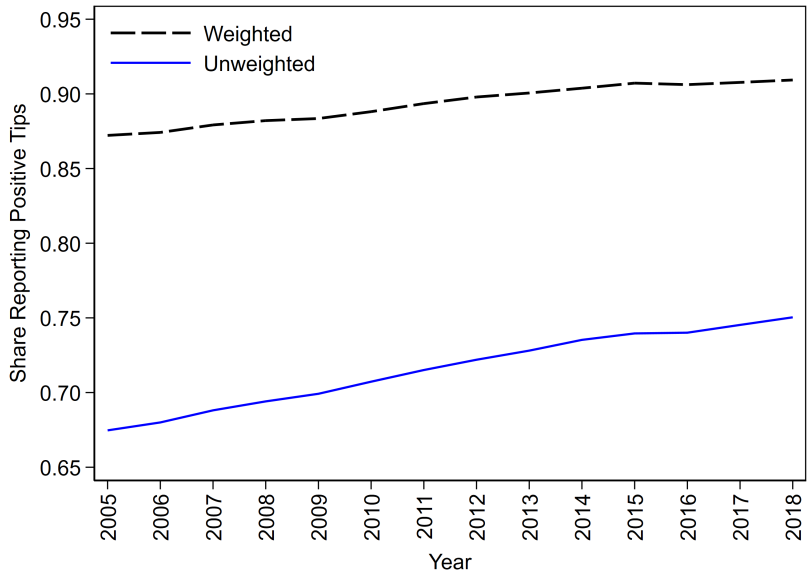
The FLSA tip credit plays a first-order role in inducing tip reporting. The FLSA tip credit is substantial, ranging from 58.6% in the beginning of our sample period to 70.6% by the end of the sample period. Because of its size, restaurants in states where the FLSA tip credit applies report substantially higher tips than restaurants in states with no tip credit. This finding holds for both small and large restaurants. For large restaurants in states with the federal tip credit, tip reporting due to the FLSA incentive is sufficiently high that the TEFRA 8% rule does not provide any additional reporting incentive. The TEFRA incentive

only operates on large restaurants not bound by the FLSA tip credit, serving as a substitute incentive in those cases.

Our findings imply that the same worker may report no tips when employed at a restaurant in Montana, where state law forbids tip credits, but report tips when employed at a restaurant across the state line in Wyoming, where the federal tip credit applies, even if her actual tip status is no different. Likewise, a worker at a small restaurant, which is not bound by the TEFRA 8% threshold, may report very little tip income but, if he moves to a larger restaurant in the same position and earns a similar amount in tips, he is likely to report much more of those tips.

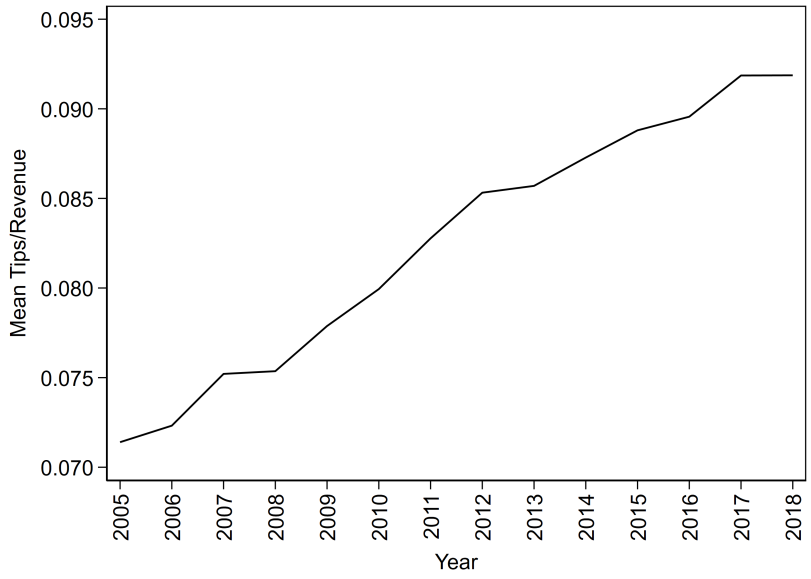
Our paper highlights the importance of understanding the provenance of a dataset and any associated measurement error and bias, especially if the data are used for policy evaluation. In our setting, because many workers only report enough tips to account for the tip credit, the incentive to report tip income to a tax authority may change with a policy change such as an increase in the minimum wage or the elimination of the tip credit. An increase in the (standard) minimum wage that leaves the tipped-subminimum wage unchanged effectively increases the tip credit and creates an incentive for workers to report more tips. A reduction in the tip credit would have the opposite impact. Extreme examples of the latter, in which tip credits have been eliminated entirely, have taken place in the past few years. In 2022, voters in Washington, DC, passed an initiative that will gradually eliminate the tip credit by 2027. In 2023, the Chicago City Council voted to eliminate the tip credit by 2028. (Voters in Massachusetts overwhelmingly rejected a similar proposal in 2024.) This change is likely to impact not only workers' earnings but also their incentives to report tip income, confounding the true impact and the reporting effect. The heterogeneity in firms' incentives to report tips due to TEFRA could further complicate any policy analysis of the impact of minimum-wage changes on workers' incomes.

