Measuring the Effects of the Tipped Minimum Wage Using W-2 Data

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Abstract

While an extensive literature exists on the effects of federal and state minimum wages, the minimum wage received by tipped workers has received less attention. Researchers have found it difficult to capture the hourly wages of tipped workers and thus assess the economic effects of the tipped minimum wage. In this paper, I present a new measure of hourly wages for tipped servers (waitstaff and bartenders) using linked W-2 and survey data. I estimate the effect of tipped minimum wages on the wages and hourly tips of servers, as well as server employment and hours worked. I find that higher mandatory tipped minimum wages increase that portion of wages paid by employers, but decrease tip income by a similar percentage. I also find evidence that employment increases over lower values of the tipped minimum wage and then decreases at higher values. These results are consistent with a monopsony model of server employment. The wide variance of tipped minimum wages compared to non-tipped minimums provide insight into monopsony effects that may not be discernible over a smaller range of minimum wage values.

Keywords: Minimum wages, restaurant industry, monopsony

JEL classification: J21, J23, J30, J31, J38

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[*]The views expressed in this paper are those of the author and do not necessarily represent the views of the U.S. Census Bureau.

1 Introduction

While the effects of the minimum wage on the wages and employment of low-income workers have received a great deal of attention in the economics literature,[1] the effects of tipped minimum wages have received little attention. This gap in the literature is likely due to the lack of quality data that includes separate wage and tip information on tipped occupations. Although a source of such data exists in the Current Population Survey Outgoing Rotation Group, these data have issues with errors in reporting that are especially extreme for the hourly wage (Moore et al., 2000; Rodgers et al., 1993).

In the absence of good survey-based hourly data, researchers have relied on establishment-level data such as the Quarterly Census of Employment and Wages (Even and Macpherson, 2014) or the Census of Retail Trade (Wessels, 1997) to study the effect of the tipped minimum wage on wages and employment. However, these data have several drawbacks: they do not isolate tipped workers from non-tipped workers within an industry; they do not record hours, allowing for the calculation of an hourly wage equivalent to compare against the tipped minimum wage; and they do not allow the separate analysis of tips versus employer-paid wage.

In this paper, I overcome the problems of survey- and establishment-level data by using a unique data set—linked administrative and survey records that permit the calculation of an hourly wage for both employer-paid wages and tips for tipped servers in the restaurant industry. Using W-2 data from the Internal Revenue Service (IRS) linked with Current Population Survey Annual Social and Economic Supplement (CPS ASEC) data for 2005–2011, I create wage equivalents that capture hourly wages paid by employers (and thus subject to tipped minimum wages) and hourly tips. I discuss the pros and cons of these new measures and then examine the effects of tipped minimum wages on hourly wages, hourly tips, server employment, and hours worked per year, using the

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[1]Brown (1999) provides a thorough overview of minimum wage research up to the late 1990s; Neumark and Wascher (2006) gives an overview of the "new minimum wage research" since that time.

variation in tipped minimum wages in states over time as an identification strategy.

The tipped minimum wage presents interesting economic questions that may have far-reaching consequences, both with respect to its effect on tipped employees and what it can tell us about minimum wages in general. Recently, advocates have made more urgent calls to raise the federal tipped minimum wage, which, at $2.13 per hour, has not seen an increase since 1996.[2] Discussions of minimum wage increases are always contentious, and the importance of good data and analysis on the topic cannot be overstated. This is especially true at present because of the number of tipped employees in the workforce. Fully 2.2 million workers were employed in service industries in 2013, representing three-fifths of all workers earning at or less than the federal minimum wage. Moreover, the recent economic recovery has seen a disproportionate growth in the food and beverage sector, with the "food services and drinking places industry [accounting] for almost 1 out of every 6 nonfarm jobs added during the recovery," according to the Bureau of Labor Statistics.[3] The expectation is that an even larger proportion of workers will be covered by tipped minimum wages in future years.

Analyses of the tipped minimum wage also provide important information on the response to minimum wage increases in general. Unlike state minimum wages, which tend to be close in value to the federal minimum wage and to one another, tipped minimum wages vary from a few cents above the federal tipped minimum to more than four times that amount. This variation provides a researcher with the opportunity to examine whether the employment response to a minimum wage may differ, or even change direction, according to the size of the increase. Thus a contribution of this study is that the wide range of tipped minimum wages can be used to test a key result of the monopsony theory of minimum wages—that employment first increases and then decreases as the wage floor rises.[4]

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[2] Much of the focus at the moment is due to a bill being considered in the House of Representatives: http://democrats.edworkforce.house.gov/issue/fair-minimum-wage-act.

[3] http://www.bls.gov/iag/tgs/iag722.htm

[4] An example of how a tipped minimum wage analysis may inform the debate is Alan Krueger's con-

The wage floors that apply to tipped and non-tipped workers are often very different from one another on a state-by-state basis. The wage that is paid to a tipped server directly by his or her employer is usually much less than the employer must pay to a cook or dishwasher (at the federal level, $2.13 versus $7.25 as of 2015). Moreover, while there is some correlation between state minimum wages and tipped minimum wages (in fact, 20 states index their tipped minimums to the standard minimum), the difference between the two is often quite large. For example, in Massachusetts the non-tipped minimum wage was $8 and the tipped minimum wage was $2.63 for 2011. The requirements that distinguish a tipped employee from a non-tipped employee are outlined in federal code, which further distinguishes the application of the tipped minimum wage as separate from the non-tipped minimum wage. In other words, these wage floors represent two distinct regimes that can be analyzed separately, with the results being generalizable from one regime to the other.

In this work, I find that hourly wages paid by employers increased as tipped minimums increased, with an elasticity of 0.5 to 0.7, and that hourly tips decreased by a similar amount. I find a small negative effect on hours worked per year that is not statistically significant in some specifications. I also find some evidence that employment of servers increases between the lowest (federal) value of the tipped minimum wage up to approximately $4.50 per hour, at which point it levels out and then begins decreasing. Overall, these results are consistent with a model of server employment in which restaurant owners have monopsony power.

My results contribute to the literature on tipped minimum wages specifically, and minimum wages in general, in several ways. First, my measures are precise enough to show how changes in wages and tips may cancel one another out, leaving a researcher using a total wage measure to find no effect (which is consistent with some previous re-

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tention that a $12 minimum wage should do more good than harm, but a $15 minimum wage would put the U.S. into "uncharted waters." Getting a handle on "how much is too much" seems like an important question. http://www.nytimes.com/2015/10/11/opinion/sunday/the-minimum-wage-how-much-is-too-much.html?_r=0.

search). Second, the wide range of tipped minimums allow an examination of a monopsony effect, where employment first increases and then decreases—an effect that is difficult to estimate using the small variations of state non-tipped minimum wages. This information is useful for the setting of regular, non-tipped minimum wages if we suspect (as is often the case) that occupations covered by the minimum wage are in industries with monopsony power.[5] Finally, while the results show that servers do not ultimately make more in total hourly wage, for most of the range of the tipped minimum they benefit from higher employment levels.

The paper proceeds as follows: Section 2 provides background on the tip credit and an overview of the relevant literature. Section 3 describes the data, with particular emphasis on how W-2 data is generated and the reporting requirements of employers and servers, with some evidence on the quality of the data. Section 4 provides some information on the monopsony theory of server employment and the tipped minimum wage, and gives the empirical specification used in the analysis. Section 5 presents the results. Section 6 provides a few robustness checks, and Section 7 concludes.

2 Background

2.1 Tip credit policies

The Fair Labor Standards Act of 1938 established the minimum wage "tip credit" for employers whose workers generally receive a substantial proportion of their income in tips. Originally, the credit was set in such a way that it made up no more than 50 percent of the standard hourly minimum wage. In 1996, an amendment to the law decoupled

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[5]Robinson (1933) first used the term "monopsony" to describe the situation of a single buyer of labor with many sellers. Manning (2003) argues that monopsony power in the labor market is widespread due to labor market frictions, and that labor economics as a discipline often fails to take monopsony power into account. Other work examining monopsony power in general and in specific labor market sectors include Hirsch and Schumacher (1995); Merrifield (1999); Bhaskar et al. (2002); Ashenfelter et al. (2010); Hirsch et al. (2010); Ransom and Sims (2010); Matsudaira (2014).

the tipped minimum from the standard minimum, and since that time the federal tipped minimum wage has remained at $2.13 per hour.[6] This rate reflects the standard, non-tipped minimum wage in place in 1996 ($4.25 per hour). Thus, as the federal standard minimum wage has increased to $7.25 over time, so has the allowable federal tip credit, which has increased to $5.12 per hour (Robinson, 2011).

States have responded to the lack of federal changes in the tipped minimum wage by altering the tip credit. At the extreme end, seven states (as of 2015) have eliminated the tip credit entirely, requiring employers to pay the standard federal or state minimum wage to employees regardless of whether they also receive tips. Tip credits in other states range from very close to the federal tip credit (Delaware) to an almost zero tip credit (Hawaii).[7] Figure 1 shows maps of the U.S. in 2005 and 2011, displaying the variation in tipped minimum wages and how they changed over the time period. The categories shown in the maps are the federal tipped minimum ($2.13), and two, three, and (for 2011) four times that amount. Compared with standard state minimum wages, which ranged from $7.25 to $8.75 in 2015, tipped minimums have a wider variation. Between 2005 and 2011, there were 85 separate state changes to tipped minimums, with enough variation in the measure over time and place to identify an effect.

The regulations regarding the tip credit are outlined in the federal code. To apply the credit to an employee's hourly wage, the employee must regularly receive more than $30 in tips in a month, must be informed of the credit and how it is applied, and must be permitted to retain all of the tips unless there is an appropriate tip-pooling arrangement.[8] Federal regulations also require careful recording of tipped and non-tipped work by an individual employee.[9] Both employers and employees have the responsibility to

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[6]The Fair Labor Standards Act of 1938, as amended 29 U.S.C. 201, et seq.

