Limited And Full Service Restaurants: California County QCEW Data, 2006Q1 – 2017Q2*

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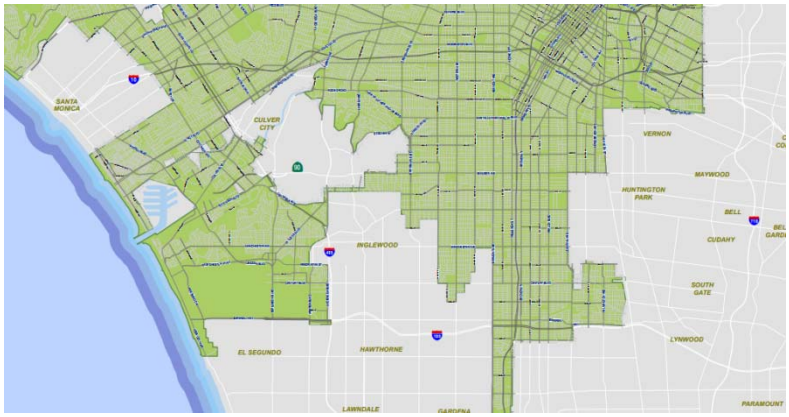
http://www.arnoldfoundation.org/

This document is part of a larger study of the impact of the increases in the California minimum wage supported by the Arnold Foundation with Principal Investigators, Ed Leamer, Till Von Wachter and Fred Zimmerman. The original grant was focused on the increments of the minimum wage voted by the City Council of Los Angeles taking effect first on July 1, 2016. The map on the right with the City in green illustrates the complex geography to which this minimum wage would have applied.



This would have created streets with a $15 minimum on one side and a $9 minimum (per California law) on the other. While extending the findings of this kind of geographic competition to other settings would have been a challenge, this extreme experiment would have shed light on the extent to which jobs might move from an area with a high minimum wage to an area with a low minimum wage. Perhaps recognizing the evolving undesirable complex patchwork of California city minimum wages, the State adopted its own schedule of increases in minimum wages, which closely tracks the legislation adopted by the City of Los Angeles. This hugely changes the competitive geography. Moving a business from one side of the street to the other to escape the City minimum wage involves relatively small costs compared with the decision to move a business from California to some other state or to some other country to escape the California minimum wage. That option is open only to tradable goods and services, e.g. manufacturing and intellectual services. (Restaurants in Los Angeles can suppose that their customers would follow them across the street, but probably not follow them to Las Vegas or Phoenix.)

This is document is a first-pass at using **California County QCEW** data to estimate minimum wage effects in California overall, including, of course, Los Angeles County. Although the data are available by industry on the BLS website https://www.bls.gov/cew/datatoc.htm#NAICS_BASED going back to 1975, this report uses California county data that begin in 2006, early enough to capture the 2008/09 recession.

A study of county data helps to focus the mind on how best to find control groups, which is one of the biggest problems[1] that confronts attempts to estimate the effects of minimum wages. What is the right county or combination of counties nationwide to contrast with Los Angeles County? The answer to this question in this document is not by direct choice, nor by the construction of so-called synthetic controls, but by modelling that allows the effects of minimum wages to differ in understandable and predictable

[1] For example, in an LA Times about a study of the Seattle minimum wage, the findings were cast aside by Michael Reich because "He faulted the researchers for using a control group that only included regions within Washington, when bigger cities outside the county have job markets that act more like Seattle's." http://www.latimes.com/business/la-fi-seattle-minimum-wage-20170626-story.html

ways. For example, it is the low-wage counties in California that are likely most affected by increases in California minimum wages, and the high-wage counties might serve as a "control group" , not an untreated control group but a minimally affected control group.

Incidentally, least squares estimation of a linear model assigns the greatest influence to the most extreme observations, which means that the location of the regression line at the mean of the data is determined not by observations close to the mean but by a combination of the extremes to the right and left. If you want similarly positioned observations to have greater influence, try a quadratic model. Or for more localization of the estimate of the slope try a higher order polynomial. That's a model-based synthetic control. A statistical model is needed to provide correct estimates of the uncertainty that comes from not knowing which the best controls are. This document uses a linear model, that is to say an interaction variable that multiplies the minimum wage with a linear combination of county characteristics, but non-linear combinations are in the plans.

The QCEW Handbook of Methods is quoted in **Section I** of this report which is intended to alert readers to the important shortcomings of these data. First of all, what is called "wages" by QCEW includes some supplements to hourly earnings and salaries but not others. I will try to use the word "compensation" or "earnings" instead of "wages" to help maintain a mental note of this. Secondly, the wage data collected by QCEW is the total wages paid by each enterprise, including low-wage workers who are directly affected by changes in minimum wages and high-wage workers who are indirectly affected, if at all. No data are collected on hours worked, and no data on individual workers. The observed sums across workers can be stable while very important changes are occurring in hourly earnings and hours worked at the individual level. These same enterprises are required by the Unemployment Insurance programs to report by Social Security number the total payments made to each worker, but these data are not publically available. Some states also require reporting of hours for hourly employees. This is something that California would wisely do as it pursues its plans to address poverty and inequality with increases in minimum wages since otherwise it is difficult to form useful and reliable estimates on the impacts of changes in California's minimum wage. Thirdly, the enterprise data are not released and instead enterprises are aggregated by geography (Counties, Counties, MSAs) and by Industries (NAICS 6-digit and higher). When the disaggregation by geography and by industry produces categories with only a few enterprises, these data are suppressed for confidentiality concerns. Studies at the enterprise level could be useful, showing how the minimum wage alters the births and deaths of enterprises and how it favors small or large ones. Studies of the individual earnings histories reported to the Unemployment Insurance program could also be useful, showing how minimum wages alters the career paths of individuals.

