Measuring the effects of the tipped minimum wage using W-2 data

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Abstract

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 (wait staff and bartenders) using linked W-2 and survey data. I also estimate the effect of tipped minimum wages on wages, hourly tips, server employment, and hours worked. To provide an assessment of the quality of the data, I compare the W-2 measures to comparable responses in the survey data. I find that higher tipped minimum wages raise that portion of wages paid by employers, but decrease tip income by a similar percentage. I also find evidence of a quadratic relationship between tipped minimum wages, where employment first increases and then decreases in response to higher wages. The results are consistent with a monopsony model of server employment.

Keywords: Minimum wages, restaurant industry, monopsony

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

*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 economic literature, the effects of tipped minimum wages have received little attention. Even those minimum wage studies that have focused on the restaurant industry, which employs a large share of employees who are covered by the tipped minimum wage, have not separately analyzed it. Rather, recognizing that the restaurant industry has a large number of minimum wage workers who are not tipped, these analyses have pooled all restaurant workers and assumed that a single wage floor applies to them. Or, they have focused only on the limited-service industry, in which workers are not tipped.

The wage floors that apply to tipped and non-tipped workers may be 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 2014). Moreover, while there is some correlation between state minimum wages and tipped minimum wages, 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 main source of information on how much tipped earners receive per hour is the Current Population Survey Outgoing Rotation Group (CPS ORG). Besides the usual information on industry and occupation, the survey asks respondents whether they receive tips as part of their hourly compensation and to report on what they make per hour minus tips (a second question asks about weekly earnings including tips). The survey response suffers from significant error (Rodgers et al., 1993), with respondents tending to overestimate at the lower end of the distribution and underestimate at the top end. Several researchers have coped with the problematic nature of survey responses by using establishment-level data such as the Quarterly Census of Employment and Wages; however, it is impossible with these aggregate data to differentiate between employer-

paid wages and tips. Without a reliable measure of the hourly wage paid by employers, the effect of tipped minimum wages on the welfare of servers is difficult to assess.

Yet the topic of tipped minimum wages is an important one for a variety of reasons. Recently, there has been increased focus on the federal tipped minimum, which has not been increased since 1996.[1] Discussions of minimum wage increases are always contentious, and the importance of good data and analysis on the topic cannot be overestimated. This is especially true because of the number of tipped employees in the workforce. For example, 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. [2] The expectation is that an even higher number of workers will be covered by tipped minimum wages in future years.

In this paper, I use a unique data set that overcomes the problems of survey and establishment-level data—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 compare them to the measures in the CPS ORG for a subset of the sample. I then examine the effects of tipped minimum wages on hourly wages, hourly tips, server employment, and hours worked per year, using the variation in tipped minimum wages in states over time as an identification strategy.

[1] 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.

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

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 also find some evidence that employment first increases and then falls in response to tipped minimum wages. These results are consistent with a monopsony model of server employment. 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 wages and tips may cancel one another out, leaving a researcher using a total wage measure to find no effect. Second, the monopsony effect of first increasing and then decreasing employment provides some policy guidance on how high to set a tipped minimum wage. This information may be useful for the setting of regular, non-tipped minimum wages if we suspect that the labor market in general follows a monopsony model. 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 and, thus, work less for their tips.

The paper proceeds as follows: Section 2 provides background on the tip credit and an overview of the relevant literature. Section 3 goes over the data, with particular emphasis on how W-2 data is generated, the reporting requirements of employers and servers, and the comparison of W-2 data to survey data. Section 4 provides some information on the usual theories regarding tipped servers and the minimum wage, and gives the empirical specification used in the analysis. Section 5 presents the results, and Section 6 concludes. Also included is an appendix providing some detail on the W-2 and the reporting requirements for employers of tipped employees, as well as a state-by-state accounting of wage information.

2 Background

2.1 Tip credit policies

The Fair Labor Standards Act of 1938 established the "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 the tipped minimum from the standard minimum, and since that time the federal tipped minimum wage has remained at $2.13 per hour. This rate reflects the standard minimum wage in place in 1996 ($4.25 per hour). Thus, as the standard minimum wage has increased over time, so has the allowable tip credit, which currently stands at $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 2013) 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).[3] Figure 1 shows maps of the U.S. in 2005 and 2011, giving an indication of 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 as of 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

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

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.[4] Federal regulations also require careful recording of tipped and non-tipped work by an individual employee.[5] Both employers and employees have the responsibility to 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 IRS has pursued legal action against restaurant owners in cases of income misreporting, as opposed to employees, as 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.

2.2 Literature review

There is an extensive literature on the impacts of minimum wages, but little research has been done specifically on the tipped minimum wage. A likely reason for this gap in the literature is the absence of reliable data on tips. The ORG data from the CPS is the

[4]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 employees 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).