Figure 1. Share of SU FS Restaurants Reporting Tips, 2005–2018



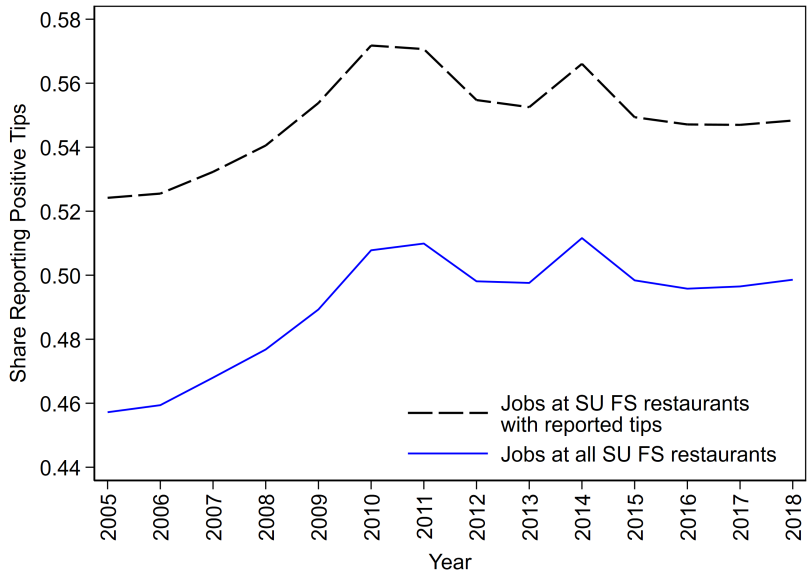
Notes: Authors' calculations from BR and Form W-2 files. Sample of 2,548,000 restaurant-years representing 428,000 unique restaurants. Weighted share uses W-2 employment.

Figure 2. Tips/Revenue at SU FS Restaurants with Reported Tips, 2005–2018



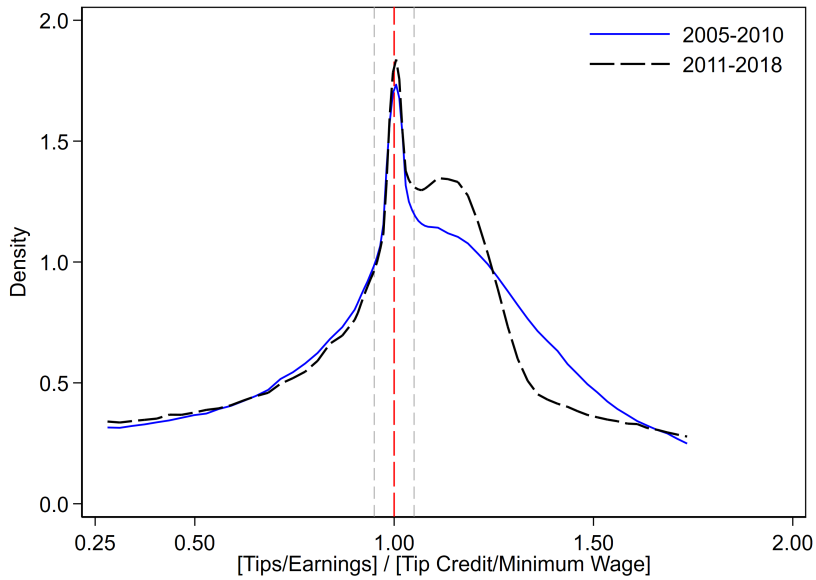
Notes: Authors' calculations from BR and LBD. Sample of 1,335,000 restaurant-years with tips and nonmissing revenue, representing 258,000 unique restaurants. Observations are weighted to adjust for nonrandom missing revenue (see Appendix A for details).

Figure 3. Share of Jobs with Reported Tips
at SU FS Restaurants, 2005–2018



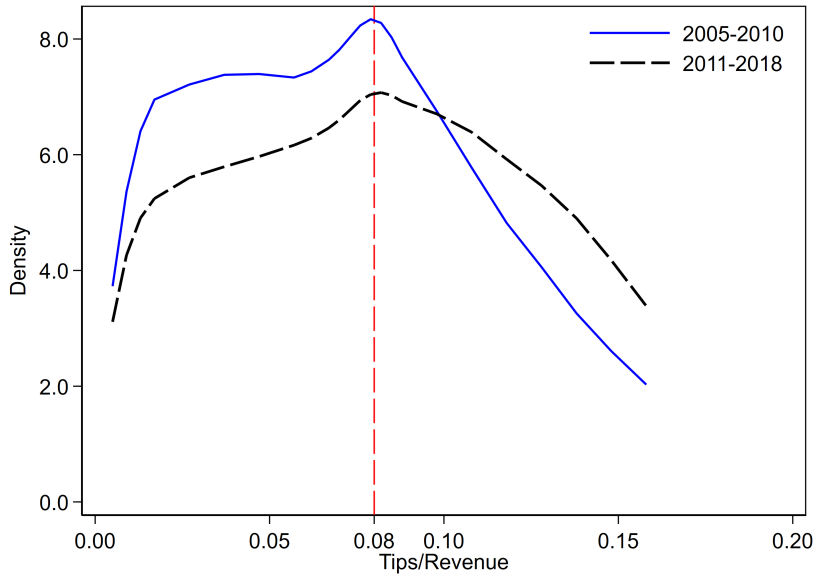
Notes: Authors' calculations from Form W-2. Sample of 68.2 million worker-job-years, representing 21.6 million unique workers.