Thus it is important to understand that average weekly earnings are computed using the QCEW data by dividing total weekly wages by total number of employees, ignoring both differences in wage rates among workers and differences in hours worked. Then, for example, average weekly earnings could increase when minimum wages rose if there is a shift in hours in favor of the higher paid workers, which is not what is desired by most minimum wage proponents. And similarly, the number of employees might fall even when total hours worked remained constant if there is shift toward workers with greater weekly hours. My message here: the QCEW data are not so good for studying minimum wage effects.

Section II lays the foundation for the data analysis reported here. First is a display of the California minimum wage – the treatment effect. Next is a list of NAICS 6-digit sectors in California with average weekly earnings below $600, and an explanation for the focus on only two NAICS 6-digit sectors: limited-service and full-service restaurants. Third is the choice of California counties, excluding those with missing data. Fourth is the "identification strategy" in a setting in which each and every enterprise in the data set is subject to the same treatment level. And then fifth is the admission that treating each county as a separate experiment is probably not ideal, because of unobserved effects that are geographically correlated and because of daily commuting between close counties and also because of movement of workers homes between counties in pursuit of the highest real wages. There is more work to do.

The focus in this document on limited service and full service restaurants is because these are two of the three low-wage NAICS 6-digit sectors with substantial employment and because the restaurant industry is subject to two forces that affect employment levels in opposite directions: (1) the employment-effects escape valve of higher prices to customers, and (2) the prospects for automation and machine-based service substituting for humans. Our minimum wage work includes a Los Angeles county restaurant price survey as well as scraping of menu prices from the Internet to determine the extent to which the increments in the minimum wage are passed on to customers. The contrast between the two restaurant sectors may be interesting because full-service restaurants are likely affected less or just differently by minimum wages because wages and hours are higher and because tipping is part of the compensation, though cash tips are probably recorded inaccurately in the QCEW data. (A limited service restaurant has no wait-staff and has food delivered at the counter.)

Next comes the analysis of the California county panel data extending from 2006q1 to 2017q2 and including the subset of the 58 California counties with complete data during that period of time. My personal view is that a persuasive data analysis would include four distinct items:

1. **Exploratory Data Analysis**: Show us what your data look like.
2. **Confirmatory Data Analysis**: Tell us what your model makes the data say.
3. **Data Perturbation**: Tell us what feature of the data allows the model to make that conclusion.
4. **Model Perturbation:** Tell us how the conclusions change if the model is changed.

This report has the first two of these included. The last two are a work in progress.

Section III of this document reports an exploratory data analysis with images first of the cross-sections comparing different counties at a point in time, secondly the seasonally unadjusted and seasonally adjusted time series for each county and third a study of the sequence over time of the cross-sections. The goal here is to make sure these data are well understood and to identify features of the data that suggest that the California minimum wage has been having an effect on either average weekly earnings or on employment in these restaurant sectors. I suggest that these visual images support the conclusion that the minimum wage has been affecting average weekly earnings but there is no smoking gun regarding the employment effects, indeed hardly any smoke.

Section IV reports four econometric dynamic panel models that explain average weekly earnings and employment in limited service and full service restaurants. If you are anxious, you can jump right to the finish line and look at **Figure 16** which displays the model-based estimates of the impact of the increments in the California minimum wage on average weekly earnings and employment. There you will see an increase in average weekly earnings in both limited-service and full-service restaurants, off-set by a decline employment of roughly the same magnitude. Frankly, in view of the exploratory data work, I am somewhat surprised to see an estimated negative employment effect of that magnitude and I do not know exactly how the model is able to force that confession from the data. Be assured, that until I find the reason why, I will not be telling Jerry Brown that the minimum wage has already had an adverse employment effect on California restaurants, which after all have experienced actual employment increases exceeding California overall, a fact illustrated in Figure 7. I suspect that the answer lies in the inclusion of a time trend in the model. Figure 10 in the exploratory data analysis illustrates detrended employment data with restaurant employment weaker than overall employment during the period in which minimum wages were rising, 2014, 2016 and 2017.

The other big caveats are:

- No individual data
- No data on hours worked
- No sensitivity analysis to demonstrate that minor changes in the models don't affect estimates of minimum wage effects very much. (like the time trend)
- No treatment of the geographic reality that prevents each county from being a stand-alone separate experiment.
- No treatment of the potential effects of the minimum wage on the county totals which are taken as exogenous.

I am not really worried about taking the minimum wage as an exogenous variable.

I. QCEW Handbook of Methods: Quotes

Here are two relevant quotes from the QCEW Handbook:

Private-industry employment. QCEW monthly employment data represent the number of covered workers who worked during, or received pay for, the pay period that included the 12th day of the month. Covered private-industry employees include most corporate officials, all executives, all supervisory personnel, all professionals, all clerical workers, many farmworkers, all wage earners, all piece workers, and all part-time workers. Workers on paid sick leave, paid holiday, paid vacation, and the like are also covered. Workers on the payroll of more than one firm during the period are counted by each employer that is subject to UI, as long as those workers satisfy the preceding definition of employment. Workers are counted even though their wages may not be subject to UI tax in the latter months of the year. In this regard, the federal UI taxable wage base is the first $7,000 paid in wages to each employee during a calendar year. Thus, at whatever point in the year an employee reaches that accumulation of wages, he or she is no longer taxed in the months remaining.