[5]This is to keep employers from assigning duties to tipped employees that would otherwise be performed by a non-tipped worker paid at the standard minimum.

main source of information on a variety of employment measures—specifically hourly wages. 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 difficulty calculating an average 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 econometrically 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., 2013).

In terms of tipped wages, the earliest empirical work on the topic is Wessels (1997) (plus an earlier paper, Wessels (1993)), 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 uses

the service time per meal (restaurant employment divided by real restaurant sales) as the dependent variable. He acknowledges that investigating the tipped wage using this measure is not ideal, as both tipped and non-tipped workers will be included in the numerator. Wessels finds evidence for the monopsony model in that employment first rises and then falls as the tipped minimum wage increases.

Since Wessels' papers, there have been a small number of analyses using survey data. Anderson and Bodvarsson (2005) investigated Occupational Employment Statistics to discover whether sub-minimum wages have "bite," finding that servers in higher-wage states do not appear to see an increase in wage. Allegretto (2013) follows 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 estimates 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 separation of full hourly wage and its two parts: wage paid by the employer and tips. An employer's response to an increased minimum will affect 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 hourly wage paid by an employer if his wages were below this threshold. Second, if at all possible it is important to separate tipped from non-tipped employees. Simply looking at sector employment conflates two separate labor markets, each of which faces a different wage floor.[6] I am able to contribute to the existing literature by examining measures on 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.

[6]Oddly, there is only a weak association between state minimum wages and state tipped minimum wages—about 0.4.

3 Data, Sample, and Descriptives

3.1 W-2 data

To my knowledge, this is the first paper to examine tipped income using W-2 administrative records. As such, a description of the data and some documentation of how it is generated is in order. The IRS directs restaurant owners to keep track of employees' wages and tips. Before the widespread use of POS systems to record this information, 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). Modern POS systems can be configured 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 and tips separately on the W-2 form.[7] 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 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. 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. Restauranteurs often employ work under the table, and such work will certainly not be recorded in tax data.[8] A final issue is that restaurant owners and managers may poorly understand the

[7] See Appendix Figure 1 for W-2 instructions. The instructions specific to reporting tips are highlighted.

[8] 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).

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 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).

Anecdotal evidence confirms this. In discussions with restaurant managers in the Washington, DC, area, I found that POS systems which track tips are the standard in the restaurant industry. On the other hand, some restaurants appear to pay their servers' tips in their paychecks rather than tipping out at the end of a shift. This practice may make the reporting of tipped wages even more difficult for survey respondents. It may also confound tip and wage reporting on the W-2.

3.2 Survey data and variables

The survey data used in this work is the 2006 to 2012 CPS ASEC, linked person by person with 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. Over this time the federal tipped wage remained at $2.13 per hour, but states' tipped minimums underwent many changes.

Records were linked in the Center for Administrative Records and Research (CARRA) at the U.S. Census Bureau. The linking process involves assigning to individuals in each data set a unique person identifier, called a Protected Identification Key

(PIK). CARRA assigned these unique identifiers via the Person Identification Validation System (PVS), which employs probabilistic record linkage techniques (see Wagner and Layne, 2014, for more information). CARRA uses personally identifiable information (PII) such as Social Security Number, name, date of birth, and address to assign a PIK by comparing the same fields in a master reference file constructed from federal administrative data sources. CARRA then removes the PII from the data file to anonymize the data and preserve confidentiality so it can be used for statistical purposes and research. Only those observations that received the unique key are used in the analysis.

The CPS provides the identification of tipped workers in the restaurant industry through the 4-digit occupation code, as well as the demographic, labor, and state characteristics used in the econometric analysis. I retain all of the respondents who report being a full-service restaurant server: wait staff and bartenders. Full wages for these individuals come from the Wages, Salary, and Tips field of the W-2. I also retain the variable that reflects FICA wage—this is wage paid by employers directly to the employee. Subtracting the latter variable from total wages, salary, and tips yields tip income.

A key concern is how hourly wage is calculated: I take yearly W-2 earnings and divide them by hours worked per year. Hours worked per year is itself the product of weeks worked per year and 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, even assuming 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 recorded 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 in 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 approximately half of those whose specified occupation is restaurant server. [9]

Appendix table 1 provides a full overview of year-by-state minimum wages, showing the average FICA wage and total wage in each state. For the most part, the listed average wage for each state and year looks reasonable, with average FICA wages generally above the tipped minimum wage, and a higher FICA wage in states with higher minimum wages. In many cases, the average FICA wage is close in value to the minimum wage, indicating that when the wage floor increases, the increase will "bite" at the low end of the wage distribution.