Figure 4. Distribution of Reported [Tips/Earnings]/[Tip Credit/Minimum Wage] among Tipped Jobs at SU FS Restaurants Subject to a Tip Credit, 2005–2010 and 2011–2018



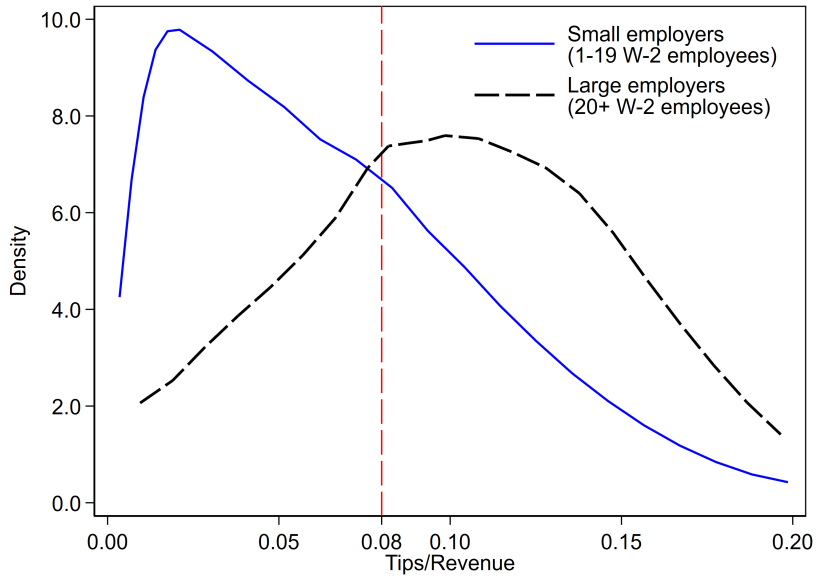
Notes: Authors' calculations from Form W-2 and state minimum wages. Sample of 23.7 million worker-job-years in states with a tip credit, representing 8.4 million unique workers. Tails removed to comply with Census Bureau disclosure-avoidance rules. Vertical lines at 0.95, 1.00, and 1.05.

Figure 5. Distribution of Reported Tips/Revenue at
SU FS Restaurants with Tips, 2005–2010 and 2011–2018



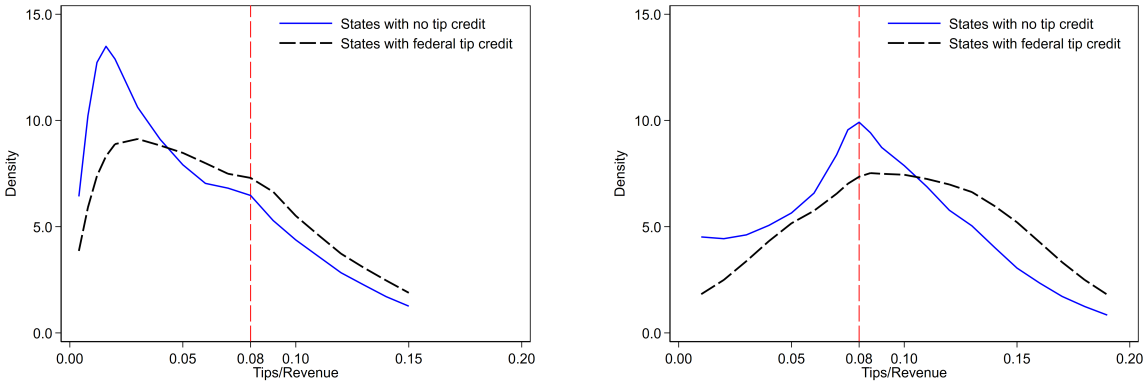
Notes: Authors' calculations from BR and LBD. Sample of 1,335,000 restaurant-years with tips and nonmissing revenue, representing 258,000 unique restaurants. Tails removed to comply with Census Bureau disclosure-avoidance rules. Vertical line at 0.08.

Figure 6. Distribution of Reported Tips/Revenue at
SU FS Restaurants with Tips, 2011–2018, by Restaurant Size



Notes: Authors' calculations from BR and LBD. Sample of 837,000 restaurant-years with tips and nonmissing revenue in 2011–2018, representing 197,000 unique restaurants. Tails removed to comply with Census Bureau disclosure-avoidance rules. Vertical line at 0.08.

Figure 7. Distribution of Reported Tips/Revenue at SU FS Restaurants with Tips, 2011–2018, by Restaurant Size and Tip-Credit Regime



(a) Small Employers (1–19 W-2 Employees)

(b) Large Employers (20+ W-2 Employees)

Notes: Authors' calculations from BR, LBD, and Form W-2. Sample of 372,000 restaurant-years with tips and nonmissing revenue in states with a federal tip credit or no tip credit in 2011–2018, representing 90,000 unique restaurants. Tails removed to comply with Census Bureau disclosure-avoidance rules. Vertical line at 0.08.

Table 1. Restaurant Size by Tip-Reporting Status, SU FS Restaurants, 2005–2018

	Reported Tips	No Reported Tips
March 12 Employment[a]	19.58	6.319
	(17.01)	(7.325)
Form W-2 Employment[b]	35.25	10.53
	(32.81)	(14.59)
Annual revenue[c,d]	953.1	379.5
	(890.4)	(449.3)
Annual payroll[d]	333.9	80.54
	(363.0)	(126.2)
Reported tips[d]	90.41	
	(115.8)	
Restaurants per year	131,000	51,000

Notes: Authors' calculations from BR, LBD, and Form W-2. Sample of 2,548,000 restaurant-years representing 428,000 unique restaurants. All variables are winsorized at the 99th percentile. Standard deviations in parentheses.

[a] Point-in-time count of workers in the pay period that includes March 12.

[b] Number of workers who worked in the restaurant at some point during the year and received a Form W-2.

[c] Weighted to adjust for nonrandom missing revenue (see Appendix A for details).

[d] Thousands of real 2018 dollars.