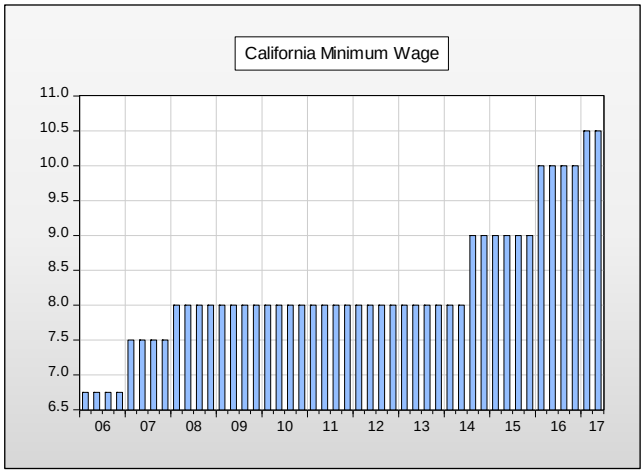
Wages. In most counties, covered employers report total compensation paid during the calendar quarter, regardless of when the services were performed. A few county laws, however, specify that wages be reported for or be based on the period during which services are performed rather than the period during which compensation is paid. *Under most county laws or regulations, wages include bonuses, stock options, severance pay, the cash value of meals and lodging, tips and other gratuities. In some counties, wages also include employer contributions to certain deferred compensation plans, such as 401(k) plans.*

Covered employers' contributions to old-age, survivors, and disability insurance; health insurance; UI; workers' compensation; and private pension and welfare funds are not reported as wages. Employee contributions for the same purposes, however, as well as money withheld for income taxes, union dues, and so forth, are reported, even though they are deducted from the worker's gross pay.

II. Foundational Work

California Minimum Wage

The California minimum wage incremented from $6.75 in 2006 to $8.00 in 2008 and then held constant until the third quarter of 2014 when it increased to $9.00. There were subsequent increments to $10.00 in 2016 and $10.50 in 2017. The minimum wage is scheduled to increase to $11.00 in January 2018 and thereafter increase in each January by $1.00 until $15 is reached in 2022. These successive increments may shed light on the critical question: what minimum wage is demonstrably "too high"?



Choice of Sectors: Limited and Full Service Restaurants

Table 1 reports QCEW average weekly earnings, employment, and number of establishments for California 6-digit NAICS sectors in 2016. These sectors are sorted by average weekly earnings including only those sectors with average weekly earnings up to $600 which is the value of 40 hours at $15 per hour. In addition to these basic data series, the table includes the sector employment share of the California total (14.2m), the cumulative share and the average establishment size equal to the number of employees divided by the number of establishments.

Although hours worked are not available, my operating assumption is that much of the variability in average weekly earnings in this table is due to variability in average wage rates among sectors, and it is the sectors that have the lowest average weekly earnings that are likely to be most affected by the rise of the California minimum wage to $15 because they have the largest shares of workers directly affected. It is a source of concern that 28.8% of California jobs are in sectors that have average weekly

earnings less than $600, which is the amount of earnings in 40 hours at $15 per hour. This share 28.8% overcounties the total directly affected by including workers who have wages above $15 per hour in the lower wage sectors, but it undercounties the total by excluding workers who earn less than $15 per hour in the higher-wage sectors.

I have highlighted the three sectors that have the largest number of employees. Services for the elderly and disabled comprise 3.7% of employment, limited service restaurants 3.5% and full service restaurants 4.5%. A distinctive feature of the health care sector is that the number of enterprises is almost the same as the number of employees, with an average size of only 1.2. That unusual fact requires enhanced understanding of the way employment and earnings are determined for home health care, a task that is postponed, with the focus now put on limited service and full service restaurants.

The other sectors with low average weekly earnings will need to be studied also. Supermarkets and other grocery stores with average weekly earnings equal to $575 comprise 2.1% of California employment and Farm labor contracts with average weekly earnings equal to $473 comprise 1.0% of California employment. These might be large enough to merit individual treatment but the rest generally have much smaller employment shares. When this study of restaurants is finished the next step is probably to aggregate by sector and by average weekly earnings, e.g. combining the low-wage food service sectors that begin with NAICS number 722. (This is something I have done once, and will revisit.)

Choice of Counties With Complete Data

Table 2 indicates the average total employment from 2006q1 to 2017q2 in each of California's 58 counties, together with the counts of observations of the county totals, limited and full service restaurants. The total data are available in all 46 quarters in all counties, but the data for limited service restaurants and full service restaurants are incomplete either because no restaurants reported to the QCEW or because too few reported to allow disclosure of the total. The shaded numbers in this table are the ones that fall short of 46, and **these are the counties that are excluded** when studying the California county data to eliminate the effects on the analysis of moving these counties in and out of the database over time. This creates a balanced panel, which is an easier structure to work with econometrically. The omitted counties all had less than 10,000 average total employment except for Placer (limited services), which had 119,976 total employees. A data analysis weighted by employment would have put low weight on these omitted counties, and these omissions probably don't affect the results materially.

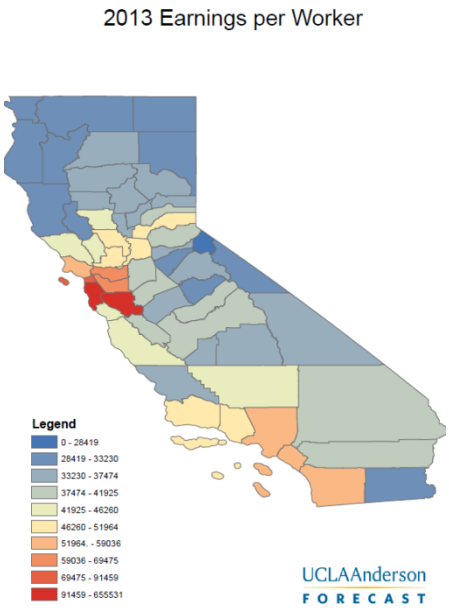
Identification Strategy

Per the California data in Table 1, full-service restaurants had average weekly earnings of $454 in 2016, $54 above the $10 minimum wage 40-hour level of $400, while limited service restaurants had average weekly earnings of $343, making these limited service restaurants more susceptible to increases in the minimum wage. One part of the"identification strategy" that I will pursue contrasts the responses to increases in the California minimum in low-wage versus high-wage sectors and also contrasts the responses in low-wage versus high-wage counties. The low-wage counties are likely to have greater responses because the average weekly earnings in low-wage sectors is likely to be especially low in low-

wage counties. This type of cross section "identification" could be pursued if there were only one increment in minimum wages common across all counties, but the five different increments in the California minimum wage allow a time series identification that contrasts the different responses over time on a county-by-county basis. One of my intentions is to be clear about the extent to which the minimum wage estimates depend on the cross-county comparisons of responses to minimum wage increases versus the intertemporal comparisons of how different minimum wage increments of different magnitudes had different effects over time on a county-by-county basis.