3.3 An assessment of W-2 and survey hourly wage

To assess how survey reports and W-2 administrative records compare, I linked CPS ASEC participants to their outgoing rotation group data for the same year.[10] When respondents rotate out of the survey sample, they receive questions on their current employment situation. Questions include: whether the respondent works by the hour; how much he or she makes per hour in non-tipped wages; whether he or she receives tips; and how much in total compensation he or she makes per week. The measurement of hourly wage from the linked CPS ASEC/ORG–W-2 data is based on the W-2 annual wage information divided by hours worked per year. Meanwhile, the hourly rate in the outgoing rotation group is a direct measure taken in the month that the respondent leaves the survey. Respondents are prompted to report what they make per hour without including tips or commissions.

Figure 2 shows kernel density estimates of ORG hourly wage as a function of W-

[9] 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.

[10] Further work on the measurement of W-2 information will use both the same-year outgoing responses and responses for the preceding rotation when it is available. See http://www.census.gov/prod/2006pubs/tp-66.pdf for the rotation structure of the CPS.

2 constructed hourly wage (top panel) and ORG earnings as a function of W-2 FICA wages divided by weeks worked. The results of this simple analysis are striking, with hourly earnings derived from the survey suffering from marked over reporting below approximately $7 or $8 per hour, and suffering from underreporting beyond that point. Estimates get very noisy beyond about $14 or $15 per hour. Weekly earnings, shown in the bottom panel, are slightly less prone to error.

There are several reasons why the two sources of information may not match. The most obvious reason is that wages, earnings, and income are routinely reported with error by respondents—a subject of multiple investigations (see Bound et al., 2001, for example). If we take W-2 wages as "true," the error shown in these graphs follows the general pattern, but is an extreme example, of wage misreporting—overestimation at the low end and underestimation at the high end. Second, as few as five and as many as 13 months passed between the generation of the information that makes up the W-2 measure and the ORG information. A respondent may have changed jobs or occupations during this time, may have received a pay increase, or may have left the labor force entirely. Finally, because weekly earnings appear to be reported more accurately than non-tipped hourly wages, it is possible that FICA wages are not as "clean" as they should be, but that some employers are including tip income in their FICA reporting. A conclusion to draw from this analysis is that W-2 reporting should be more thoroughly investigated, which will be the focus of a separate paper.

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' 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 x axis is serving time per meal, which will reflect 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 y 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 better table coverage). A tipped minimum wage above w_c causes hiring to decrease back along the service demand 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 wages are already higher than the a 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 from 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 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 Empirics

To examine the evidence on tipped minimum wages using the theoretical construct outlined above, I use a difference-in-differences approach that has become standard in analyses of this type. First, I collapse the data into state-year cells, retaining information on tipped minimum wages, minimum wages, and rates of employment and demographic characteristics. An effect of higher minimum wages is identified using the variation in state tipped minimums over time. The dependent variables in question (FICA wages, total compensation including tips, employment, and hours worked) is examined in turn

using the following model:

$$\ln(y_{st}) = \alpha_{st} + \beta * \ln(TW_{st}) + \gamma * \ln(MW_{st}) + \phi_s + \eta_t + \epsilon_{st} \quad (1)$$

where $\ln(y_{st})$ is one of the dependent variables described above, $\ln(TW_{st})$ 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 time fixed effects. To this baseline model, I then add demographic characteristics measured at the state level, including log total employment, average wage for all workers, and the proportion of the labor force in the state who are men, the proportion married, the proportion with a high school degree or more, and the proportion of nonwhites. I add information on restaurant prices by including the "food away from home" component of the Bureau of Labor Statistics' Consumer Price Index. 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.[11] All specifications employ standard errors clustered at the state level, and each regression is weighted using the number of observations in the state-year cell.

5 Results

Table 1 provides summary statistics for the sample used in the regression analysis. Overall, the mean tipped minimum wage is $3.19 per hour, compared with a mean FICA wage of $4.44 per hour. The mean minimum wage is $6.43 per hour, while the per hour total compensation for servers is $7.42. 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 $21.79 per hour.

[11] The number of year-state observations limited to restaurant servers leads to an analysis data set of fewer than 400 observations.

The average size of the server labor force within a state 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 analysis. Results did not change much when the cell size was limited to greater than 3 compared with greater than 5. The ratio of servers to non-servers in the restaurant industry is approximately 0.3. I did not include restaurant employees who may be partially tipped in the server category, including food runners, hosts and hostesses, and busers; according to the IRS-provided definition, these employees should be covered by the minimum wage and not the tipped minimum.

Table 2 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 indicates 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. Meanwhile, the state minimum wage does not appear to affect the wages of tipped employees, which is as expected.