[7]Allegretto (2013) provides an overview of the tipped minimum wage compared with the standard minimum wage.

[8]Tip-pooling regulations vary slightly by state, but generally allow employers to require tipped employees to contribute a certain percentage of their tips into a pool, as long as the contributed amount does not lower an employee's hourly wage to less than the minimum wage. No portion of pooled tips may go to the employer or to employees who generally don't receive tips (e.g., cooks and dishwashers).

[9]This is to keep employers from assigning duties to tipped employees that would otherwise be per-

record tip income for tax purposes. This includes recordkeeping through point-of-sale (POS) systems that can keep track of tips written on credit card slips, as well as tip logs showing the cash tips received during a shift. Historically, the Internal Revenue Service (IRS) has pursued legal action against restaurant owners in cases of income misreporting, as opposed to employees, because it is less costly to act against a single entity rather than multiple individuals (Peckron, 2002). Thus, employers have a strong incentive to accurately record the tips made by their employees.

The tax regulations regarding the recording of tips center on the payment of payroll taxes, for which tips are treated as regular wages. The record of the wages that are paid by an employer to a tipped employee are recorded separately on the W-2; the wages made in tips, and the payroll taxes paid on those tips, are then recorded in separate fields. All wages—from the employer and from tips—are then recorded in the familiar "Wages, Salary, and Tips" field of the W-2. The topic of W-2 tip reporting is discussed at length in section 3.

2.2   Literature review

There is an extensive literature on the impacts of minimum wages, but little research has been performed specifically on the tipped minimum wage. A likely reason for this gap in the literature is the absence of reliable data on tips. Research using administrative records linked with survey data has established that the reporting of hourly wages suffers from error (Moore et al., 2000; Rodgers et al., 1993). Yet it seems likely that most employees who are paid an hourly wage set by an employer know, more or less, what they receive per hour. The same cannot be said for tipped employees, whose hourly wage will vary depending on the tips received. Wait staff who work a shift on a slow day will make much less per hour than they will during a busy dinner shift. Wages will also be dependent on the season in many geographic areas. A typical server will likely have dif-

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formed by a non-tipped worker paid at the higher, standard minimum.

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ficulty calculating an average hourly rate of pay over a given period.

Brown (1999) provides a thorough overview of minimum wage research up to the late 1990s; Neumark and Wascher (2006) gives an overview of the "new minimum wage research" since that time. The general findings of early research pointed to a negative effect of minimum wages on employment, with later modeling that used state variation in minimum wages and difference-in-differences models showing either no effect or a small positive effect. The empirical findings of these later studies fit in with models of the labor market that depart from the competitive model, such as monopsony (Boal and Ransom, 1997). A monopsony model is particularly well suited to the situation of tipped workers since the wage is expressed as a function of the number of employees, with the supply curve of labor upward sloping. Lately, minimum wage research has focused on statistically controlling for spatial heterogeneity in panel data designs (see, for example, Dube et al. (2010)), although use of this method has been questioned (Neumark et al., 2014).

In terms of tipped wages, the earliest empirical work on the topic is Wessels (1993) (plus a slightly later paper, Wessels (1997)), who developed a monopsony model of restaurant employment and analyzed the Census of Retail Trade. Without more detailed information on employees, such as occupation or number of hours worked, Wessels used the service time per meal (restaurant employment divided by real restaurant sales) as the dependent variable. He acknowledges that investigating the tipped minimum wage using this measure is not ideal, as both tipped and non-tipped workers will be included in the numerator. Wessels found evidence for monopsony power in the restaurant service sector in that employment first rises and then falls as the tipped minimum wage increases.

Since Wessels's papers, there has been a small number of analyses that employed register or survey data to examine the effect of the tipped minimum wage. Anderson and Bodvarsson (2005) investigated Occupational Employment Statistics to discover

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whether sub-minimum wages have "bite," finding that servers in higher-wage states do not appear to see an increase in wage. Allegretto (2013) followed a strategy similar to Dube et al. (2010) to study the effects of the tipped minimum wage in the full-service restaurant industry, finding that wages and employment both increase as a response to a higher wage floor. This is in contrast to a similar paper by Even and Macpherson (2014), which estimated a positive earnings effect and a negative employment effect using the same data (the Quarterly Census of Earnings and Wages), albeit over a shorter time period.

There are key missing elements in each of these analyses. First is the inability to capture an hourly wage equivalent when using register data. In such cases, the researcher simply calculates an average weekly wage based on payroll divided by number of employees, a technique that does not take into account that hours worked by employees may change in response to wage floors. A specific problem occurs when using the QCEW, in that a researcher is unable to differentiate between tipped and non-tipped restaurant employees. Even and Macpherson (2014) supplement the analysis in their paper using the monthly CPS, but the results of this analysis are inconclusive, which may be a result of small sample sizes or the flawed earnings reporting in the data, or both. Register data also reflects the full wage, including tips, disallowing a separation of full hourly wage into its two parts: wage paid by the employer and tips. An employer's response to an increased minimum will affect hourly tip income in a manner that is ambiguous, since changes in price, hours of operation, and number of employees will affect each employee's tips. However, there should be an unambiguous increase in the hourly wage paid by an employer if the wages he paid previously were below the threshold. I am able to contribute to the existing literature by examining wages paid by employers separate from tip income through administrative records. By linking these records to survey data, I am also able to look exclusively at restaurant servers.

3 Data, Sample, and Descriptive Statistics

3.1 W-2 data

The main data source for information on wages and tips is the IRS W-2 administrative records from 2005 to 2011. The IRS directs employers with tipped employees to keep track of employees' wages and tips. Before the widespread use of POS systems to record this information in food service establishments, servers would, ideally, record tip information in a tip log and report it to their employers on a regular basis (once per shift, per week, or per month). Employers can configure modern POS systems to require servers to report all tips every shift, regardless of whether they were made as cash or electronically, and the closeout of business for the day includes the tallying of all tip income (Williams, 2014). The employer is then responsible for submitting payroll taxes for his or her employees based on the tip data. For each employee, the employer must report wages (referred to as FICA or Social Security wages) and tips separately on the W-2 form.[10] There is also a field on the W-2 for allocated tips. Allocated tips are reported when the total tips recorded by restaurant employees for the year sum to less than eight percent of yearly food and beverage sales. Taxes on allocated tips are paid by the employer.

The question then arises: How accurate is tip reporting? In an era when most transactions in restaurants are performed electronically, and POS systems can track all transactions performed by individual servers, it is safe to say that W-2 data is more accurate than survey responses (Williams, 2014). Like all wage data, it is unlikely to be perfect. Some tipping is still performed in cash, and much of this will go unreported by servers. Tax data will also not have a record of any under-the-table employment.[11] A final issue

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[10]See Appendix Figure 1 for W-2 instructions.

[11]This aspect of hourly wage mis-measurement is unrelated to tipping per se, since other occupations suffer from under-the-table work (construction, for example). However, many restaurants owners are tempted by the off-the-books nature of tips, employing unskilled and possibly undocumented workers for tips only (ROCUnited, 2011).

is that restaurant owners and managers may poorly understand the W-2 instructions, in which case they may include tips in the FICA wage field.

On the other hand, a specific high-profile case from 2002 has put employers on their guard when it comes to tip income. In *United States* v. *Fior d'Italia*, the Supreme Court determined that a San Francisco restaurant was liable to the IRS for tip income that had gone unreported by its employees. The restaurant was required to pay $23,000 in back FICA taxes, representing both the restaurant's and the employees' share (Peckron, 2002). Since this landmark case, employers have had a strong incentive to carefully track their employees' tip earnings, and the increasing prevalence of debit/credit cards and POS systems has made it easy for them to do so. As technology has improved, the reporting of tips has improved(Williams, 2014).

3.2   Survey data and variables

The survey data used in this work is the 2006 to 2012 CPS ASEC, linked by person to W-2 data. Because the CPS ASEC captures information for the preceding tax year, each CPS file is linked to the W-2 file for the year before (for example, the 2006 CPS ASEC is linked to the 2005 W-2 data). All years are appended together, for seven years of data.

Records are linked at the U.S. Census Bureau using a process whereby individuals in each data set were given a unique, protected identifier. When a Social Security Number (SSN) is available in a data set, the identifier is placed based on SSN (in essence, the unique identifier is a "scrambled" SSN). For records without an SSN, personally identifiable information such as name, address, and date of birth are used in probabilistic matching to assign persons to their identifier. The fields used for matching are compared against the same fields in a master reference file that contains the unique identifier. Personal information is then removed from each data set before a researcher may link the data sets together and use them for research purposes. Only those observations that received the unique identifier are used in the analysis. For more information on the

linking process, see Wagner and Layne (2014). Only those observations that received the unique key are used in the analysis. Table 1 lists the primary variables used in the analysis.

The CPS ASEC provides the identification of tipped workers in the restaurant industry through the 4-digit occupation code; it also provides the demographic, labor market, and state characteristics used in the econometric analysis. For the main analysis, I retain all of the respondents who report being a full-service restaurant server: waitstaff and bartenders. For this sample, the W-2 data provide two variables used in this analysis—FICA Wage, which is paid by the employer, and Wages, Salary, and Tips. The subtraction of FICA Wage from Wages, Salary, and Tips yields tip income. Robustness checks use all other employees for comparison, some of whom may also worked in tipped categories. Wages for these individuals come from the FICA Wages field of the W-2.

A key concern is how hourly wage is calculated: I take the yearly W-2 earnings variables and divide them by hours worked per year. Hours worked per year is itself the product of weeks worked in the preceding year and the usual hours worked per week. Because wage floors may impact both hourly wage and the supply of labor over the year, this calculation is necessary. However, aside from the assumption that the W-2 FICA wage accurately records wages from employers over the year, some error may be introduced in the hourly wage equivalent if weeks worked per year or usual hours per week are recalled with error.