County Combinations

I will be treating each county as a separate minimum wage experiment, but in fact these are not separate experiments. One reason is that counties that are geographically close may share common unobserved effects. Another possibility is that commuting to work ties the labor markets of close counties together. The image at the right is a color coded map of California counties based on 2013 earnings per worker. This image seems to be calling out for geographic aggregation or for estimation that allows correlations between counties. More on this later.



III. Exploratory Data Analysis

Cross-Sections

The data set that is studied is a panel of California counties which has a time-series for each county and a cross-section of counties in each period. It is wise initially to distinguish features of the cross sections from features of the time series: cross sections in this section and time series next.

Discussion of Tables

Table 3 reports 2016 California county data on employment, average weekly earnings, number of establishments and establishment size (employees per establishment) for limited service restaurants and for full service restaurants, sorted by the average weekly earnings in limited service restaurants. The last four columns report the ratios of the numbers: limited to full. Two numbers are highlighted in each column: the minimum and the maximum.

Table 4 reports California total county data on employment, average weekly earnings and number of establishments, and the ratios of restaurant to county wide totals. The overall average weekly earnings varies from a low of $545 per week in Sierra to a high of $2348 per week in Santa Clara. The share of

employment in limited service restaurants varies from a high of 7.7% in Lassen to a low of 1.7% in Plumas. That's a lot of fast-food in Lassen. The share of employment in full service restaurants varies from a high of 12.3% in Mono to a low of 1.8% in Madera. That's a lot of full-service -food in Mono.

Tourism May Help Make the Demand Curve Inelastic

The way that Mono stands out in the full service ratios in this table suggests that tourism should be part of the discussion of minimum wage impacts. An escape valve that helps to limit the adverse employment effect of a minimum wage is the ability to pass the added costs on to the customers, and for this to work without job loss it requires adequately inelastic demand for the affected products. In other words, for this escape valve to work it requires "market power" at the level of the industry overall. If the full service customers in Marin county are wealthy locals who are not price sensitive, the minimum wage is a transfer from the wealthy to restaurant workers. If the customers are wealthy tourists, it's the tourists who are paying the tax. If the fast-food customers in Lassen county are poor locals, it doesn't seem like wise public policy to transfer some amount of money from poor customers to poor workers, and at the same time take money out of the pockets of poor workers and use it to hire robots instead. My point is that the minimum wage should be thought to be a tax on low-wage employment with the proceeds distributed to the low-wage workers. For wise public policy it is essential to determine who pays this tax: is it the low-wage workers themselves, is it the customers (higher prices), is it high-wage workers, is it management, or is it the owners/investors (lower returns on investment)? My ultimate goal is to find a credible answer to this question, more reliable than the politicians' current answer: "Martians"

Discussion of Scatter Diagrams

There is a lot going on in these first two tables, and pictures may help to see the messages more clearly. **Figure 1** is a scatter comparing the 2016 employment share in limited service restaurants (top panel) and full service restaurants (lower panel) with the county's overall average weekly earnings. The share of employment in limited service restaurants is noticeably less in the higher wages counties, while the share of employment in full service restaurants is not much related to overall average weekly earnings. The decline in limited service employment share is presumably an income effect. While eating at full-service restaurants probably increases with income, the share of employment in full service income is pretty stable at about 4.5%. It may be that the wealthier customers buy higher priced meals that do not require more restaurant workers. Or it may be that full-service restaurants in some of the counties with low average weekly earnings overall are propped up by visitors. The outliers are Mono, Inyo, and El Dorado, all of which abut other counties, and San Luis Obisbo. County fixed effects could absorb these abnormalities but not the part that interacts with the minimum wage variable.

Figure 2 is a scatter comparing the average weekly earnings in limited service (top panel) and full service restaurants (lower panel) with average weekly earnings overall. Both the data on the horizontal axis (county overall average weekly earnings) and the data on the vertical axis (restaurant average weekly earnings) were generated by a California economy with significant worker mobility among the counties. If we assume that the real earnings at every level of skill are the same in every county, then the variability in county-wide average weekly earnings on the horizontal axis reflects either (1) differences in

the composition of the workforce with more high-skilled workers in counties with higher average weekly earnings or (2) higher cost-of-living in the locales where high-skilled high-paid workers concentrate.

Real Wages May be Equalized Across California Counties

The table below has been created by the BLS[2] to illustrate the impact of cost-of-living adjustments to average wages in different MSAs. The large gap in mean wages between San Jose-Sunnyvale-Santa Clara ($75,770) and Durham-Chapel Hill ($55,840) is greatly reduced by the cost-of-living differences to $62,107 vs. $58,779. The figure below this table illustrates mean wages of police and sheriffs in California MSAs in 2014, without and with adjustment for regional price differences. The MSAs with the highest mean wage, San Jose, and San Francisco, are brought back in line when purchasing power computed and the MSA with the lowest mean, El Centro, is also brought back in line in the purchasing power data.

Annual mean wage, regional price parity, and purchasing power for the 10 Metropolitan Statistical Areas with the highest purchasing power, May 2014

Area	Annual mean wage	Regional price parity	Purchasing power
San Jose–Sunnyvale–Santa Clara, CA	$75,770	122.0	$62,107
Durham–Chapel Hill, NC	55,840	95.0	58,779
Huntsville, AL	51,730	91.3	56,659
Hartford–West Hartford–East Hartford, CT	55,580	100.9	55,084
Boston–Cambridge–Quincy, MA–NH	60,540	111.6	54,247
Washington–Arlington–Alexandria, DC–VA–MD–WV	64,930	120.4	53,929
Springfield, IL	49,760	92.4	53,853
Trenton–Ewing, NJ	60,020	111.5	53,830
Seattle–Tacoma–Bellevue, WA	57,370	107.0	53,617
San Francisco–Oakland–Fremont, CA	64,990	121.3	53,578

Source: U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis.