In contrast, I do not find that overall compensation increases with increases in the tipped minimum wage—this is due to 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 wage increase (5 or 6 percent). Taken alone, these results are consistent with the monopsony model, as we expect less in tips as employer-paid wage increases. 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 3, we see that in a linear model there is no relationship between tipped minimum wages and server employment. This is true for both person employment and hours worked contingent on employment. However, 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, 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. While the graph looks noisy, the resulting quadratic estimation is presented in Table 4. The coefficients on the tipped minimum wage and its square are statistically significant in the first two models, with the interpretation that the relationship is positive over lower values of the tipped minimum wage but eventually level out and then decrease. When controlling for state-specific time trends, the coefficients are smaller and no longer statistically significant. There is no relationship between hours worked and tipped minimum wages in the quadratic equation.

The coefficients from the quadratic model imply that as tipped minimum wages increase from $2.13 to about $4.50, employment in the server sector increases.[12] Yet, considering how strong the elasticities are for both wages and tips, the employment evidence is noisier and not as strong. It is more than likely that some employers respond to higher wage floors in other 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). If these schemes are more common in high tipped-minimum-wage states, it may

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

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 make it appear that servers do not see an increase in overall compensation when a tipped minimum wage is established, but do experience greater employment over a substantial proportion of state minimum wages.

As a sensitivity check, it has become a common practice in minimum wage papers 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. There is no statistically significant relationship between the placebo and any dependent variable used in the analysis.

6 Conclusion

This paper presents a new source of information for wages on tipped servers and analyzed 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 and compared it with similar measures from the CPS ORG. I present evidence that raising the tipped minimum wage has the effect of raising that portion of wages paid by employers, but decreases tip income by a similar percentage. An increase in the 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 monopsony model, with some caveats about the noisiness of the employment estimates compared with the wage and tip estimates.

A limitation of this work is that, while we can feel confident that W-2 FICA wages represent 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 part of the W-2, the effect of the tipped minimum wage 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 proven difficult to capture in other sources of data. The clear demonstration of a monopsony effect provides some policy guidance on the setting of minimum wages, with the understanding that higher minimums may induce employment in industries where a monopsony 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 and thus better table coverage over a wide range of the tipped minimum wage.

More work needs to be done on assessing the wage information generated by the W-2. An especially useful activity would involve discovery of actual reporting practices (that is, how well employers follow the W-2 instructions), how tip-pooling and service charges affect reporting, and how these activities are affected by minimum wage increases.

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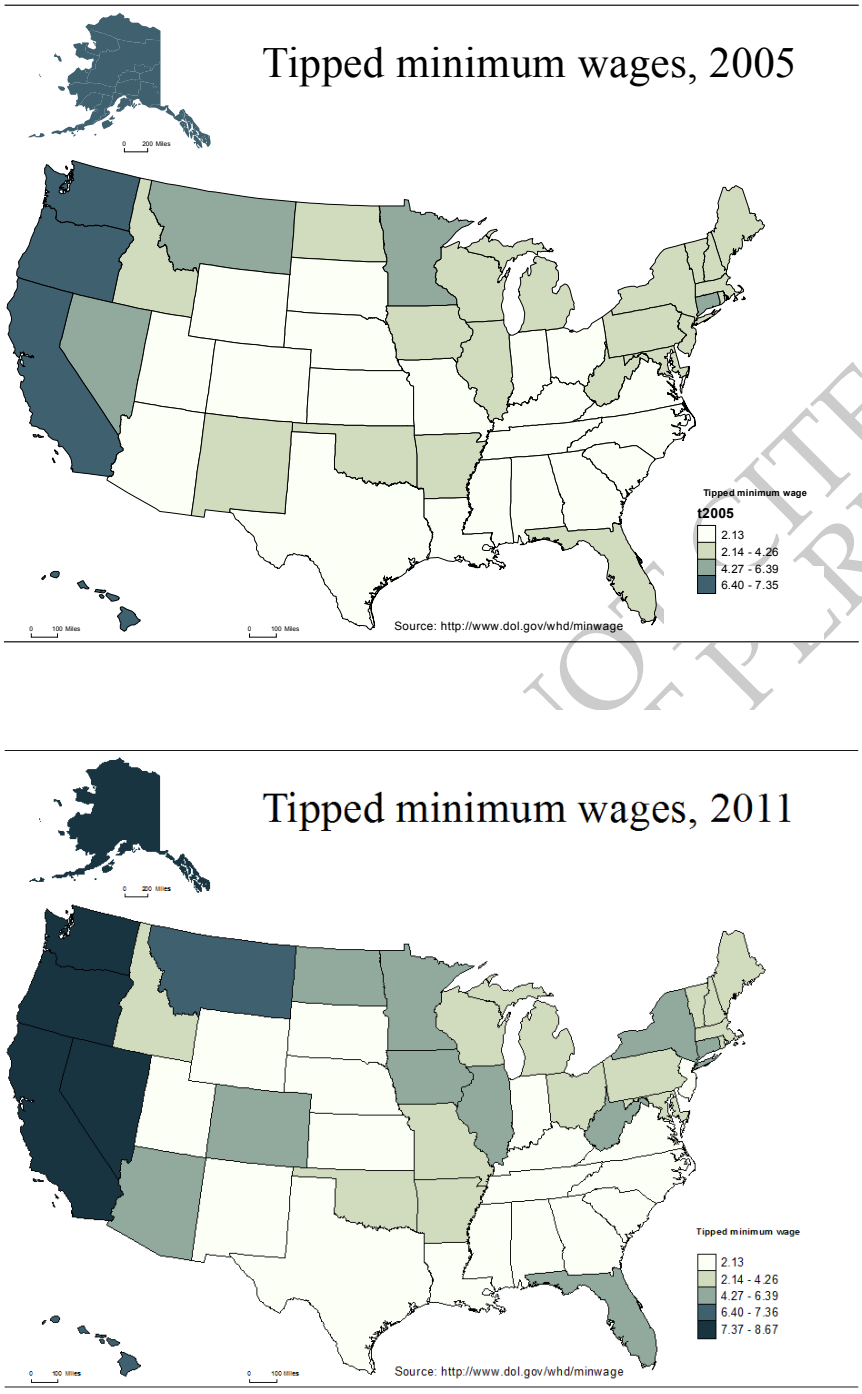