Table 2. Reported W-2 Earnings for SU FS Restaurant Jobs, 2005–2018

	Tipped Jobs	Non-Tipped Jobs
Reported earnings[a]	8,986	8,335
	(10,686)	(11,651)
Reported tips	4,727	
	(6,536)	

Notes: Authors' calculations from Form W-2. Sample of 68.2 million worker-job-years, representing 21.6 million unique workers, who have a SU FS restaurant Form W-2 and match to the Numident. Values are in real 2018 dollars and are winsorized at the 99th percentile. Standard deviations in parentheses. "Tipped jobs" are jobs with reported Form W-2 tips. "Non-tipped jobs" are jobs without tips reported on a Form W-2.

[a] For tipped jobs, reported earnings include reported tips

Table 3. Share of Jobs Reporting Tips by Tip-Credit Status and Time Period

	2005–2010	2011–2018
States with No Tip Credit[a]	43.1%	49.3%
States with Federal Tip Credit[b]	46.7%	49.5%

Notes: Authors' calculations from Form W-2 and BR. Sample of 30.2 million worker-job-years with tips, representing 10.4 million unique workers in states with federal or no tip credit.
[a] States with no tip credit are Alaska, California, Minnesota, Montana, Nevada, Oregon, and Washington.
[b] States in which the federal tip credit applied continuously in 2005–2010 are Alabama, Georgia, Indiana, Kansas, Louisiana, Mississippi, Nebraska, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, and Wyoming. States in which the federal tip credit applied continuously in 2011–2018 are Alabama, Georgia, Indiana, Kansas, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Utah, Virginia, and Wyoming. The federal tip credit ranged from approximately 58.6% until July 2007 to approximately 70.6% after July 2009.

Table 4. Share of Restaurants Reporting Tips
by Time Period, Restaurant Size, and State Tip-Credit Status

	All States		No Tip Credit[a]	Federal Tip Credit[b]
Size	2005–2010	2011–2018	2011–2018	2011–2018
All	0.6908	0.7348	0.6807	0.7422
Small[c]	0.5332	0.5695	0.5133	0.5727
Large[d]	0.8974	0.9203	0.8836	0.9111

Notes: Authors' calculations from BR and Form W-2. The unit of observation is a restaurant-year. Sample of 2,548,000 restaurant-years representing 428,000 unique restaurants.
[a] States with no tip credit are Alaska, California, Minnesota, Montana, Nevada, Oregon, and Washington.
[b] States in which the federal tip credit applied continuously in 2011–2018 are Alabama, Georgia, Indiana, Kansas, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Utah, Virginia, and Wyoming. The federal tip credit was approximately 70.6% throughout this period.
[c] 1–19 W-2 employees
[d] 20+ W-2 employees

Table 5. Tips/Revenue for Restaurants Reporting Tips by Time Period, Restaurant Size, and State Tip-Credit Status

	All States		No Tip Credit[a]	Federal Tip Credit[b]
Size	2005–2010	2011–2018	2011–2018	2011–2018
All	0.0819	0.0941	0.0776	0.0944
Small[c]	0.0658	0.0713	0.0601	0.0727
Large[d]	0.0950	0.1101	0.0899	0.1080

Notes: Authors' calculations from BR and Form W-2. The unit of observation is a restaurant-year. Sample of 1,335,000 restaurant-years with tips and nonmissing revenue, representing 258,000 unique restaurants. All cells are weighted to adjust for nonrandom missing revenue (see Appendix A for details).

[a] States with no tip credit are Alaska, California, Minnesota, Montana, Nevada, Oregon, and Washington.

[b] States in which the federal tip credit applied continuously in 2011–2018 are Alabama, Georgia, Indiana, Kansas, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Texas, Utah, Virginia, and Wyoming. The federal tip credit was approximately 70.6% throughout this period.

[c] 1–19 W-2 employees; reported separately only for 2011–2018

[d] 20+ W-2 employees; reported separately only for 2011–2018

A Data Appendix

BR, LBD, and Form W-2

The BR is a list of all business establishments operating in the United States. The LBD tracks businesses across Employer Identification Number (EIN) changes over time; we make use of these longitudinal links whenever possible to mitigate the impact of re-organizations on our linking. For the purposes of this appendix, we refer to the two files as the BR/LBD.

We identify FS restaurants primarily using NAICS codes from the BR. These industry codes incorporate information shared with the Census Bureau by the IRS, SSA, and the Bureau of Labor Statistics but are not based exclusively on administrative data. They are edited by Census Bureau staff to account for responses to various Census Bureau annual surveys as well as the EC. All of these sources rely on businesses to describe their primary activity and are subject to reporting errors. Industry assignment is noisiest for SU firms, the majority of which are "non-mail" cases in the EC, meaning they do not receive any EC forms, so their data come entirely from administrative sources (Basker, 2021).

Given its hierarchical structure, a natural starting place to examine the accuracy of industry coding is at the two-digit level. For example, Cuffe, Bhattacharjee, Etudo, Smith, Basdeo, Burbank, and Roberts (2022) find that 80% of SU establishments have the same industry code in Census Bureau and SSA records, and 86% have the same codes in Census Bureau and BLS records, but they do not provide a breakdown specifically for restaurants. Oehlert (2023) use a sample of hand-validated IRS tax returns from 2012–2016 and report that among businesses that reported sector 72, "Accommodation and Food Services," on their tax forms, the sector was correct in 92% to 96% of cases, depending on the form used (Oehlert, 2023, Tables 13 and 17). In our paper, depending on the year, we rely on either the fourth or sixth digit of the industry code to distinguish between FS restaurants and other types of restaurant establishments (limited-service restaurants, bars, coffee shops, etc.). Elvery, Foster, Krizan, and Talan (2006) compare Census Bureau and BLS industry

codes and find that, for SU firms, the rate of agreement falls from 85% at the sector level to 67% at the six-digit level, but they do not provide a breakdown for specific sectors.