[2] https://www.bls.gov/opub/mlr/2016/article/purchasing-power-using-wage-statistics-with-regional-price-parities-to-create-a-standard-for-comparing-wages-across-us-areas.htm

Figure 2. Mean wage versus purchasing power (in dollars) for police and sheriff's patrol officers in selected areas, May 2014

Source: U.S. Bureau of Labor Statistics, U.S. Bureau of Economic Analysis.

The message of this discussion is that employee mobility and local amenities should be a consideration when studying minimum wages. Changes in minimum wages that affect some counties more than others disturb the regional equilibrium and encourage workers to move from unaffected to affected counties, that is to say, paradoxically, from high cost-of-living counties to low cost-of living-counties. However, since the increase in the minimum wages in the low-wage counties cannot create jobs, the equilibrating force might be higher unemployment in the low-wage counties that bring the effective wage rates (adjusted for the chances of landing one of those jobs) back to what they had been before the minimum wage increment. Another equilibrating force would be the removal of enough low-wage workers from the high-wage counties to drive up wages there even though no employment contracts are directly affected by the minimum wage. In summary, an increment of a minimum wage with an affected low-wage region and an unaffected high-wage region creates a new fully-mobile equilibrium with a movement of low-skilled workers from high-age to low-wage region, a large increment in nomimal wages in the low-wage region, offset by higher unemployment risk in the low-wage region and higher wages in the high-wage region. However, McKinnish (2017) reports in the abstract: "As a whole, the results suggest that low-wage workers tend to commute away from minimum wage increases rather than towards them."

Figure 3 compares establishment size with average weekly earnings overall. There is an inverted U-shaped relation between restaurant size and county overall average weekly earnings.

Time Series

Not Seasonally Adjusted Data: Not Very Useful

Shifting from cross-sections to time series, **Figure 4** illustrates the average weekly earnings in limited service and full services restaurants in the California counties quarterly from 2006q1 to 2017q2, **Figure 5** illustrates the average weekly earnings overall, and **Figure 6** is the ratio of these. **Figure 7** illustrates the employment shares of limited and full service restaurants. The Los Angeles data are highlighted in bold in all of these figures.

These figures convey two important messages: (1) Seasonal effects and the county effects are substantial enough to make it difficult to detect with confidence any minimum wage effect that might be there. (2) Nonetheless, the county ordering in many of these images seems rather stable over time, and possibly treated well with county fixed effects.

Seasonal Adjustment

Table 5 reports a weighted panel regression (cross-section weights) for the logarithm of average weekly earnings in limited service restaurants using the data for 47 California counties from 2006q1 to 2017q2, including quarterly indicators, county fixed effects and a time trend that increments one each year. At the bottom of the table is the translation of the three quarterly coefficients into a set of seasonal factors that average to zero. These seasonal adjustment factors are found by treating the QTR=4 as a zero, and subtracting from each of the four indicators the average so that the adjustment factors sum to zero.

Similar regressions have been estimated for limited, full and total, and for average weekly earnings, employment and establishment counts. The time trends in these regressions are collected together in the table below. It is weekly earnings in full service restaurants that has the largest time trend, while the time trend in limited service average weekly wages is the same as the total. One might have thought that the multiple increments in the minimum wage would have been felt more on average weekly earnings in limited service restaurants than full service, so the fact that the greatest trend is in full service average weekly earnings casts a shadow on the hypothesis that the increments to the minimum wages would have had a greater effect in these restaurant sectors than the county overall numbers. If you are looking for a negative effect of the minimum wage on employment in these time trends, that isn't there either since the time trend for employment in limited service restaurants is greater than full which is greater than total. If the minimum wage were killing off jobs, increasingly over time, one might have expected the opposite ordering. **This makes the role of the time trend potentially important in the econometric modelling to come.**

Time Trends

	Limited Service	Full Service	Total
Weekly Earn	2.3%	3.1%	2.3%
Employment	2.1%	1.3%	0.3%
Establishments	1.2%	0.6%	0.3%

The seasonal adjustment factors for average weekly earnings, employment and establishments are displayed in **Figure 8**. The restaurant sectors have their lowest employment levels in Q1 and highest in Q3. Average weekly earnings have a similar set of seasonal effects, a commonality which might be interpreted as the labor market supply and demand in operation, with high wage rates when hiring is strong and low wage rates when hiring is weak. However, the magnitudes of these changes in average weekly earnings from Q1 to Q3 in the table below make it very doubtful that this reflects only a change in hourly wage rates – a five percent increase followed by a five percent reduction. This swing in average weekly earnings could be a compositional change with more high-paid workers in Q3, which is a possibility that also seems doubtful, since it is more likely that it is the lower paid workers in restaurants who experience the greatest seasonal variability. Most likely what we are seeing in these seasonals is variability in hours worked per employee. We are expecting to get access to individual worker records, which will be helpful, but what is desperately needed is data on hours worked. **Best to keep firmly in mind the fact that whatever we learn about the effect of the California minimum wage on average weekly earnings, we cannot now disentangle that finding into an hourly wage effect, a worker composition effect and a worker hours effect.**[3]

Change in Seasonals from Q1 to Q3

	Average Weekly Earnings	Employment
Limited Service	5.01%	1.70%
Full Service	3.95%	3.90%
County Overall	-0.33%	5.90%

A premise of the regression models to be discussed below is that restaurants are hiring workers from the county labor pool but the feedback from the restaurants to the rest of the county is small enough that it can be neglected, an assumption that needs to be scrutinized. With that premise, it is notable that the hiring captured by the employment seasonals is very similar in restaurants and in the overall county. Restaurants hire when the other county employers are hiring. However, the seasonal pattern in average weekly earnings is very different in restaurants than in the county overall which has a big spike up in the fourth quarter.[4] If restaurants are hiring from the same labor pool, where is their Q4 spike? I am inclined to think of this spike as reflecting year-end bonuses outside the restaurant sector – this needs more investigation.