Another concern is the number of employers a person may have during the year. A W-2 should exist for each job held. If more than one job is held simultaneously, and one of those jobs is a non-serving job, then FICA Wages will reflect both tipped and non-tipped wages. To avoid this, I take only earners who held one job at a time, and took only jobs for which FICA Wages were less than Wages, Salary, and Tips. Those who held only one job at a time were those whose number of W-2s matched the number of employers they reporting having, non-simultaneously, over the year. This retains a quarter

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to a third of CPS ASEC respondents whose specified occupation as restaurant server.[12]

A final consideration, as with all examinations of wage policies on employment, is the construction of an employment-to-population ratio that includes in the denominator both employed persons (for whom we will have current wage information) and those who are not currently employed. As the denominator, I included the total servers in the CPS ASEC in each state-year cell. The numerator is the number of servers identified for the analysis group who reported that they were currently employed in the state-year cell. The construction of the variable in this manner ensures that the full population of servers is included in the denominator, regardless of whether they had employment reflected in a W-2. Table 2 reports on the number of CPS ASEC servers found in the W-2 data and the number of servers left after the imposition of the sample restrictions described in the preceding paragraph. About 80 percent of CPS ASEC servers received a W-2 from the year before the survey, while approximately 30 percent received a number of W-2s that matched their reported number of non-simultaneous employers.

To examine the quality of the hourly FICA wage and hourly wages, salary, and tips that result, I graphed the mean of these wages for each value of the tipped minimum wage, shown in Figure 2. While there is some variation in my hourly wage equivalents—likely due both to true variation in employers' pay and measurement error in the hours variables—the hourly FICA wage trends strongly upward as the tipped minimum wage increases, and full compensation follows a similar pattern. Moreover, the value of the hourly FICA wage is close to the mandatory minimum wage in most cases, providing evidence that the floor is often binding.

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[12]In a sensitivity test, I lifted the second restriction, keeping everyone whose number of W-2s matched their number of employers. Results were slightly weaker, but qualitatively unchanged.

4 Theoretical and empirical model

4.1 Theory

Wessels examined the market for tipped servers first in a competitive model (1993) and then as a monopsony (1997). Wessels's argument that the hiring of tipped servers is an example of monopsony power is a compelling one: for a given number of tables, hiring an additional server decreases per-person tips for that shift. Thus, a restaurant owner must offer more pay to all servers when hiring an additional server. Because the marginal cost of servers is thus greater than the average cost, the market fits the classic definition of a monopsony.

Figure 3 shows Wessels' model for the restaurant industry. On the horizontal axis is serving time per meal, which reflects the number of servers for a set quality and quantity of meals and constant returns to scale. As S increases, the number of meals served in an hour decreases and the hourly tips decrease. On the vertical axis is the wage paid to a server per hour. Restaurants face a server wage of W_s but can manipulate payment versus service by having more or fewer servers working on each shift. Thus, the restaurant actually faces a supply for "serving time per meal" of W, and servers are paid $W + tP/S$, where tP/S expresses the tips per hour as a function of the price of the meal and the number served. The customers' "demand price of service time" is shown as curve $P(1 + t)MP_s$.

In the absence of a wage floor, a restaurant owner will hire servers to fulfill a service per meal at A, which corresponds to the wage w_m (the intersection of the wage plus tips and the demand for service curve). Were there to be a wage imposed between w_m and w_c (the wage in a competitive market), hiring and service per meal would increase. Lower tips would offset the wage increase, and servers would not be better off monetarily (although they might benefit from higher employment and better table coverage). A tipped minimum wage above w_c causes hiring to decrease back along the service de-

mand curve.

In a competitive model, the imposition of a wage floor is predicted to decrease employment or increase output prices, or both. In a monopsony where the wage floor is set between the monopsony wage and the competitive wage, we would expect to see employment increase and output prices decrease. However, the situation becomes muddy when the portion of the wage paid as tips is a function of the output price. Wessels recognized this element of tipped wages in his model, but assumed a constant per-worker effort. However, restaurants are defined by their seating capacity and hours of operation. For a given number of tables, a restauranteur may curtail serving hours or increase the number of tables per server per shift rather than cut employees or raise prices. The existence of tip pooling and service charges add to the manner in which employers may react to higher tipped minimums.

That being said, the key testable hypothesis from this model is: tipped minimum wages should increase the portion of a server's per-hour wage that comes from the employer. If employer-paid wages are already higher than the proposed tipped minimum for all servers, then an increase in the statutory wage will have no effect. With W-2 data, this hypothesis should be easy to test, as the FICA wage field is the portion of a server's wages paid directly by the employer. The second hypothesis is that a restaurant will hire more servers, and per-person tips will decrease. Wessels uses restaurant employment divided by restaurant sales, while acknowledging that a better measure would be total person hours of servers. Even better is a direct measure of hourly tips, which is also available from the W-2. Finally, the monopsony model predicts that employment should increase as a function of employer-paid wages until point w_c on the graph, and then decrease. This can be tested using total server employment divided by the population of workers who identify as servers in the CPS ASEC.

4.2 Empirical method

To examine the evidence on tipped minimum wages using the theoretical construct out-lined above, I use a difference-in-differences approach that has become standard in the minimum wage literature. An effect of higher minimum wages is identified using the variation in state tipped minimums over time, accomplished with the inclusion of year and state fixed effects and a measure for the time-variant treatment. I estimate hourly FICA wages, hourly tips, employment, and hours worked, all in natural log form, using the following model:

$$\ln(y_{ist}) = \alpha + \beta * \ln(TW_{st}) + \gamma * \ln(MW_{st}) + X_{ist}\omega + L_{st}\lambda + \phi_s + \eta_t + \epsilon_{ist} \tag{1}$$

where $\ln(y_{ist})$ is one of the dependent variables described above for individual i in state s and time t; $\ln(TW_{st})$ and $\ln(MW_{st})$ are the tipped minimum wage and minimum wage in state s and time t; and ϕ_s and η_t are state and year fixed effects. To this baseline model, I add demographic characteristics measured at the individual level, X_{ist}, as well as state-level demographic and labor market characteristics (L_{st}). These include an individual's race, Hispanic origin, sex, age, marital status, and education. State-level variables include the total employment rate, the log population, the log average wage for all workers, the percent male, the percent married, the percent non-White, and the percent with a high school degree or more. I add information on restaurant prices by including the "food away from home" component of the Bureau of Labor Statistics' Consumer Price Index (in log form). The last model includes a state-specific time trend, with the caveat that the model may not fit as well at others due to near collinearity. All specifications employ standard errors clustered at the state level.

5   Results

Table 3 provides summary statistics for the sample used in the regression analysis. Wages are reported in log form, as they are logged for the regression analysis. On average, the tipped minimum wage is $3.19 per hour, compared with a mean FICA wage of $4.44 per hour. The mean state minimum wage is $6.43 per hour, while the per hour total compensation for servers is $7.42 (the natural logs of hourly FICA wage and hourly tips are used in the regression models). These numbers give some indication that, on average at least, state tip credits and actual compensation received are in line with states' minimum wages. The low pay of servers is contrasted with the average hourly wage for all workers of almost $19 per hour.

The average number of servers within a state-year cell is approximately 14. This may present some problems for the analysis if results are driven by small cell sizes. I experimented with different limitations on the sample selection. Results did not change much when the cell size was limited to greater than 3 compared with greater than 5. I did not include restaurant employees who may be partially tipped in the server category, including food runners and busers; according to the IRS-provided definition, these employees should be covered by the minimum wage and not the tipped minimum. I examine these categories in Section 6.

Table 4 shows the first set of results of the difference-in-differences specifications. I find strong evidence that hourly wages paid by restaurant owners to their servers increase with increases in the tipped minimum wage. An elasticity of approximately 0.5 to 0.6 suggests that when the tipped minimum increases by 10 percent, FICA wages of servers increase by 5 to 6 percent, meaning that tipped minimum increases affect a significant proportion of tipped workers. These results are in line with the evidence presented in Appendix table 1, in that many of the states with higher tipped minimum wages do appear to have a higher mean FICA wage. These results are also in line with the wide variation in tipped minimums across the states. As expected, the state non-

tipped minimum wage does not appear to affect the wages of tipped employees.

In contrast, I do not find that overall compensation increases with increases in the tipped minimum wage—this is due to total tips decreasing in response to tipped minimum wage increases. Tips per hour appear to decrease in response to higher tipped minimum wages in the same proportion as FICA wages increase (5 or 6 percent). Taken alone, these results are consistent with the monopsony model, as we expect less in tips as employer-paid wages increase, employment increases, and tips are shared among more servers. However, we should also expect employment to increase at the same time, which would account for lower tips resulting from greater table coverage.

Turning to Table 5, we see that in a linear model there is no relationship between tipped minimum wages and server employment. For hours, there is a negative elasticity of 0.2, but only for Model 2. With such a wide range of tipped minimums, the possibility exists that employment first rises and then falls as the tipped minimum wage is increased. Looking at a partial residual plot of the full model (Figure 4), it appears that the relationship between the tipped minimum wage (logged) and the rate of server employment is certainly not linear, and might be quadratic. The resulting quadratic estimation is presented in Table 6. The coefficients on the tipped minimum wage and its square are statistically significant in the first two models and indicate that the relationship is positive over lower values of the tipped minimum wage, but it eventually levels out and then decreases. When controlling for state-specific time trends, Model 3, the coefficients are smaller and no longer statistically significant. Model 3 has a variance inflation factor of 82.6, which might account for smaller and less precise estimates. There is no relationship between hours worked per year and the tipped minimum wage in the quadratic equation.