BR/LBD payroll, employment, and tips are primarily sourced from IRS Form 941. Businesses file this tax form quarterly to remit FICA payroll and income tax withheld from workers' earnings during the previous quarter and to pay the employer's share of the FICA tax. Payroll is the total amount of wages, tips, and other compensation paid to all employees during the quarter. Similarly, tips are the total amount of tips reported by all employees during the quarter. However, employment is reported at a point in time: workers who received wages, tips, or other compensation in the pay period that includes the 12th day of the third month of the quarter (March 12 (Q1), June 12 (Q2), September 12 (Q3), or December 12 (Q4)). For more information about the BR/LBD, see Chow, Fort, Goetz, Goldschlag, Lawrence, Perlman, Stinson, and White (2021).

BR/LBD revenue is primarily sourced from annual IRS business-income tax filings on Form 1120, Form 1065, Form 990, and Form 1040 Schedule C, depending on the business's legal form of organization. However, we cannot link all Form 941 tax filers to a revenue tax filing, likely because some firms use different tax identifiers on IRS payroll versus revenue forms: revenue information is only available for about 80% of businesses in the LBD (Haltiwanger, Jarmin, Kulick, and Miranda, 2017, p. 17). Unfortunately, revenue is not missing at random; it is much more likely to be missing for the very smallest of our SU FS restaurants. To address this issue, when we calculate average revenue per restaurant in Tables 1 and 5, we use propensity-score weights to adjust for the nonrandom pattern of data. Specifically, we first estimate a probit model predicting the availability of revenue information using the log number of Form W-2 workers, log annual payroll, indicators for establishment birth and death years, and calendar-year and state fixed effects; we use the inverse predicted probability to weight observations with non-missing revenue. Figures 5 and 7 are unweighted. For more information about revenue in the LBD, see Haltiwanger, Jarmin, Kulick, Miranda, Penciakova, and Tello-Trillo (2019) and Yeh and Macaluso (2023).

Form W-2 data are available by worker-job-year, where a job is defined as a match between a business and a person. These individual tax forms are filed by employers for all jobs for which income or FICA taxes are withheld, which includes virtually all restaurant jobs (see Internal Revenue Service, 2006b, 2019a). We drop a small number of workers whose identifiers are associated with more than 24 unique employers in a given year. The IRS requests that Form W-2 and Form 941 be filed using the same EIN so that IRS can ensure that the amounts match across the two forms (Internal Revenue Service, 2006b, 2019a). Because of this, we can match most individual Form W-2 records to BR/LBD restaurant records. However, there are cases in which we do not match the two sources. These could be the result of late or missing filings or change in EIN due to change in ownership. In our analysis of restaurant-level reporting, we treat any reporting of tips – whether on a Form W-2 for a worker at the business, or on a Form 941 for the business as a whole – as evidence that the business is reporting tips to the IRS.

IRS rules require workers to report tip income to their employers, which are then responsible for entering the information on the workers' Form W-2, and on Form 941 quarterly filings at the business level. Tips are reported separately on Form W-2 because they are treated differently from wage earnings for the purpose of FICA taxes.[17] Workers pay half of the payroll taxes on their tips and employers pay the other half but are allowed to take a credit against their income tax for payroll taxes on tips that contribute to workers earning more than $5.15 an hour (U.S. Department of Treasury, Office of Tax Analysis, 2016). Because of this employer rule, wages subject to FICA tax are reported in Box 3 (Social Security wages) and tips subject to FICA tax are reported in Box 7 (Social Security tips). In practice, Form W-2 data housed at the Census Bureau do not include tips reported to the IRS, so we infer tips by subtracting Form W-2 Box 3 income (Social Security wages) from total compensation, which includes Box 1 income (wages, tips, other compensation) and Box 12

[17]The federal payroll tax, often referred to as FICA based on the law that authorized it, funds the Social Security Old-Age, Survivor, and Disability Insurance (OASDI) program and Medicare.

income (deferred compensation, such as 401(k) and Health Savings Account contributions, and other compensation, such as moving expenses). This difference gives us the portion of total compensation not treated as Social Security wages and is a valid measure of tips for employees of restaurants as long as the worker's total earnings are less than the FICA taxable maximum, which varies by year. In 2018, the FICA maximum was $128,400, well above what most tipped employees earn from tips and wages combined.[18] We drop any worker-job-year observation if Box 3 income is at that year's FICA maximum to avoid over-imputing tips to non-tipped jobs. In addition, our method of calculating tips combines regular tips (Box 7) and allocated tips, which are required when a restaurant reports insufficient tips to meet its required revenue share (Box 8).[19] However, IRS tabulations for 2008–2018 show that allocated tips are well under 1% of total reported tips every year (Internal Revenue Service, 2017). This is consistent with our finding that most restaurants meet the 8% revenue-share threshold for tips if it applies to them, so allocating tips is generally not required.

Unemployment Insurance

One more source of information at the job level is the Longitudinal Employer-Household Dynamics (LEHD) data infrastructure, which captures state UI records. LEHD data include total earnings by worker-job-quarter. We use this information to refine minimum-wage assignments. Minimum wages sometimes change during a calendar year, as when the federal minimum wage increased in July of 2007, 2008, and 2009. Because many jobs in the restaurant industry last less than a full calendar year, we use LEHD information to more precisely identify the effective minimum wage at the job level for Figure 4.