The vertical scales in these three figures are the same, and the seasonal variability in number of establishments is revealed to be small compared with average weekly earnings and employment. The county total number of establishments had greater seasonal variation than the number of restaurants, especially limited service restaurants which was quite flat.

[3] Leamer(***) on effort and minimum wages is an idea that needs to be explored.
[4] This fourth quarter spike is shared by most counties.

Seasonally Adjusted Data: Averaged Across Counties

The residuals from the seasonal adjustment equations averaged across counties are illustrated in **Figure 9** (Average Weekly Earnings), **Figure 10** (Employment) and **Figure 11** (Establishments). The logarithmic form of the estimated model means that the scale of the residuals reflects percentages. These figures include vertical lines that indicate when there were increments in the California minimum wage. **Can you see the positive effect of these minimum wage increases on average weekly earnings and the negative effect on employment? Perhaps, and perhaps not.**

The method of estimation assures that these residuals average to zero across time. In the case of average weekly earnings illustrated in **Figure 9** the positive residuals coincide with the periods of increments of the minimum wages, thus suggestive that minimum wages were contributing to high average weekly earnings in both limited service and full service restaurants. Furthermore, there were spikes in average weekly earnings in both limited and full service restaurants coincident with the first two increases in the minimum wages in 2007q1 and 2008q1, but these spikes did not last. If the minimum wage effect is revealed by the difference between the restaurant earnings and the overall earnings, you can still see a minimum wage effect, although the total earnings residual is rather noisy. Perhaps what is most needed is some convincing explanation for the decline in restaurant earnings from 2008 to 2014.

The employment data are a whole lot smoother than the average weekly earnings data. If you are looking for a suppression of employment associated with the minimum wage, a quick glance at **Figure 10** will be disappointing because the periods of exceptionally high employment (relative to trend) occurred when the minimum wage was increasing. If you see adverse employment effects in the later years when the last two minimum wage increments occurred because restaurant employment was falling behind total employment, the opposite was the case for the first two minimum wage increments.

Another visual display can be created with a regression with only county and period fixed effects like the one in Table 6 where the log of the ratio of full-service to total is the dependent variable. The period fixed effects from this equation are seasonally adjusted and displayed in Figure 12 along with the seasonally adjusted period fixed effect for the three other ratios. It appears that restaurant wages relative to overall wages were on the rise with the increments of the minimum wage beginning in 2014q3. Employment relative to overall employment, which had been on the rise from 2008 to 2014, seemed to have stopped rising with the increments of the minimum wage commencing in 2014q3. A conclusion about the effect of the minimum wage in both figures depends on assumptions about the trend: no trend in earnings up to 2014 when earnings took off, and a trend up in employment until 2014 when the trend ended. Thus positive earnings effect but negative employment effects

Seasonally Adjusted Data: County by County

These are displayed in an Appendix, Figure 25 to Figure 30. The message may be that there is a lot of county variability and some distinctive county seasonals.

Time Series of Cross Sections

My favorite images for demonstrating an impact of the minimum wage on average weekly earnings are put in two appendices. Figure 17 on page 41 has five images, each of which includes two scatter diagrams and two corresponding regression lines. The image in the upper left compares average weekly earnings in limited service restaurants with average weekly earnings overall for two different periods: 2012q1 and 2013q1. The thinner line describes the earlier data, 2012q1, and the fatter line the later data, 2013q1. These are on top of each other, which means the two scatters one year apart are almost identical. These are one-year apart to eliminate the quarterly seasonal effect. The image directly below that one includes scatters for 2014q1 and 2015q1. Here the regression lines are separated from each other, and the thick (later) line is above the thinn (earlier) line, meaning that earnings were higher in 2015q1 than in 2014q1. This one-year period includes 2014q3 when a minimum wage increase occurred, and the separation of the two lines is a symptom of that increase. The images in Figure 17 that refer to periods during which there was a minimum wage increase are encased in dark red boxes. Take a look at the three in dark red boxes versus the two with thin lines around them. Can you see the minimum wage increase in the dark red boxes? I can. These are the quarter one scatters. In your leisure time, take a look at the other quarters in Figure 18 (q2), Figure 19 (q3), and Figure 20(q4). There are some images that are not perfect, but overall they offer pretty clear across-the-board evidence of the impact of minimum wages on earnings in limited service restaurants. If you find the time, take a look also at the corresponding figures for full service restaurants: Figure 21, Figure 22, Figure 23 and Figure 24.

Incidentally, these images do not work for employment because the persistence is too dominant and most of the regression line lie right on top of each other.

Minimum Wages Compared with Average Weekly Wages

The ratio of the "full time" minimum weekly wage representing 40 hours of work at the minimum divided by the overall average weekly wage is illustrated in **Figure 13.** This puts the county minimum wages at 20% to 70% of the overall county average weekly earnings. This ratio increases when the California minimum wage increased but overall it's been fairly constant.

Using 30 as the typical number of hours worked in limited service restaurants, **Figure 14** displays the "bite" of the prevailing minimum wage in that sector equal to 30 times the minimum wage divided by average weekly earnings. This bite ranges from 60% to 110 %.

IV. An Econometric Model

Table 7 reports estimated panel regression models with cross-section weights that explain the log of average weekly earnings in limited service restaurants and full service restaurants. **Table 8** has regressions with a similar structure that explain the log of employment in these two sectors. The t-values in excess of 2 in absolute value are shaded in these tables.

Structure of the Model

These regression models share the following explanatory variables:

Persistence: Lagged Dependent Variables

These models all include two lagged dependent variables which determine the persistence of the variable. The persistence is measured by the sum of the coefficients on the lagged dependent variable. A value of one means perfectly persistent; a value greater than one describes a variable that is growing over time, and a value between zero and one describes reversion to a moving mean as described by the other variables.