The coefficients from the quadratic model suggest that as tipped minimum wages increase from $2.13 to about $4.50, employment in the server sector increases.[13] For

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[13]In 2011, 13 states had tipped minimum wages higher than $4.50 per hour.

servers in the sample who are covered by a tipped minimum wage between $4.50 and $5.00, the average they receive in tips is $6.25, implying a total prevailing wage of $10.75 to $11.25 per hour. In reference to the current minimum wage debate, this value is above the $10.10 per hour currently being proposed in the Fair Wage Act referenced in the introduction. The bottom graph in Figure 4 shows the relationship between the tipped minimum wage and the server unemployment rate (not logged for easier interpretation).

Considering how strong the elasticities are for both wages and tips, the employment evidence is noisier, not as strong, and does not hold up to the inclusion of state-specific time trends (although these results suffer from near-multicollinearity). Moreover, the employment and hours evidence is mixed in the linear specification. It is likely that employers respond to higher wage floors in different ways. In practice, one explanation for lower tips could be that employers institute or intensify tip-pooling schemes to apply mandated wage increases more equitably across their employees. When an employer must raise wages for servers, he or she may feel it necessary to compensate partially tipped employees who are not officially covered by the mandate in order to retain workers who might otherwise consider the wage increase unfair. There is also some anecdotal evidence that employers may turn to service charges when tipped minimum wages increase (Azar, 2012; Lester, 2016). If these schemes are more common in high-tipped-minimum-wage states, it may put downward pressure on tip income. For example, an employer may begin to apply a service charge to all tables over a certain number. These service charges are owned by the employer and can be used to meet tip credit requirements, regardless of which employee actually served the table. This may be especially problematic if employers then report these tips in the FICA wage field, since it will then represent a simple shift of wages from tips to FICA wage. In all cases, the combined results suggest that servers do not see an increase in overall compensation as the tipped minimum wage increases, but do experience greater employment levels over a substan-

tial range of state tipped minimum wages.

6 Robustness checks

Because tipped minimum wages cover a very specific category of worker, we should expect that these mandatory minimums will have no effect on workers outside of this category. To test this, I constructed hourly FICA wages using the same definitions described in Section 3 for workers in other occupations, and estimated the same econometric models. The results of this analysis are reported in Table 7. Rather than look at every four-digit occupation code, I examined the 52 two-digit occupation codes reported in the CPS ASEC. The four-digit occupation code is narrowly defined, and for many the state-year cell sizes are too small for meaningful analysis. To create a comparable measure of employment rate, I divided the workers whose reported number of non-simultaneous employers matched their number of W-2s by the total number of workers in the state-yea-category cell. I included two-digit occupation code 33, which comprises several categories of food service workers: both the servers I have already identified as well as cooks, dishwashers, and limited-service restaurant workers such as counter persons and cashiers. Certain occupation codes, mentioned below, will encompass other types of workers who are covered by the tipped minimum wage, such as hairdressers and taxi drivers.

The table reports the direction of the elasticity ("pos" or "neg") for each occupation code whenever a statistically significant coefficient resulted from either Model 1 or Model 2. For eight of 52 occupations (15 percent), the estimation resulted in a statistically significant effect of tipped wages on FICA wage. Two of these are expected. The largest effect was estimated for occupation code 37, which includes a number of tipped occupations, including hairdressers, cosmetologists, bellhops, and concierges. However, no effect was found on employment or hours worked for this category. Except for food

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service workers (occupation code 33), no other occupation codes yielded a positive wage effect and a negative or monopsony-type employment effect of tipped minimum wages. Occupation code 3 yielded negative wage and negative hours elasticities: this category covers a wide variety of managerial positions, including those in food service and lodging.

Aside from the results just described, statistically significant effects for the employment variables occur between 6 percent and 12 percent of the time, but without any consistent connection between the FICA wage estimation and the employment estimations. Even fewer of these retain statistical significance in both Model 1 and Model 2, indicating that they are data artifacts rather than "true" responses to the tipped minimum wage.

Interesting results occur for occupation code 33, with a statistically significant elasticity of about 0.20 between tipped minimum wages and FICA wage and a negative employment elasticity of about 0.16 (hours per year is statistically significant at the 10 percent level, with an elasticity of -0.16, as well). No statistically significant effect was estimated for the quadratic model. Because no linear employment effect was found specifically for servers, these results point to possible spillover effects in the food-service industry as a whole due to increased tipped minimum wages. Spillovers may also account for the negative elasticities reported for occupation code 3. The requirement to pay more to servers, and a possible increase in number of servers employed, may lead to decreases in hiring of non-tipped workers in the industry.

To test this further, I examine each 4-digit food service category separately, with the exception of waitstaff and bartenders, who make up the "server" category in the main analysis. The results from the Model 2 specification are reported in Table 8, and are decidedly mixed. While higher-skilled back-of-the-house categories such as head chefs and cooks experienced increases in employment and hours, lower skilled workers such as attendants, helpers, and dishwashers experienced lower hours and employment. Pos-

sibly due to smaller sample sizes, the latter results are imprecise. Taken together, the results suggest that restaurants may change the nature of worker inputs in response to a higher tipped minimum wages, with the higher-skilled categories of workers—waitstaff, bartenders, and chefs—experiencing higher employment rates and hours. This is consistent with work by Lester (2016), who finds that employers in San Francisco "exhibit greater investment in finding better matches and tend to seek higher-skilled, more professional workers" in response to wage mandates in full-service restaurants.

As a final robustness check, it has become a common practice in minimum wage research to randomly assign wage floors to states in the data and see whether statistically significant results can be estimated from these false wage floors. Following this procedure, I ran each specification presented in the main results in which a statistically significant association was found, using a randomly assigned placebo tipped minimum wage.[14] There is no statistically significant relationship between the placebo and any dependent variable used in the analysis.

7 Conclusion

This paper presents a new source of information for wages on tipped servers and analyzes the effect of the tipped minimum wage on wages, hourly tips, server employment, and hours worked. It also provides some assessment of the quality of the data. I present evidence that increasing the tipped minimum wage has the effect of increasing that portion of wages paid by employers, but decreases servers' tip income by a similar percentage. An increase in the tipped minimum wage has a quadratic relationship with sector employment, where employment first increases, levels out, and then decreases as the tipped minimum increases. This result is consistent with a model of monopsony power, with some caveats about the noisiness of the employment estimates compared with the

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[14]Results available upon request.

wage and tip estimates. There is also a negative relationship between tipped minimum wages and the number of hours worked per year, although this finding is also not consistent across models.

A limitation of this work is that, while we can feel confident that the W-2 FICA Wage field represents what a person was paid directly by his or her employer, CPS-reported hours per year must be used to calculate an hourly equivalent wage. If hours and weeks of work for the year suffer from error, the calculated hourly wage will also suffer. A second limitation is that the results may be driven by employers in higher tipped-minimum-wage state moving to tip-pooling or service-charge schemes. If these tips are reported in the FICA Wage field of the W-2, the effect of the tipped minimum wage on FICA Wages and tips will be overstated.

That being said, the paper makes a contribution to the literature on minimum wages by using administrative records to generate separate measures of employer-paid wages and tips—measures that have proved difficult to capture in other sources of data. The demonstration of monopsony power in the restaurant sector provides some policy guidance on the setting of minimum wages in general, with the understanding that higher minimums may—up to a point—induce employment in industries where monopsony power may exist. Finally, the results provide evidence on the welfare effects of tipped minimum wages on servers, showing that, while overall compensation may not change, servers benefit from higher employment over a wide range of the tipped minimum wage.