Figure 1: The maps show states with tipped minimum wage for 2005 (top) and 2011 (bottom). Graph shading indicates the federal minimum wage times 1 (white) to more than 4 times (darkest blue).

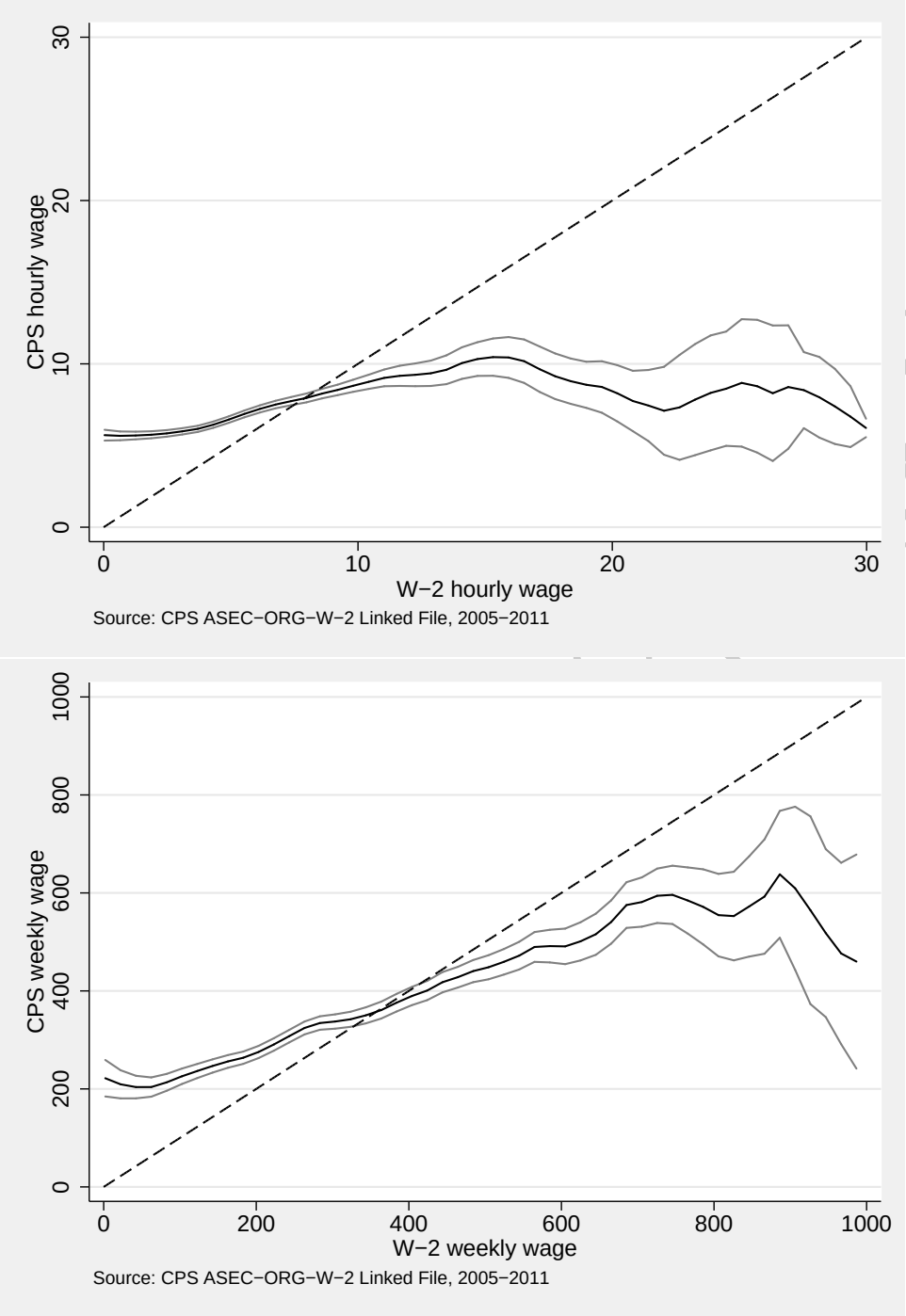

Figure 2: The top figure shows a kernel density estimates of ORG hourly wage (not including tips) as a function of FICA wage calculated from W-2 total FICA earnings for the year divided by hours worked per year. The bottom figure is an estimate of ORG weekly compensation (including tips) as a function of W-2 Wage, Salary, and Tips divided by weeks worked per year. See text for description of variables.

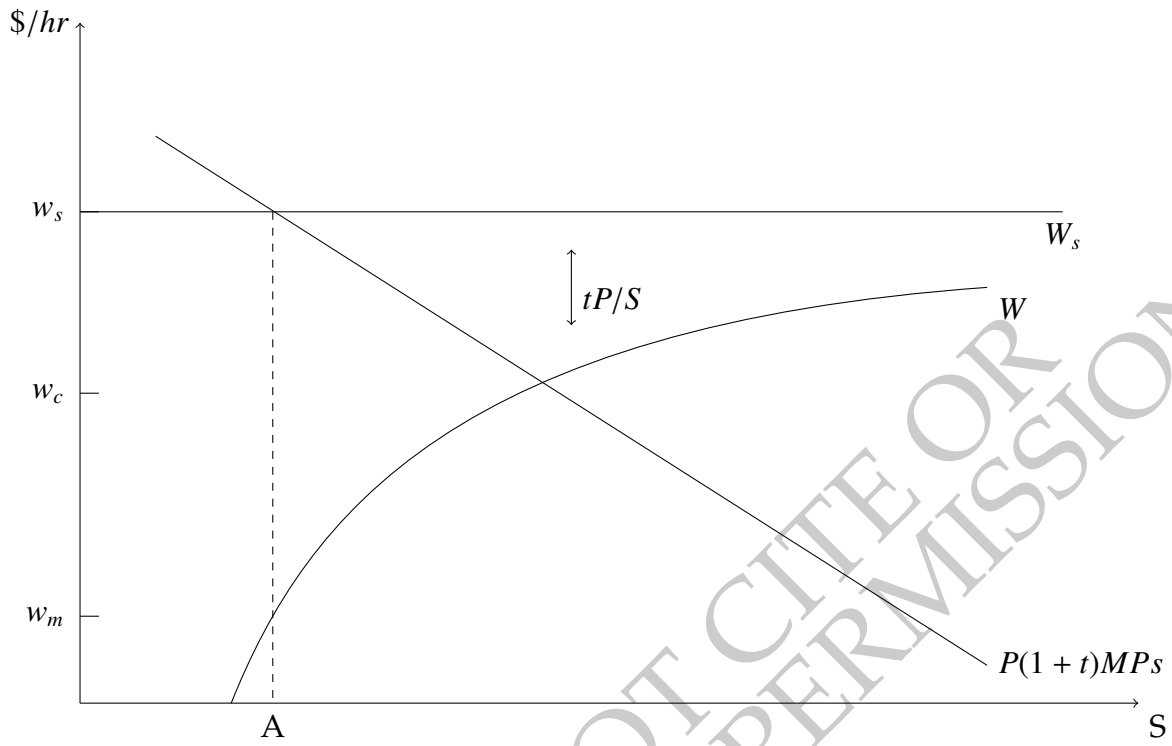

Figure 3: Adapted from Wessels (1997). The figure shows the monopsony market for tipped servers. See text for description.

Table 1: Summary statistics of variables used in analysis

State characteristics	Mean	SD
Tipped minimum wage	3.19	1.55
Minimum wage	6.43	1.17
Employment rate	0.94	0.02
Size of labor force, all workers	586.93	1.64
Price of meals	8.28	1.13
Average hourly wage, all workers	21.79	1.31
Proportion male	0.57	0.03
Proportion married	0.63	0.05
Proportion nonwhite	0.30	0.18
Proportion with HS education +	0.75	0.14
State characteristics, servers		
FICA wage per hour	4.44	0.32
Size of server labor force	13.61	1.81
Annual hours	871.47	1.32
Total hourly compensation	7.42	0.29
Ratio of servers to non-server restaurant employment	0.25	0.07
Observations	357	

Source: Linked CPS ASEC–W-2 file for tax years 2005 to 2011. The columns show the mean and standard deviation for variables after collapsing by state and year. The number of observations reflects the number of year-state cells (51 states including DC and 7 years). Key variables from the W-2 are FICA wage per hour and total compensation 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 2: Difference-in-difference estimates: wages and tips