The long-run effects of the other variables are found by dividing the sum of the estimates by one minus the sum of the estimates on the lagged dependent variable.

Strength of the County-wide Labor Market

The strength of the county's overall labor market is captured with current and past values of county average weekly wages, county growth of employment and county unemployment rate. An important implicit assumption here is that these county-wide variables are exogenous, meaning not materially affected by changes in the restaurant sectors or changes in minimum wages.

Quarterly Indicators

Seasonal effects are absorbed by three additive quarterly indicators. These effects are estimated after controlling for all the other variables in the equation, and are not the same as the traditional seasonal adjustment factors. An important implicit assumption here is that these seasonal effects apply equally to all counties, which is decidedly not the case, and will be discussed in a companion paper based on county data that are individually seasonally adjusted.

Trend and County Fixed Effects

These "panel" models include fixed effects for counties, which will absorb any time-invariant differences among the counties, including climate and closeness to waterways, provided that these enter additively in these log-linear models. Things that are almost constant over time, like cost of living differences, will be mostly absorbed by these fixed effects. Like the seasonal effects, the trend is implicitly assumed to be the same for all counties.

The inclusion of the trend and the county fixed effects are a quick and lazy way of dealing with differences in counties and trend economic growth. The better approach would be to include variables that determine the trend and the differences among the counties not captured by QCEW county totals for employment and earnings. More on this later.

Timing

The restaurant employment levels and average weekly wages are allowed by the model to respond without a lag to the overall county numbers and to the minimum wage, but for establishment counts everything is lagged as if to suggest that the planning and commitment to births and deaths of establishments occur before the period in which the births and deaths occur.

Minimum Wage Level

In the double log form, the coefficient on the log of the minimum wage is the elasticity (percent change of the dependent variable induced by a percent change in the minimum wage). The log of the minimum wage enters ten different ways in these equations. The log of the minimum wage enters by itself. The log of the minimum wage interacts with the ratio of the minimum wage 40 hour weekly work divided by the county's overall average weekly earnings. This ratio is a measure of the "bite" of the minimum wage. It is anticipated that this effect will work to produce greater sensitivity to the minimum wage when the minimum is high relative to the county's overall average weekly earnings.

The log of the minimum wage also interacts with the labor market variables: the level of unemployment, the change in the unemployment rate, the current and lagged rates of growth of overall county employment.

Growth of Minimum Wage: Short Run Effect

The percent change of the minimum wage is also included to capture announcement effects. The pace of response is otherwise determined by the coefficients on the lagged dependent variables. When these sum to numbers close to one, the response is slow. The inclusion of the percent change in the minimum wage serves to accelerate the response.

Discussion of the Equations.

The lagged dependent variables have the greatest t-values in both earnings equations and both employment equations reported in Table 7 and Table 8. The sums of the lagged dependent variables for average weekly earnings in limited and full-service restaurants are 0.66 and 0.48, a bit more persistence and slower response in limited service restaurants. The long-run elasticities of restaurant average weekly earnings with respect to overall weekly earnings are only 0.29 and 0.10 in limited and full-service restaurants. The sums of the lagged dependent variables for employment in limited and full-service restaurants are 0.87 and 0.78, much greater persistence than average weekly earnings. The long-run elasticities of restaurant employment with respect to overall weekly earnings are only 0.57 and 0.77 in limited and full-service restaurants. Thus employment in restaurants is more closely linked to overall county employment than average weekly earnings are linked with overall county average weekly

earnings. The employment effect is probably operating through the demand for restaurant meals will the earning effect is a labor-market connection.

Most of the other coefficients are hard to interpret because these refer to "partial correlations" controlling for everything else in the equation and because many variables enter by themselves and also interacted with the minimum wage variable. It is worth noting that the variable LOG(MIN_WAGE)*40*MIN_WAGE/TOT_AVG_WKLY_WAGE is not statistically significant in any of the equations, meaning that low-wage counties are not more substantially affected by minimum wage increments than high-wage counties. That aspect of the "identification strategy" seems to have failed.

Figure 15 illustrates the impact of the minimum wage on the seasonal effects. These restaurants have strong seasonal variability in demand, and it is important to know how the minimum wage affects the seasonal labor market responses to that demand variability. If the wage rate of individuals varied with that seasonal variability in demand, it could be that the minimum wage effect would be felt most in the quarter with the weakest demand, keeping wages high then, with a consequent employment effect. Pending more work on this issue, further comments on Figure 15 are postponed.

Estimated Effects of California Minimum Wages

Rather than a discussion of each of the variables in the model that includes the minimum wage, I will study them collectively by using the estimated model to predict what would have happened if the California minimum wage had stayed at its 2006 level of $6.75 and subtract that from the models' predictions if the actual minimum wages are used. That's the estimated impact of the increases in the California minimum wage above the $6.75 level. Items that are common to both calculations are netted out. Thus the calculations make use of only the part of the model that includes the minmum wage variable. To make this simple and also informative, I will transform the model into a long run model by dividing by one minus the sum of the coefficients on the lagged dependent variables.