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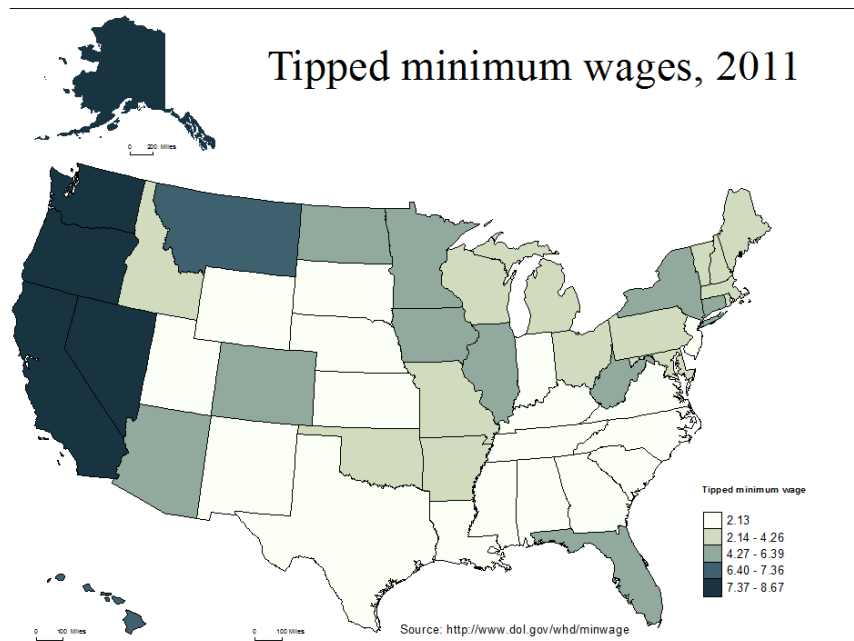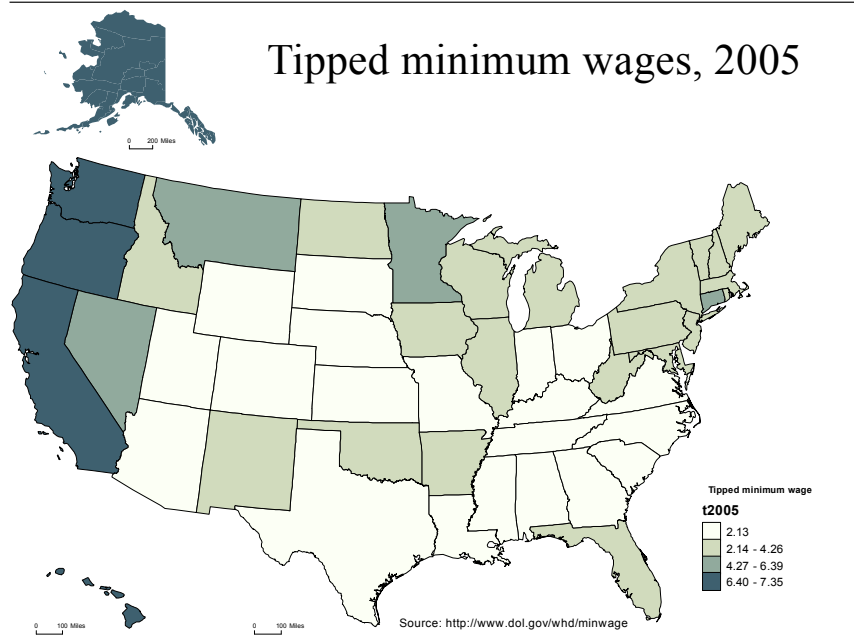
Figure 1: The maps show states with tipped minimum wages for 2005 (top) and 2011 (bottom). Graph shading indicates the federal tipped minimum wage times 1 (white) to more than 4 times (darkest blue).
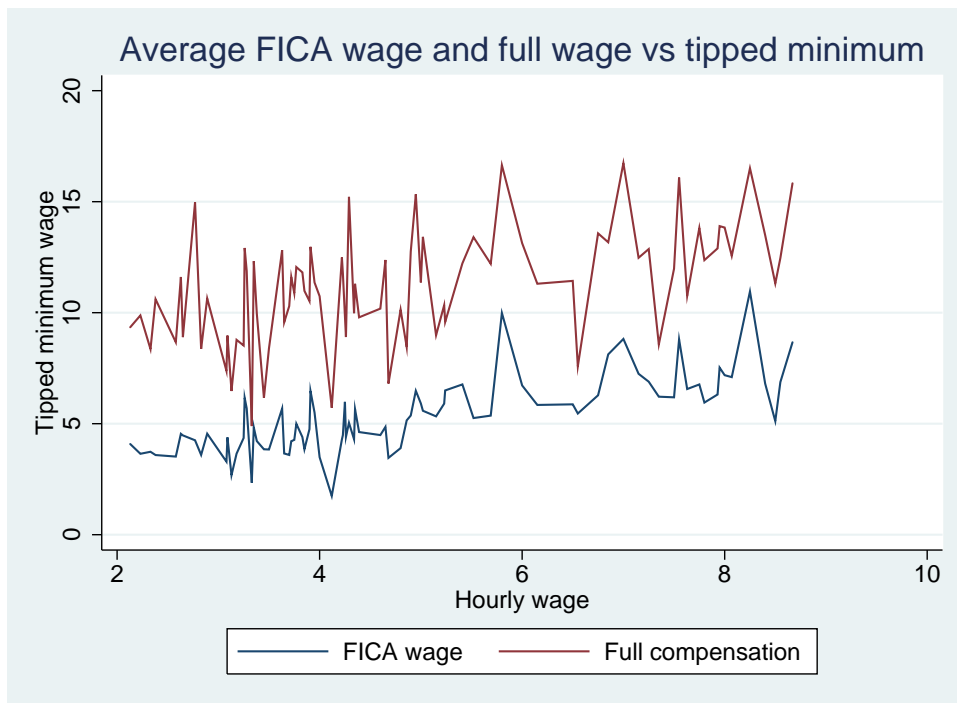
Figure 2: The figure shows connected scatterplots of hourly employer-paid wages and full hourly compensation for each mandated tipped minimum wage. FICA wage and Full compensation are hourly wage equivalents derived by dividing the yearly value from W-2 data with the reported annual hours worked reported in the CPS ASEC, as reported in the text. While there is some variation in each measure, each calculated wage variable displays a strong positive relationship with the tipped minimum wage.
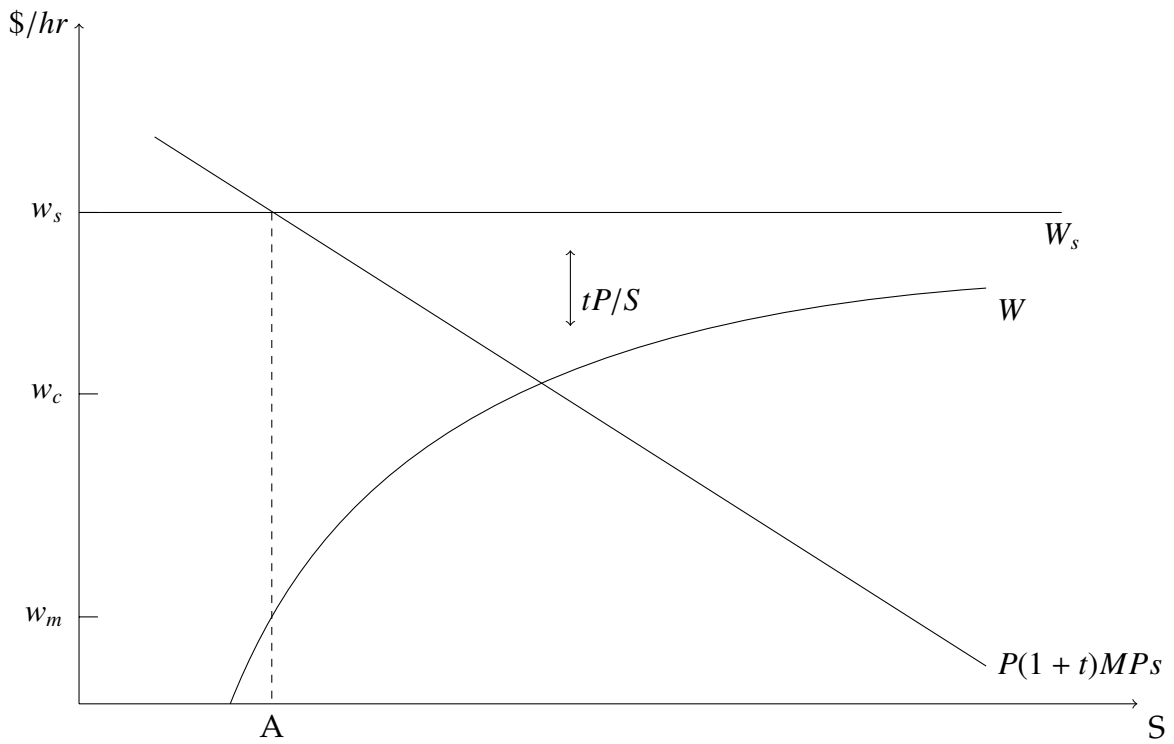
Figure 3: Adapted from Wessels (1997). The figure shows the monopsony market for tipped servers. See text for description.
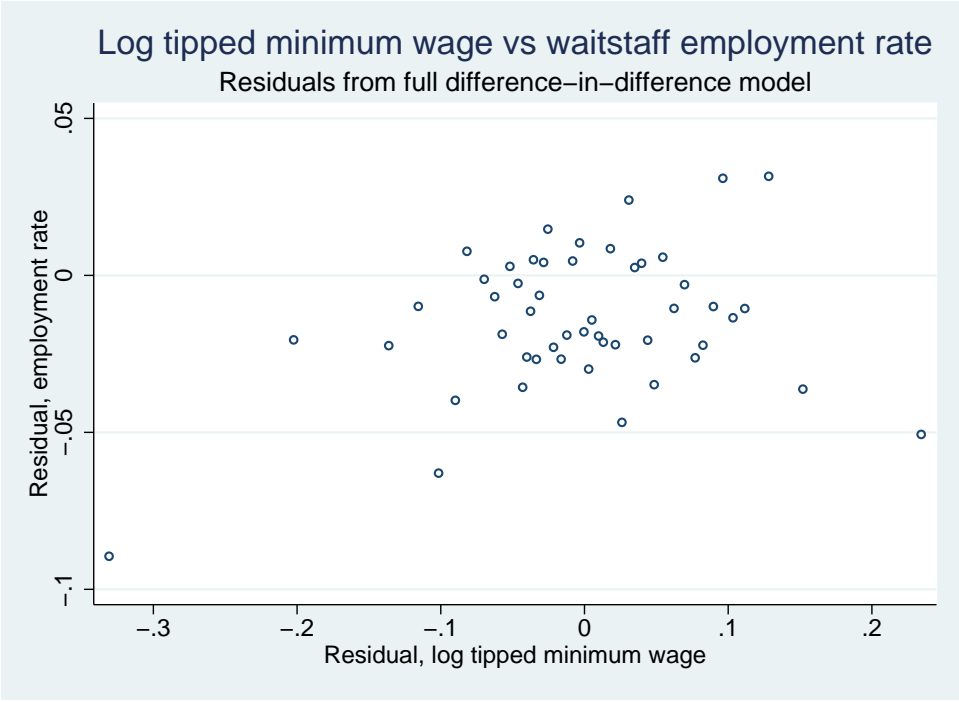
Figure 4: The graphs show partial residual plots of the relationship between the tipped minimum wage and employment rate among servers (top) and graphs out quadratic relationship over all values of the logged tipped minimum wage (bottom).

Table 1: List of variables and their source

Number	Variable	Description
1	FICA (employer-paid wage)	Box 1 of W-2
2	WST (Wages, Salary, and Tips)	Box 3 of W2
3	Tips	Variable 2 minus variable 1
4	Weeks worked last year	CPS ASEC
5	Usual hours/week worked last year	CPS ASEC
6	Hourly wage from employer	Variable 1/(variable 4*variable 5)
7	Hourly tips	Variable 3/(variable 4*variable 5)
8	Occupation	CPS ASEC
9	Server	Single-employer CPS waitstaff and bartenders with all FICA less than WST
10	Server employment rate	State/year sum of servers who report being employed divided by state-year total number of servers

The table lists the source of variables used in the analysis and the method by which certain variables were constructed. See text for full description of variable source and construction.