Most Form W-2 jobs can be matched by EIN and person identifier to state UI records. In some cases, however, employers may use different tax identifiers for reporting employment

[18] For a history of FICA taxable maximum amounts see Social Security Administration (undated).

[19] As noted in Section 5.1, that threshold is typically 8%. However, restaurants may petition the IRS for a lower rate, which can be as low as 2% (Internal Revenue Service, 2006a). We do not know how often such petitions are made or granted.

to their state UI systems and for reporting to the IRS, in which case we are unable to match earnings records across sources.[20] Because LEHD includes Massachusetts only starting in 2010 (Hyatt, McEntarfer, McKinney, Tibbets, and Walton, 2014), we exclude restaurants in Massachusetts from the analysis in this paper. For jobs that do not match to LEHD, we use the mean value of the minimum wage faced by the business in a calendar year. For more information about the LEHD data infrastructure, see Abowd, Stephens, Vilhuber, Andersson, McKinney, Roemer, and Woodcock (2009) and Vilhuber (2018).

Minimum Wages

Minimum wages apply at the business level, meaning that it is the location (and sometimes the size and industry) of the business, not the state of residence of the worker, that determines the applicable minimum wage.

We use monthly minimum-wage data at the state and local level from 2005 to 2018. We deflate each monthly value using the all-items CPI, and then average by calendar year. Our starting point for the regular minimum wages is a monthly file from Basker and Khan (2016) with state-level minimum wages for the period 1993–2014. We extend the dataset by four years using the Department of Labor's (DOL) website (U.S. Department of Labor, Wage and Hour Division, undated a). Our starting point for the tipped, subminimum, wages is an annual file created by Jones (2016). We supplement this file using another DOL website to create monthly records (U.S. Department of Labor, Wage and Hour Division, undated c). (Even and Macpherson, 2014, construct a similar dataset ending in 2013.)

For both the minimum and subminimum wages, we supplement state-level files with information on city- and county-specific minimum-wage ordinances. In some cases these ordinances were repealed or litigated and annulled by the courts. We have done extensive

[20] Goldschlag, Jarmin, Lane, and Zolas (2021, Appendix IA.2) report that, across the universe of Form W-2 records in 2005–2014, an LEHD record is missing in approximately 20% of cases; conversely, Form W-2 is missing for approximately 10% of LEHD observations.

searches in city codes and news reports to compile the start and, when applicable, end dates of these higher minimum wages. In all, we have found approximately 45 localities that imposed a higher minimum wage than their states at some point during the sample period.

Some states and localities have different minimum wages for different types of jobs or businesses. For example, New York has different minimum wages for different industries and occupations; we use the minimum wage for food-service jobs in the restaurant industry. Connecticut has two different tipped-submininum wages: one for bartenders, and one for all other waitstaff. We use the waitstaff submininum wage for our tip-credit calculations. West Virginia instituted a lower minimum wage for employers with five or fewer employees, starting in July 2006, and Ohio instituted two different minimum wages, one for businesses with under $250,000 in revenues and one for those with more than $250,000 in annual revenue, in 2007; the revenue threshold has moved annually since then. In these and similar cases, we use information on employment and revenue from the BR/LBD to assign the relevant minimum wages to each restaurant.

Although Washington bans tip credits, Seattle instituted a different minimum wage for tipped jobs starting in 2015 in restaurants belonging to chains with up to 500 employees worldwide (Seattle Office of Labor Standards, 2019). These jobs must earn tips but there is no minimum level of tips for the jobs to be eligible for the lower minimum wage. In Hawaii, also starting in 2015, tipped employees must earn at least $7/hour in tips to be eligible for a $0.50–0.75 tip credit (Hawaii Department of Labor and Industrial Relations, 2014).[21] The District of Columbia passed a ballot initiative in 2022 that will eventually eliminate the tip credit (D.C. Law 24-281), and the Chicago City Council passed a similar measure in 2023 (Romeo, 2023).

Finally, whenever the federal minimum wage exceeds a state or locality's statutory minimum wage, or the state has no statutory minimum wage, the federal value applies.

[21] Because the Hawaii tip credit is not equal to the amount workers must earn in tips, we omit jobs in Hawaii from Figure 4.

References

Abowd, J. M., B. E. Stephens, L. Vilhuber, F. Andersson, K. L. McKinney, M. Roemer, and S. Woodcock (2009) "The LEHD Infrastructure Files and the Creation of the Quarterly Workforce Indicators," in *Producer Dynamics: New Evidence from Micro Data*, ed. by T. J. Dunne, J. B. Jensen, and M. J. Roberts, chap. 5, pp. 149–230. University of Chicago Press, Chicago, IL.

Ali, F., C. C. Olson, C. Pantzalis, J. C. Park, and J. C. Park (2023) "Large Sample Evidence on Tipping Rates in the Restaurant Industry: A Comprehensive Study," *International Journal of Hospitality Management*, 111, 103458.

Azar, O. H. (2020) "The Economics of Tipping," *Journal of Economic Perspectives*, 34(2), 215–236.

Basker, E. (2021) "An Evaluation of New Content on the 2017 Census of Retail Trade," Center for Economic Studies Technical Note 21-03 (confidential).

Basker, E., L. Foster, and M. Stinson (2024) "Tip of the Iceberg: Tipping and Tip Reporting at U.S. Restaurants, 2005–2018," Center for Economic Studies Working Paper 24-68.

Basker, E., and M. Khan (2016) "Does the Minimum Wage Bite into Fast-Food Prices?," *Journal of Labor Research*, 37(2), 129–148.

Bíró, A., D. Prinz, and L. Sándor (2022) "The Minimum Wage, Informal Pay, and Tax Enforcement," *Journal of Public Economics*, 215(104728).