	FICA Wage			Tips per Hour		
Tipped minimum wage (log)	0.57***	0.59***	0.54*	-0.55*	-0.56**	-0.82*
	(0.14)	(0.13)	(0.21)	(0.21)	(0.18)	(0.37)
Minimum wage (log)	0.10	-0.01	-0.07	-0.06	-0.36	-0.36
	(0.20)	(0.14)	(0.23)	(0.31)	(0.29)	(0.40)
Employment rate, all worker		0.40	-0.66		0.91	1.40
		(0.97)	(1.38)		(1.56)	(3.22)
Population (log)		0.82**	0.61		-0.69	-0.50
		(0.29)	(0.41)		(0.64)	(0.95)
Price of meals (log)		-0.28	-0.39		0.33	0.49
		(0.19)	(0.29)		(0.33)	(0.46)
Average hourly wage, all workers (log)		0.85***	0.89***		1.18***	1.20***
		(0.05)	(0.06)		(0.16)	(0.20)
Proportion male		-0.08	-0.02		-0.29	-0.55
		(0.58)	(0.74)		(1.28)	(1.82)
Proportion married		0.04	0.25		-0.03	-0.26
		(0.54)	(0.71)		(1.47)	(1.93)
Proportion nonwhite		0.31	0.42		0.05	-0.07
		(0.42)	(0.52)		(0.88)	(1.26)
Proportion with HS education+		-0.25*	-0.15		0.44*	0.27
		(0.10)	(0.13)		(0.20)	(0.27)
Constant	0.13	-9.53**	-6.70	1.35*	5.36	3.87
	(0.36)	(3.10)	(4.57)	(0.52)	(6.54)	(10.10)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Trends	No	No	Yes	No	No	Yes
Observations		357			357	
R2	0.67	0.68	0.72	0.56	0.57	0.61

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 FICA wage, full hourly compensations, and employment rate of servers. Model 1 includes only 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 use standard errors clustered at the state level.

Table 3: Difference-in-difference estimates: employment effects

	Sever employment			Hours worked per year		
Tipped minimum wage (log)	0.07	0.06	0.08	-0.27	-0.24	-0.44
	(0.06)	(0.06)	(0.07)	(0.16)	(0.15)	(0.31)
Minimum wage (log)	-0.03	-0.02	-0.07	0.29	0.30	0.47
	(0.06)	(0.06)	(0.06)	(0.27)	(0.24)	(0.34)
Employment rate,		0.07	-0.23		-0.96	-1.47
		(0.41)	(0.53)		(1.11)	(1.68)
Population (log)		-0.12	0.01		-0.97*	-1.41*
		(0.16)	(0.17)		(0.43)	(0.61)
Price of meals (log)		-0.05	-0.05		0.05	0.34
		(0.10)	(0.13)		(0.29)	(0.39)
Average hourly wage, all workers (log)		0.00	0.00		-0.37***	-0.35***
		(0.02)	(0.02)		(0.07)	(0.08)
Proportion male		-0.02	-0.04		0.92	1.81
		(0.28)	(0.34)		(0.77)	(1.03)
Proportion married		0.18	0.19		-0.18	-0.34
		(0.25)	(0.30)		(0.82)	(0.99)
Proportion nonwhite		-0.03	0.00		-0.09	0.45
		(0.16)	(0.26)		(0.50)	(0.52)
Proportion with HS education or more		-0.00	-0.05		0.60***	0.53***
		(0.04)	(0.04)		(0.12)	(0.15)
Constant	0.25*	1.23	0.31	6.60***	17.11***	19.93**
	(0.10)	(1.69)	(1.69)	(0.47)	(4.63)	(6.46)
State dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Trends	No	No	Yes	No	No	Yes
Observations		357			357	
R2	0.67	0.68	0.72	0.56	0.57	0.61

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 FICA wage, full hourly compensations, and employment rate of servers. Model 1 includes only 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 use standard errors clustered at the state level.

Table 4: Difference-in-difference estimates: Rate of employment of waitstaff, alternate specification

	Sever employment		
Tipped minimum wage (log)	0.35*	0.37*	0.09
	(0.15)	(0.18)	(0.30)
Minimum wage (log)	-0.04	-0.04	-0.07
	(0.06)	(0.06)	(0.06)
Square of tipped minimum (log)	-0.12*	-0.13*	-0.01
	(0.05)	(0.06)	(0.13)
Employment rate, all workers		-0.27	-0.23
		(0.38)	(0.52)
Population (log)		-0.13	0.01
		(0.15)	(0.17)
Price of meals (log)		-0.03	-0.05
		(0.09)	(0.13)
Average hourly wage, all workers (log)		0.00	0.00
		(0.02)	(0.02)
Proportion male		-0.07	-0.04
		(0.28)	(0.34)
Proportion married		0.17	0.19
		(0.25)	(0.30)
Proportion nonwhite		0.02	0.00
		(0.18)	(0.26)
Proportion with HS education or more		-0.02	-0.05
		(0.04)	(0.05)
Constant	0.12	1.58	0.31
	(0.11)	(1.60)	(1.70)
State dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Trends	No	No	Yes
Observations		357	
R2	0.67	0.68	0.72

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 employment rate of servers using a quadratic in the log tipped minimum wage. Model 1 includes only 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 use standard errors clustered at the state level.