Table 2: Number of CPS ASEC-identified servers found in W-2 data and meeting sample restrictions

	Servers under sample restriction	Servers in W-2	Total servers in labor force	Percent of Servers with a W-2	Percent of servers in sample
2005	532	1786	2182	81.85	24.38
2006	537	1729	2067	83.65	25.98
2007	625	1851	2190	84.52	28.54
2008	587	1774	2208	80.34	26.59
2009	666	1788	2204	81.13	30.22
2010	627	1741	2129	81.78	29.45
2011	649	1772	2162	81.96	30.02
Total	4,223	12,441	15,142	82.16	27.89

Source: Linked CPS ASEC–W-2 file for tax years 2005 to 2011. The table shows the number of CPS ASEC servers in the final sample, the number of CPS ASEC servers found in W-2 data, and the percentages for each category.

Table 3: Summary statistics of variables used in analysis

Individual characteristics, servers in sample	Mean	SD
Black alone	0.05	0.21
Asian alone	0.06	0.23
Other	0.04	0.20
Hispanic	0.13	0.33
Male	0.26	0.44
Age	31.62	12.80
More than HS education	0.85	0.35
Married	0.30	0.46
FICA wage (log)	1.26	0.85
Employment rate	0.26	0.08
Hours per year (log)	6.98	0.80
Tips per hour (log)	1.26	1.30

State-year characteristics	Mean	SD
Tipped minimum wage (log)	1.24	0.46
Minimum wage (log)	1.88	0.15
Proportion nonwhite	0.36	0.19
Proportion with more than HS education	0.61	0.36
Proportion married	0.41	0.02
Population (log)	8.42	0.57
Price of meals (log)	2.13	0.11
Average hourly wage, all workers (log)	2.92	0.20
Proportion male	0.49	0.01
Employment rate	0.93	0.03
Observations	4,223	

Source: Linked CPS ASEC–W-2 file for tax years 2005 to 2011. The columns show the mean and standard deviation for server-related variables in the top panel, and demographic and labor force characteristics for each state-year cell. Key variables from the W-2 are FICA wage per hour and tips per hour, which are arrived at by diving the separate values reported on the W-2 by total hours worked in the year, reported in the CPS ASEC.

Table 4: Difference-in-difference estimates: wages and tips

	FICA Wage (log)			Tips per Hour (log)		
	(1)	(2)	(3)	(1)	(2)	(3)
Tipped minimum wage (log)	0.57***	0.57***	0.51**	-0.55**	-0.55**	-0.72*
	(0.13)	(0.12)	(0.17)	(0.19)	(0.16)	(0.31)
Minimum wage (log)	0.10	-0.01	-0.07	-0.06	-0.29	-0.35
	(0.19)	(0.13)	(0.20)	(0.29)	(0.25)	(0.31)
Black alone		-0.01	0.00		-0.12	-0.13
		(0.05)	(0.05)		(0.07)	(0.07)
Asian alone		0.06	0.05		-0.02	-0.01
		(0.06)	(0.07)		(0.06)	(0.06)
Other		0.10*	0.12*		-0.10	-0.11
		(0.05)	(0.05)		(0.08)	(0.09)
Hispanic		0.10**	0.10***		-0.09	-0.09
		(0.03)	(0.03)		(0.06)	(0.06)
Male		-0.01	-0.01		-0.03	-0.03
		(0.02)	(0.02)		(0.04)	(0.04)
Age		-0.03***	-0.03***		0.08***	0.08***
		(0.01)	(0.01)		(0.01)	(0.01)
Age squared		0.00***	0.00***		-0.00***	-0.00***
		(0.00)	(0.00)		(0.00)	(0.00)
HS education or more		-0.23***	-0.23***		0.25***	0.24***
		(0.02)	(0.03)		(0.05)	(0.05)
Married		-0.01	-0.01		-0.02	-0.02
		(0.02)	(0.02)		(0.04)	(0.04)
Proportion nonwhite		0.20	-0.22		0.90	1.20
		(0.80)	(0.87)		(1.74)	(2.24)
Proportion male		-1.06	-1.83		4.61	4.63
		(1.73)	(1.97)		(3.33)	(4.21)
Proportion with a HS ed or more		-2.43*	-3.66**	1.13	1.83	
		(1.13)	(1.34)		(2.17)	(2.88)
Proportion married		0.57	0.70		2.25	1.70
		(1.11)	(1.27)		(3.03)	(3.53)
Population (log)		0.68*	0.32		-0.57	-0.39
		(0.27)	(0.36)		(0.56)	(0.79)
Employment rate, all workers		0.01	-0.55		1.89	1.88
		(0.89)	(1.27)		(1.46)	(2.59)
Average hourly wage, all workers (log)		0.83***	0.83***		1.11***	1.11***
		(0.02)	(0.02)		(0.03)	(0.03)
Price of meals (log)		-0.30	-0.40		0.28	0.44
		(0.17)	(0.22)		(0.31)	(0.38)
Constant	0.16	-3.21	1.72	1.30**	-4.11	-6.46
	(0.33)	(2.57)	(3.44)	(0.45)	(4.79)	(7.52)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Trends	No	No	Yes	No	No	Yes
Observations		4,223			4,223	
R2	0.13	0.57	0.56	0.05	0.43	0.43

Source: Linked CPS ASEC–W-2 file for tax years 2005 to 2011.

$*p < 0.05, **p < 0.01, ***p < 0.001$. The table shows the results of difference-in-differences specifications for hourly FICA wage (log) and hourly tips (log). Model 1 includes only the state-year tipped minimum wage and minimum wage in the specification, where the minimums are the higher of the federal or state minimum, and state and year fixed effects. Model 2 shows the same specification, but includes covariates measured at the state level. Model 3 includes state-specific time trends. All models employ standard errors clustered at the state level.

Table 5: Difference-in-difference estimates: employment effects

	Sever employment rate (log)			Hours worked per year (log)		
	(1)	(2)	(3)	(1)	(2)	(3)
Tipped minimum wage (log)	0.24	0.22	0.36	-0.27	-0.22*	-0.31
	(0.22)	(0.22)	(0.22)	(0.15)	(0.11)	(0.25)
Minimum wage (log)	-0.16	-0.13	-0.35	0.29	0.41	0.53
	(0.24)	(0.25)	(0.28)	(0.25)	(0.22)	(0.30)
Black alone		0.01	0.02		0.03	0.02
		(0.02)	(0.02)		(0.07)	(0.07)
Asian alone		-0.01	-0.01		0.09*	0.10*
		(0.01)	(0.01)		(0.04)	(0.04)
Other		-0.03	-0.00		-0.09	-0.11
		(0.02)	(0.02)		(0.06)	(0.06)
Hispanic		0.01	-0.00		0.18***	0.18***
		(0.01)	(0.01)		(0.02)	(0.02)
Male		-0.01	-0.01		0.20***	0.20***
		(0.01)	(0.01)		(0.03)	(0.03)
Age		-0.00	-0.00*		0.10***	0.10***
		(0.00)	(0.00)		(0.01)	(0.01)
Age squared		0.00	0.00*		-0.00***	-0.00***
		(0.00)	(0.00)		(0.00)	(0.00)
HS education or more		0.00	-0.00	0.37***	0.36***	
		(0.01)	(0.01)	(0.04)	(0.04)	
Married		0.01	0.01	-0.12***	-0.12***	
		(0.01)	(0.01)	(0.03)	(0.03)	
Proportion nonwhite		-0.54	-1.10	-0.55	0.18	
		(1.28)	(1.80)	(1.05)	(1.11)	
Proportion male		-0.50	-1.60	0.50	0.18	
		(3.35)	(3.49)	(2.05)	(2.40)	
Proportion with a HS ed or more		0.64	-0.82	3.48*	3.34	
		(1.95)	(2.75)	(1.41)	(1.91)	
Proportion married		0.68	0.44		-1.65	-3.19*
		(2.14)	(2.22)		(1.38)	(1.51)
Population (log)		-0.36	0.15		-0.48	-0.67
		(0.56)	(0.65)		(0.41)	(0.57)
Employment rate, all workers		0.65	0.07		0.37	-0.93
		(1.33)	(1.84)		(1.10)	(1.32)
Average hourly wage, all workers (log)		-0.00	-0.00		-0.26***	-0.26***
		(0.01)	(0.01)		(0.02)	(0.03)
Price of meals (log)		-0.12	-0.16		0.06	0.33
		(0.38)	(0.48)		(0.24)	(0.27)
Constant	-1.46***	0.89	-1.24	6.60***	6.74	9.03
	(0.39)	(5.08)	(5.54)	(0.42)	(3.94)	(5.14)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Trends	No	No	Yes	No	No	Yes
Observations		4,223			357	
R2	0.38	0.39	0.51	0.05	0.13	0.14

Source: Linked CPS ASEC–W-2 file for tax years 2005 to 2011.
$*p < 0.05, **p < 0.01, ***p < 0.001$. The table shows the results of difference-in-differences specifications for server employment rate (log) and hours worked per year (log). Model 1 includes only the state-year tipped minimum wage and minimum wage in the specification, where the minimums are the higher of the federal or state minimum, and state and year fixed effects. Model 2 shows the same specification, but includes covariates measured at the state level. Model 3 includes state-specific time trends. All models employ standard errors clustered at the state level.