Chow, M., T. C. Fort, C. Goetz, N. Goldschlag, J. Lawrence, E. Perlman, M. Stinson, and T. K. White (2021) "Redesigning the Longitudinal Business Database," Center for Economic Studies Working Paper 21-08.

Connor, J., and R. Dole (1982) "Inside Look at the 1982 Tax Law: An Interview with Senator Robert Dole," *Tempo*, 28(1), 38–40.

Cuffe, J., S. Bhattacharjee, U. Etudo, J. C. Smith, N. Basdeo, N. Burbank, and S. R. Roberts (2022) "Using Public Data to Generate Industrial Classification Codes," in *Big Data for Twenty-First Century Economic Statistics*, ed. by K. G. Abraham, R. S. Jarmin, B. C. Moyer, and M. D. Shapiro, chap. 8, pp. 229–246. University of Chicago Press.

Eisenberg, S. N., and J. T. Williams (2015) "Evolution of Wage Issues in the Restaurant Industry," *ABA Journal of Labor & Employment Law*, 30(33, Symposium: Fair Labor Standards Act), 389–408.

Elvery, J., L. Foster, C. Krizan, and D. Talan (2006) "Preliminary Micro Data Results from the Business List Comparison Project," in *Joint Statistical Meetings*.

Even, W. E., and D. A. Macpherson (2014) "The Effect of the Tipped Minimum Wage on Employees in the U.S. Restaurant Industry," *Southern Economic Journal*, 80(3), 633–655.

Executive Office of the President, Office of Management and Budget (2022) "North American Industry Classification System: United States, 2022," https://www.census.gov/naics/reference_files_tools/2022_NAICS_Manual.pdf, accessed November 30, 2023.

Federal Register (2021) "Tip Regulations Under the Fair Labor Standards Act (FLSA); Partial Withdrawal (Final Rule)," *Federal Register*, 86(183), 52973–52987, https://www.govinfo.gov/content/pkg/FR-2021-09-24/pdf/2021-19795.pdf, accessed November 11, 2023.

Federal Reserve Bank of Atlanta (2021) "Survey of Consumer Payment Choice," https://www.atlantafed.org/banking-and-payments/consumer-payments/survey-of-consumer-payment-choice, accessed September 3, 2024.

Feinmann, J., R. Hsu Rocha, and M. Lauletta (2024) "Payments Under the Table: Employer-Employee Collusion in Brazil," Unpublished paper.

Garin, A., E. Jackson, D. K. Koustas, and A. Miller (2023) "The Evolution of Platform Gig Work, 2012–2021," National Bureau of Economic Research Working Paper 31273.

Gavoille, N., and A. Zasova (2023) "What We Pay in the Shadows: Labor Tax Evasion, Minimum Wage Hike and Employment," *Journal of Public Economics*, 228(105027).

Gerdes, G. R., J. Hamburg, and X. M. Liu (2017) "The Federal Reserve Payments Study 2016: Recent Developments in Consumer and Business Payment Choices," https://www.federalreserve.gov/newsevents/pressreleases/files/2016-payments-study-recent-developments-20170630.pdf, accessed March 21, 2024.

Goldschlag, N., R. Jarmin, J. I. Lane, and N. Zolas (2021) "Research Experience as Human Capital in New Business Outcomes," in *Measuring and Accounting for Innovation in the 21st Century*, ed. by C. Corrado, J. Miranda, J. Haskel, and D. Sichel, chap. 6, pp. 229–254. University of Chicago Press, Chicago, IL.

Haltiwanger, J., R. S. Jarmin, R. Kulick, and J. Miranda (2017) "High-Growth Young Firms: Contribution to Job, Output, and Productivity Growth," in *Measuring Entrepreneurial Businesses: Current Knowledge and Challenges*, ed. by J. Haltiwanger, E. Hurst, J. Miranda, and A. Schoar, chap. 1, pp. 11–62. University of Chicago Press, Chicago, IL.

Haltiwanger, J., R. S. Jarmin, R. Kulick, J. Miranda, V. Penciakova, and C. Tello-Trillo (2019) "Firm-level Revenue Dataset," U.S. Census Bureau Center for Economic Studies Technical Note 19-02 (confidential).

Hawaii Department of Labor and Industrial Relations (2014) "Notice to Employees: Tip Credit under the Hawaii Wage and Hour Law," https://labor.hawaii.gov/wsd/files/2014/06/Tip-Credit-Notice-with-exhibits-June-2014.pdf, accessed September 26, 2021.

Hyatt, H., E. McEntarfer, K. McKinney, S. Tibbets, and D. Walton (2014) "Job-To-Job (J2J) Flows: New Labor Market Statistics from Linked Employer-Employee Data," Center for Economic Studies Working Paper 14-34.

Imboden, C., J. Voorheis, and C. Weber (2023) "Self-Employment Income Reporting on Surveys," Center for Economic Studies Working Paper 2023-19.

Internal Revenue Service (2006a) "2005 Instructions for Form 8027," https://www.irs.gov/pub/irs-prior/i8027--2005.pdf, accessed October 23, 2024.

——— (2006b) "2005 Instructions for Forms W-2 and W-3," https://www.irs.gov/pub/irs-prior/iw2w3--2005.pdf, accessed May 13, 2024.

——— (2013) "2011 Internal Revenue Service Instructions for Form 1099-K," https://www.irs.gov/pub/irs-prior/i1099k--2011.pdf, accessed October 23, 2024.