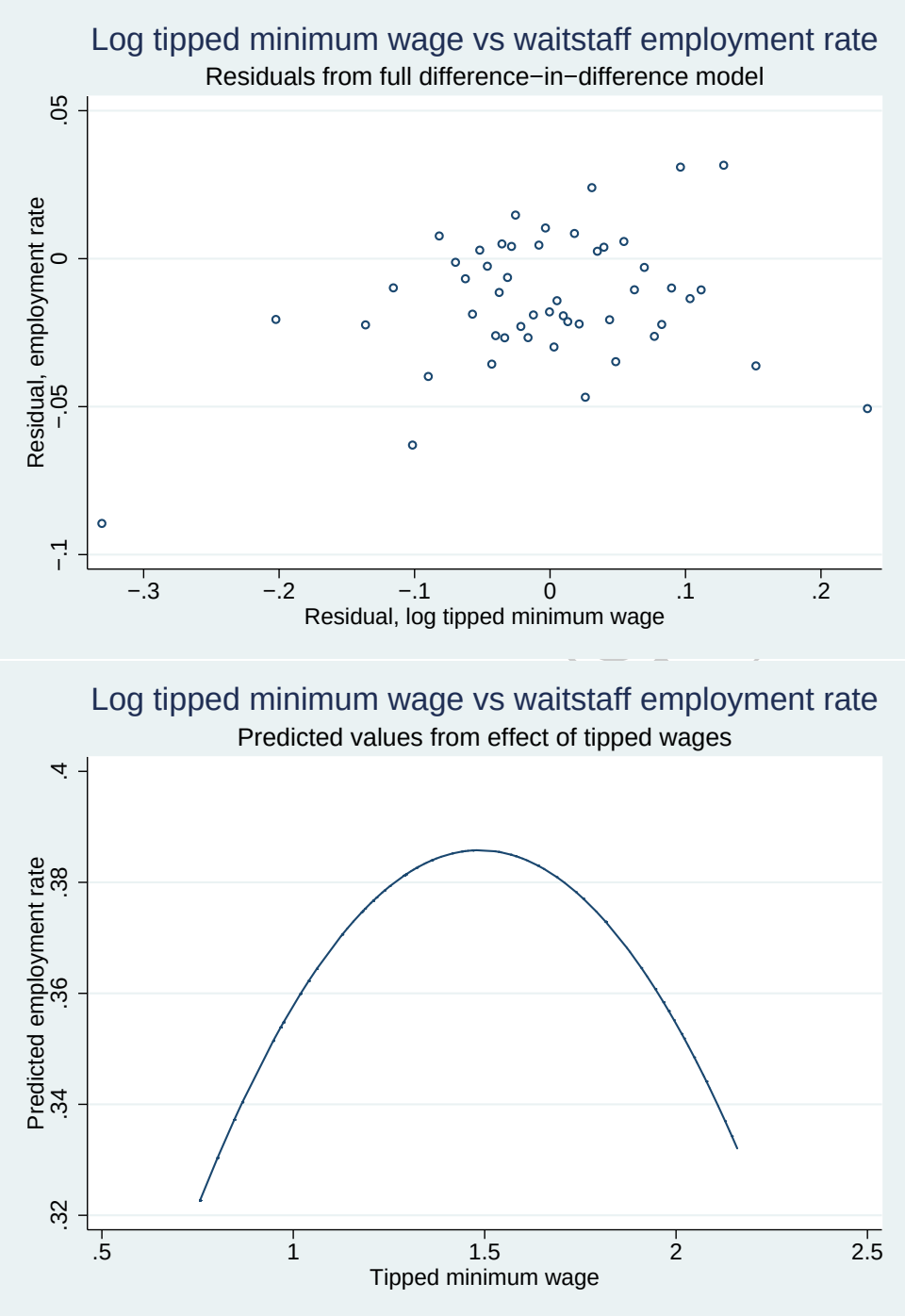

Figure 4: The graphs show partial residual plots of the relationship between the tipped minimum wage and employment rate among servers (top) and graphs out quadratic relationship over all values of the logged tipped minimum wage (bottom).

7 Appendix

The following pages show the IRS instructions for employers in filling out employees' W-2s. Information pertaining to tips is highlighted.