Table 6: Difference-in-difference estimates: Rate of employment of waitstaff, alternate specification

| | Sever employment rate (log) | | |
	(1)	(2)	(3)
Tipped minimum wage (log)	1.39*	1.42*	0.84
	(0.56)	(0.68)	(1.14)
Minimum wage (log)	-0.22	-0.19	-0.35
	(0.23)	(0.25)	(0.28)
Square of tipped minimum (log)	-0.48*	-0.51*	-0.22
	(0.18)	(0.24)	(0.49)
Black alone		0.01	0.02
		(0.02)	(0.02)
Asian alone		-0.01	-0.01
		(0.01)	(0.01)
Other		-0.03	-0.00
		(0.02)	(0.02)
Hispanic		0.01	-0.00
		(0.01)	(0.01)
Male		-0.01	-0.01
		(0.01)	(0.01)
Age		-0.00	-0.00*
		(0.00)	(0.00)
Age squared		0.00	0.00*
		(0.00)	(0.00)
HS education or more		0.00	-0.00
		(0.01)	(0.01)
Married		0.01	0.01
		(0.01)	(0.01)
Proportion nonwhite		0.06	-1.06
		(1.41)	(1.81)
Proportion male		-0.54	-1.56
		(3.40)	(3.46)
Proportion with a HS ed or more		0.65	-0.92
		(1.93)	(2.79)
Proportion married		0.80	0.50
		(2.16)	(2.22)
Population (log)		-0.42	0.15
		(0.56)	(0.65)
Employment rate, all workers		-0.64	0.00
		(1.27)	(1.84)
Average hourly wage, all workers (log)		-0.00	-0.00
		(0.01)	(0.01)
Price of meals (log)		-0.03	-0.19
		(0.36)	(0.47)
Constant	-1.98***	1.50	-1.33
	(0.42)	(4.94)	(5.52)
State dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Trends	No	No	Yes
Observations		4,223	
R2	0.39	0.40	0.51

Source: Linked CPS ASEC–W-2 file for tax years 2005 to 2011.
$*p < 0.05, **p < 0.01, ***p < 0.001$. The table shows the results of difference-in-differences specifications for server employment (log). Model 1 includes only the state-year tipped minimum wage, the square of the tipped minimum wage, and the minimum wage in the specification, where the minimums are the higher of the federal or state minimum, and state and year fixed effects. Model 2 shows the same specification, but includes covariates measured at the state level. Model 3 includes state-specific time trends. All models employ standard errors clustered at the state level.

Table 7: Relationship between tipped minimum wages, wages, and employment for other categories of worker.

	FICA Wage	Employment rate	Quadratic	Hours worked
Other occupations				
1	-	-	-	-
2	-	-	-	-
3	neg	-	-	neg
4	-	-	-	neg
5	pos	-	-	-
6	-	-	-	-
7	-	-	-	-
8	-	-	-	-
9	-	-	-	-
10	-	-	-	pos
11	-	-	-	-
12	-	neg	-	-
13	-	-	-	-
14	neg	-	-	-
15	-	-	-	-
16	-	-	-	-
17	-	-	pos & neg	-
18	pos	-	-	-
19	-	pos	-	-
20	-	-	-	-
21	-	-	-	-
22	-	-	-	-
23	neg	-	-	-
24	-	neg	-	-
25	-	-	-	-
26	-	-	-	-
27	-	-	-	-
28	-	-	-	-
29	-	-	neg & pos	-
30	neg	-	-	-
31	-	-	-	-
32	-	neg	-	-
33*	pos	neg	-	-
34	-	-	-	-
35	-	-	-	-
36	-	-	-	-
37*	pos	-	-	-
38	-	-	-	-
39	-	-	-	-
40	-	-	-	-
41	-	-	-	-
42	-	-	-	neg
43	-	-	-	-
44	-	-	-	-
45	-	-	-	-
46	-	-	-	-
47	-	-	-	-
48	-	-	-	pos
49	-	-	-	-
50	-	-	-	-
51	-	-	-	-
52	-	-	-	-
percent stat. sig.	0.15	0.10	0.04	0.10

Source: Linked CPS ASEC–W-2 file for tax years 2005 to 2011.
The table shows the results of difference-in-differences specifications for each of dependent variables used in the analysis and for each CPS-ASEC two-digit occupation code. Occupations for which an effect of the tipped minimum wage is expected are marked with an asterisk.

Table 8: Difference-in-difference estimates: Other occupation categories in the food service

Category	Sever employment			
	FICA Wage (log)	Employment rate (log)	Hours worked per year (log)	N
Chefs and head cooks	-0.20	0.43*	0.47*	982
	(0.25)	(0.29)	(0.19)	
First-line managers	0.10	0.15	0.14	2,049
	(0.17)	(0.15)	(0.12)	
Cooks	0.07	0.23	0.07	6,397
	(0.06)	(0.12)	(0.12)	
Food prep workers	0.07	0.06	0.08	2,617
	(0.12)	(0.20)	(0.18)	
Combined food prep/serving workers, incl. fast food	-0.22	0.57*	0.19	1,165
	(0.18)	(0.24)	(0.21)	
Counter attendants	0.11	0.05	-0.01	1,290
	(0.15)	(0.28)	(0.38)	
Dining room/cafeteria attendants, bartender helpers	-0.38	-0.02	-0.34	1,314
	(0.28)	(0.28)	(0.28)	
Dishwashers	0.02	-0.36	-0.79*	984
	(0.19)	(0.34)	(0.38)	

8 Appendix

The following pages show the IRS instructions for employers in filling out employees' W-2s.

Form W-2c showing the employee's SSN. If the employee needs to change his or her name from that shown on the card, the employee should call the SSA at 1-800-772-1213.

If you do not provide the correct employee name and SSN on Form W-2, you may owe a penalty unless you have reasonable cause. For more information, see Publication 1586, Reasonable Cause Regulations & Requirements for Missing and Incorrect Name/TINs.

ITINs for aliens. Do not accept an ITIN in place of an SSN for employee identification or for work. An ITIN is only available to resident and nonresident aliens who are not eligible for U.S. employment and need identification for other tax purposes. You can identify an ITIN because it is a 9-digit number, beginning with the number "9" with either a "7" or "8" as the fourth digit, and is formatted like an SSN (for example, 9NN-7N-NNNN). An individual with an ITIN who later becomes eligible to work in the United States must obtain an SSN.

⚠ **CAUTION** *Do not auto-populate an ITIN into box a.*

Box b—Employer identification number (EIN). Show the EIN assigned to you by the IRS (00-0000000). This should be the same number that you used on your federal employment tax returns (Forms 941, 941-SS, 943, 944, CT-1, or Schedule H (Form 1040)). Do not use a prior owner's EIN. If you do not have an EIN when filing Forms W-2, enter "Applied For" in box b; do not use your SSN. You can get an EIN by applying online at IRS.gov, by calling the toll-free number, 1-800-829-4933, or by filing Form SS-4, Application for Employer Identification Number. Also see *Agent reporting.*

Box c—Employer's name, address, and ZIP code. This entry should be the same as shown on your Forms 941, 941-SS, 943, 944, CT-1, or Schedule H (Form 1040). The U.S. Postal Service recommends that no commas or periods be used in return addresses. Also see *Agent reporting.*

Box d—Control number. You may use this box to identify individual Forms W-2. You do not have to use this box.

Boxes e and f—Employee's name and address. Enter the name as shown on your employee's social security card (first name, middle initial, last name). If the name does not fit in the space allowed on the form, you may show the first and middle name initials and the full last name. It is especially important to report the exact last name of the employee. If you are unable to determine the correct last name, use of the SSA's Social Security Number Verification System may be helpful. Separate parts of a compound name with either a hyphen or a blank. Do not join them into a single word. Include all parts of a compound name in the appropriate name field. For example, for the name "John R Smith-Jones," enter "Smith-Jones" or "Smith Jones" in the last name field. If the name has changed, the employee must get a corrected social security card from any SSA office. Use the name on the original card until you see the corrected card. Do not show titles or academic degrees, such as

"Dr.," "RN," or "Esq.," at the beginning or end of the employee's name. Generally, do not enter "Jr.," "Sr.," or other suffix in the "Suff." box on Copy A unless the suffix appears on the card. However, the SSA still prefers that you do not enter the suffix on Copy A.

Include in the address the number, street, and apartment or suite number (or P.O. box number if mail is not delivered to a street address). The U.S. Postal Service recommends that no commas or periods be used in delivery addresses. For a foreign address, give the information in the following order: city, province or state, and country. Follow the country's practice for entering the postal code. Do not abbreviate the country name.

The IRS expects to change the third-party sick pay recap reporting and filing requirements for wages paid in 2014. Information about this change will be included in the 2014 Publication 15-A, Employer's Supplemental Tax Guide (Supplement to Circular E, Employer's Tax Guide, Publication 15) and other relevant tax products.

Box 1—Wages, tips, other compensation. Show the total taxable wages, tips, and other compensation (before any payroll deductions) that you paid to your employee during the year. However, do not include elective deferrals (such as employee contributions to a section 401(k) or 403(b) plan) except section 501(c)(18) contributions. Include the following.

1. Total wages, bonuses (including signing bonuses), prizes, and awards paid to employees during the year. See *Calendar year basis.*

2. Total noncash payments, including certain fringe benefits. See *Fringe benefits.*

3. Total tips reported by the employee to the employer (not allocated tips).

4. Certain employee business expense reimbursements. See *Employee business expense reimbursements.*

5. The cost of accident and health insurance premiums for 2%-or-more shareholder-employees paid by an S corporation.

6. Taxable benefits from a section 125 (cafeteria) plan if the employee chooses cash.

7. Employee contributions to an Archer MSA.

8. Employer contributions to an Archer MSA if includible in the income of the employee. See *Archer MSA.*

9. Employer contributions for qualified long-term care services to the extent that such coverage is provided through a flexible spending or similar arrangement.

10. Taxable cost of group-term life insurance in excess of $50,000. See *Group-term life insurance.*

11. Unless excludable under *Educational assistance programs,* payments for non-job-related education expenses or for payments under a nonaccountable plan. See Pub. 970.

12. The amount includible as wages because you paid your employee's share of social security and Medicare taxes (or railroad retirement taxes, if applicable). See *Employee's social security and Medicare taxes (or railroad retirement taxes, if applicable) paid by employer.*

If you also paid your employee's income tax withholding, treat the grossed-up amount of that withholding as supplemental wages and report those wages in boxes 1, 3, 5, and 7. (Use box 14 if railroad retirement taxes apply.) No exceptions to this treatment apply to household or agricultural wages.