——— (2017) "Table 5.A. Summary of Items for Taxpayers with Form W-2, by Return and Earner Type," SOI Tax Stats—Individual Information Return Form W-2 Statistics, https://www.irs.gov/statistics/soi-tax-stats-individual-information-return-form-w2-statistics, accessed January 4, 2024.

——— (2019a) "2018 Instructions for Forms W-2 and W-3," https://www.irs.gov/pub/irs-prior/iw2w3--2018.pdf, accessed May 13, 2024.

——— (2019b) "2018 Internal Revenue Service Instructions for Form 1099-K," https://www.irs.gov/pub/irs-prior/i1099k--2018.pdf, accessed October 23, 2024.

——— (undated a) "Tip Recordkeeping and Reporting," https://www.irs.gov/businesses/small-businesses-self-employed/tip-recordkeeping-and-reporting, accessed September 3, 2024.

——— (undated b) "Topic no. 761, Tips: Withholding and Reporting," https://www.irs.gov/taxtopics/tc761, accessed July 31, 2024.

Jones, M. R. (2016) "Measuring the Effects of the Tipped Minimum Wage Using W-2 Data," Center for Administrative Records Research and Applications Working Paper 2016-03.

Meyer, B. (2017) "Mrs. Orville Isn't Trying to Steal Tips: An FLSA Story," *University of Chicago Law Review*, 86(4), 1971–2016.

Newman, J. S. (1988) "Waiter, There's an IRS Agent in My Soup," *Tax Notes*, 40(8), 861–696.

Oehlert, C. (2023) "Accuracy and Errors in Self-Assigned NAICS Codes in Tax Return Data," *Statistical Journal of the IAOS*, 39(3), 679–697.

Robertson, J., T. Quinn, and R. C. Carr (2006) "Unreported Tip Income: A Taxing Issue," *The CPA Journal*, 76(2), 30–39.

Romeo, P. (2023) "Chicago Votes to Kill the Tip Credit," *Restaurant Business Online*, October 6, https://www.restaurantbusinessonline.com/workforce/chicago-votes-kill-tip-credit, accessed October 11, 2023.

Saez, E. (2010) "Do Taxpayers Bunch at Kink Points?," *American Economic Journal: Economic Policy*, 2(3), 180–212.

Seattle Office of Labor Standards (2019) "Seattle's Minimum Wage," http://www.seattle.gov/Documents/Departments/LaborStandards/OLS-MW-multiyearChart2019FINAL10118(1).pdf, accessed March 25, 2021.

Social Security Administration (undated) "Contribution and Benefit Base," https://www.ssa.gov/oact/cola/cbb.html, accessed April 30, 2024.

TD Ameritrade (2020) "Financial Etiquette Survey: Exploring Americans' Attitudes on Tipping and Splitting Restaurant Bills," https://s2.q4cdn.com/437609071/files/doc_news/research/2020/financial-etiquette-survey.pdf, archived on the Wayback Machine (https://web.archive.org/) October 27, 2020 and accessed March 23, 2024.

U.S. Census Bureau (2017) "Economic Census: Selected Sectors: Single Unit and Multiunit Firms for the U.S.: 2017," https://data.census.gov/table/ECNSIZE2017.EC1700SIZESUMU?text=7225&g=010XX00US&y=2017&n=722511, accessed November 11, 2023.

U.S. Department of Agriculture, Economic Research Service (2016) "FoodAPS National Household Food Acquisition and Purchase Survey," https://www.ers.usda.gov/foodaps, accessed August 24, 2023.

U.S. Department of Labor, Wage and Hour Division (2009) "Fact Sheet #14: Coverage Under the Fair Labor Standards Act (FLSA)," https://www.dol.gov/agencies/whd/fact-sheets/14-flsa-coverage, accessed April 24, 2023.

——— (2016) "Fact Sheet #2: Restaurants and Fast Food Establishments Under the Fair Labor Standards Act (FLSA)," https://www.dol.gov/agencies/whd/fact-sheets/2-flsa-restaurants, accessed April 24, 2023.

——— (undated a) "Changes in Basic Minimum Wages in Non-Farm Employment Under State Law: Selected Years 1968 to 2024," https://www.dol.gov/agencies/whd/state/minimum-wage/history, accessed March 11, 2021.

——— (undated b) "Fact Sheet #15: Tipped Employees Under the Fair Labor Standards Act (FLSA)," https://www.dol.gov/agencies/whd/fact-sheets/15-tipped-employees-flsa, accessed April 30, 2023.

——— (undated c) "Minimum Wages for Tipped Employees: Historical Tables," https://www.dol.gov/agencies/whd/state/minimum-wage/tipped/History, accessed March 11, 2021.

U.S. Department of Treasury, Office of Tax Analysis (2016) "Federal Insurance Contributions Act (FICA) Tip Credit," Special Studies in Tax Analysis, https://home.treasury.gov/system/files/131/FICA-Tip-Credit.pdf, accessed February 2, 2024.

U.S. General Accounting Office (1986) "Tax Administration: Tip Income Reporting Can Be Increased," Report GAO/GGD-86-119, https://www.gao.gov/assets/ggd-86-119.pdf, accessed April 23, 2024.

Vermont Agency of Administration, Department of Taxes (2017) "New Law Lowers Reporting Threshold for 1099-K Information Reporting," https://tax.vermont.gov/news/1099-k-information-reporting, accessed October 23, 2024.

Vilhuber, L. (2018) "LEHD Infrastructure S2014 files in the FSRDC," Center for Economic Studies Working Paper 18-27.

Yeh, C., and C. Macaluso (2023) "Understanding and Improving the Firm-Level Revenue Measures from the Business Register (BR) Files," Center for Economic Studies Technical Note 23-03 (confidential).