13. Designated Roth contributions made under a section 401(k) plan, a section 403(b) salary reduction agreement, or a governmental section 457(b) plan. See *Designated Roth contributions*.

14. Distributions to an employee or former employee from an NQDC plan (including a rabbi trust) or a nongovernmental section 457(b) plan.

15. Amounts includible in income under section 457(f) because the amounts are no longer subject to a substantial risk of forfeiture.

16. Payments to statutory employees who are subject to social security and Medicare taxes but not subject to federal income tax withholding must be shown in box 1 as other compensation. See *Statutory employee*.

17. Cost of current insurance protection under a compensatory split-dollar life insurance arrangement.

18. Employee contributions to a health savings account (HSA).

19. Employer contributions to an HSA if includible in the income of the employee. See *Health savings account (HSA)*.

20. Amounts includible in income under an NQDC plan because of section 409A. See *Nonqualified deferred compensation plans*.

21. Payments made to former employees while they are on active duty in the Armed Forces or other uniformed services.

22. All other compensation, including certain scholarship and fellowship grants. See *Scholarship and fellowship grants*. Other compensation includes taxable amounts that you paid to your employee from which federal income tax was not withheld. You may show other compensation on a separate Form W-2. See *Multiple forms*.

Box 2—Federal income tax withheld. Show the total federal income tax withheld from the employee's wages for the year. Include the 20% excise tax withheld on excess parachute payments. See *Golden parachute payments*.

For Forms W-2AS, W-2CM, W-2GU, or W-2VI, show the total American Samoa, CNMI, Guam, or U.S. Virgin Islands income tax withheld.

Box 3—Social security wages. Show the total wages paid (before payroll deductions) subject to employee social security tax but not including social security tips and allocated tips. If reporting these amounts in a subsequent year (due to lapse of risk of forfeiture), the amount must be adjusted by any gain or loss. See *Box 7—Social security tips* and *Box 8—Allocated tips*. Generally, noncash payments are considered to be wages. Include employee business expense reimbursements reported in box 1. If you paid the employee's share of social security and Medicare taxes rather than deducting them from

wages, see *Employee's social security and Medicare taxes (or railroad retirement taxes, if applicable) paid by employer*. The total of boxes 3 and 7 cannot exceed $117,000 (2014 maximum social security wage base).

Report in box 3 elective deferrals to certain qualified cash or deferred compensation arrangements and to retirement plans described in box 12 (codes D, E, F, G, and S) even though the deferrals are not includible in box 1. Also report in box 3 designated Roth contributions made under a section 401(k) plan, under a section 403(b) salary reduction agreement, or under a governmental section 457(b) plan described in box 12 (codes AA, BB, and EE).

Amounts deferred (plus earnings or less losses) under a section 457(f) or nonqualified plan or nongovernmental section 457(b) plan must be included in boxes 3 and/or 5 as social security and/or Medicare wages as of the later of when the services giving rise to the deferral are performed or when there is no substantial forfeiture risk of the rights to the deferred amount. Include both elective and nonelective deferrals for purposes of nongovernmental section 457(b) plans.

TIP *Wages reported in box 3 include:*

• *Signing bonuses an employer pays for signing or ratifying an employment contract. See Rev. Rul. 2004-109, 2004-50 I.R.B 958, available at www.irs.gov/irb/2004-50_IRB/ar07.html.*
• *Taxable cost of group-term life insurance over $50,000 included in box 1. See* Group-term life insurance.
• *Cost of accident and health insurance premiums for 2%-or-more shareholder-employees paid by an S corporation, but only if not excludable under section 3121(a)(2)(B).*
• *Employee and nonexcludable employer contributions to an MSA or HSA. However, do not include employee contributions to an HSA that were made through a cafeteria plan. See* Archer MSA *and* Health savings account (HSA).
• *Employee contributions to a SIMPLE retirement account. See* SIMPLE retirement account.
• *Adoption benefits. See* Adoption benefits.

Box 4—Social security tax withheld. Show the total employee social security tax (not your share) withheld, including social security tax on tips. For 2014, the amount should not exceed $7,254 ($117,000 × 6.2%). Include only taxes withheld (or paid by you for the employee) for 2014 wages and tips. If you paid your employee's share, see *Employee's social security and Medicare taxes (or railroad retirement taxes, if applicable) paid by employer*.

Box 5—Medicare wages and tips. The wages and tips subject to Medicare tax are the same as those subject to social security tax (boxes 3 and 7) except that there is no wage base limit for Medicare tax. Enter the total Medicare wages and tips in box 5. Be sure to enter tips that the employee reported even if you did not have enough employee funds to collect the Medicare tax for those tips. See *Box 3—Social security wages*, for payments to report in this box. If you paid your employee's share of taxes, see

Employee's social security and Medicare taxes (or railroad retirement taxes, if applicable) paid by employer.

If you are a federal, state, or local governmental agency with employees paying only Medicare tax, enter the Medicare wages in this box. See *Government employers.*

Example of how to report social security and Medicare wages. You paid your employee $140,000 in wages. Enter in box 3 (social security wages) 117000 but enter in box 5 (Medicare wages and tips) 140000.00. There is no limit on the amount reported in box 5. If the amount of wages paid was $117,000 or less, the amounts entered in boxes 3 and 5 would be the same.

Box 6—Medicare tax withheld. Enter the total employee Medicare tax (including any Additional Medicare Tax) withheld. Do not include your share. Include only tax withheld for 2014 wages and tips. If you paid your employee's share of the taxes, see *Employee's social security and Medicare taxes (or railroad retirement taxes, if applicable) paid by employer.*

For more information on Additional Medicare Tax, go to IRS.gov and enter "Additional Medicare Tax" in the search box.

Box 7—Social security tips. Show the tips that the employee reported to you even if you did not have enough employee funds to collect the social security tax for the tips. The total of boxes 3 and 7 should not be more than $117,000 (the maximum social security wage base for 2014). Report all tips in box 1 along with wages and other compensation. Include any tips reported in box 7 in box 5 also.

Box 8—Allocated tips (not applicable to Forms W-2AS, W-2CM, W-2GU, or W-2VI). If you are a food or beverage establishment, show the tips allocated to the employee. See the Instructions for Form 8027, Employer's Annual Information Return of Tip Income and Allocated Tips. Do not include this amount in boxes 1, 3, 5, or 7.

Box 9. Do not enter an amount in box 9.

Box 10—Dependent care benefits (not applicable to Forms W-2AS, W-2CM, W-2GU, or W-2VI). Show the total dependent care benefits under a dependent care assistance program (section 129) paid or incurred by you for your employee. Include the fair market value (FMV) of care in a daycare facility provided or sponsored by you for your employee and amounts paid or incurred for dependent care assistance in a section 125 (cafeteria) plan. Report all amounts paid or incurred (regardless of any employee forfeitures), including those in excess of the $5,000 exclusion. This may include (a) the FMV of benefits provided in kind by the employer, (b) an amount paid directly to a daycare facility by the employer or reimbursed to the employee to subsidize the benefit, or (c) benefits from the pre-tax contributions made by the employee under a section 125 dependent care flexible spending account. Include any amounts over $5,000 in boxes 1, 3, and 5. For more information, see Pub. 15-B.

TIP *An employer that amends its cafeteria plan to provide a grace period for dependent care assistance may continue to rely on Notice 89-111 by reporting in box 10 of Form W-2 the salary reduction amount elected by the employee for the year for*
dependent care assistance (plus any employer matching contributions attributable to dependent care). Also see Notice 2005-42, 2005-23 I.R.B. 1204, available at www.irs.gov/irb/2005-23_IRB/ar11.html.

Box 11—Nonqualified plans. The purpose of box 11 is for the SSA to determine if any part of the amount reported in box 1 or boxes 3 and/or 5 was earned in a prior year. The SSA uses this information to verify that they have properly applied the social security earnings test and paid the correct amount of benefits.

Report distributions to an employee from a nonqualified plan or nongovernmental section 457(b) plan in box 11. Also report these distributions in box 1. Make only one entry in this box. Distributions from governmental section 457(b) plans must be reported on Form 1099-R, not in box 1 of Form W-2.

Under nonqualified plans or nongovernmental 457(b) plans, deferred amounts that are no longer subject to a substantial risk of forfeiture are taxable even if not distributed. Report these amounts in boxes 3 (up to the social security wage base) and 5. Do not report in box 11 deferrals included in boxes 3 and/or 5 and deferrals for current year services (such as those with no risk of forfeiture).

CAUTION *If you made distributions and also are reporting any deferrals in box 3 and/or 5, do not complete box 11. See Pub. 957, Reporting Back Pay and Special Wage Payments to the Social Security Administration, and Form SSA-131, Employer Report of Special Wage Payments, for instructions on reporting these and other kinds of compensation earned in prior years. However, **do not file Form SSA-131 if this situation applies and the employee was not 61 years old or more during the tax year for which you are filing Form W-2.***

Unlike qualified plans, NQDC plans do not meet the qualification requirements for tax-favored status for this purpose. NQDC plans include those arrangements traditionally viewed as deferring the receipt of current compensation. Accordingly, welfare benefit plans, stock option plans, and plans providing dismissal pay, termination pay, or early retirement pay are not generally NQDC plans.

Report distributions from NQDC or section 457 plans to beneficiaries of deceased employees on Form 1099-MISC, not on Form W-2.

Military employers must report military retirement payments on Form 1099-R.

TIP *Do not report special wage payments, such as accumulated sick pay or vacation pay, in box 11. For more information on reporting special wage payments, see Pub. 957.*

Box 12—Codes. Complete and code this box for all items described below. Note that the codes do not relate to where they should be entered in boxes 12a through 12d on Form W-2. For example, if you are only required to report code D in box 12, you can enter code D and the amount in box 12a of Form W-2. Report in box 12 any items that are listed as codes A through EE. Do not report