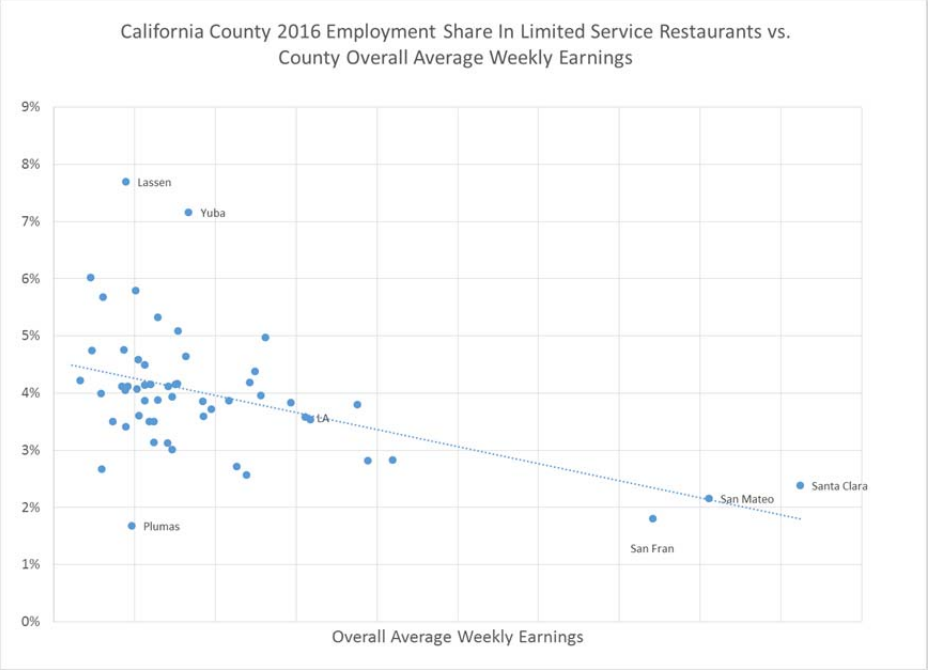
The top panel of **Figure 16** illustrates the estimated effect of California's rising minimum wage on average weekly earnings and employment in limited service restaurants and the bottom panel has the same information for full service restaurants. The increments in the minimum wage from 6.75 to $7.50 in 2007 and to $8 in 2008 were estimated to increase earnings in limited service restaurants slightly more than 10% but reduced employment by about 12%. The additional increments of the minimum wage to $10.50 increased earnings by an additional 20% and reduced employment by an additional 10%. The story in full service restaurants is similar but not as big.

V. Conclusion

There is more work to be done.

VI. Figures

Figure 1 Average Employment Shares in Restaurants vs. County Avg. Wkly. Earnings, 2016



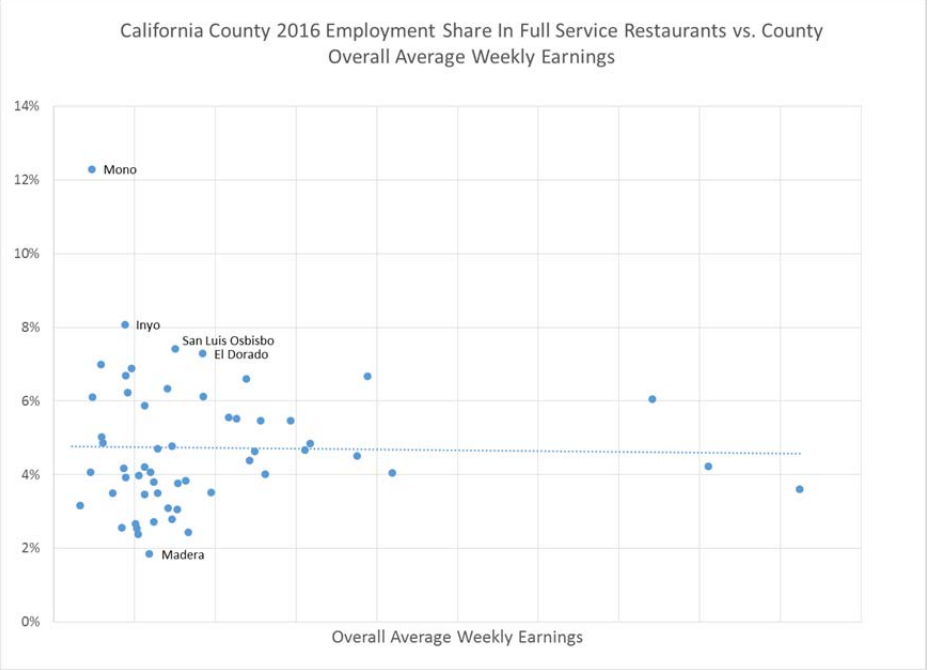
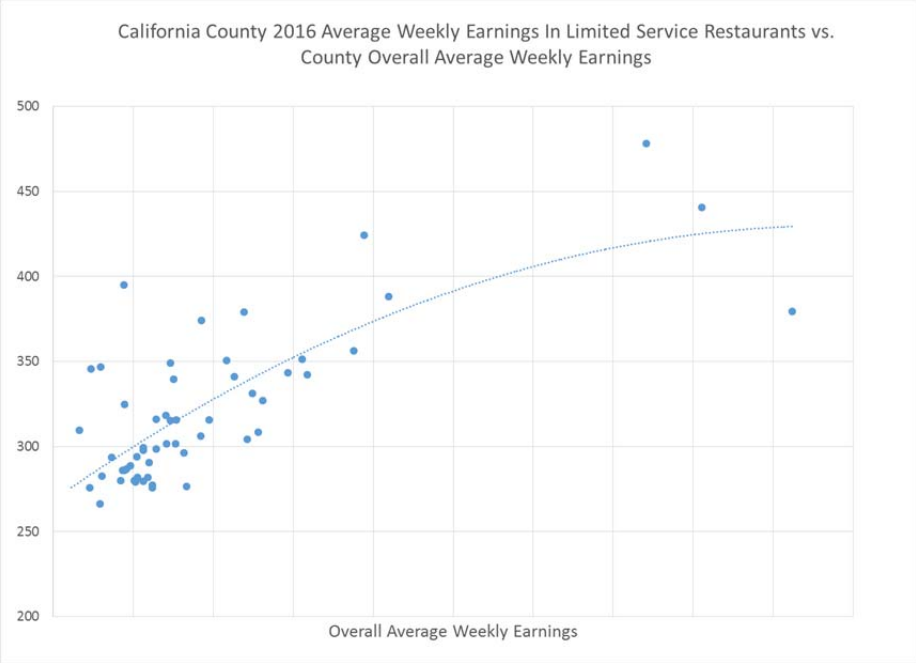


Figure 2 2016 Average Avg. Wkly Earnings in Restaurants vs. County Avg. Wkly. Earnings



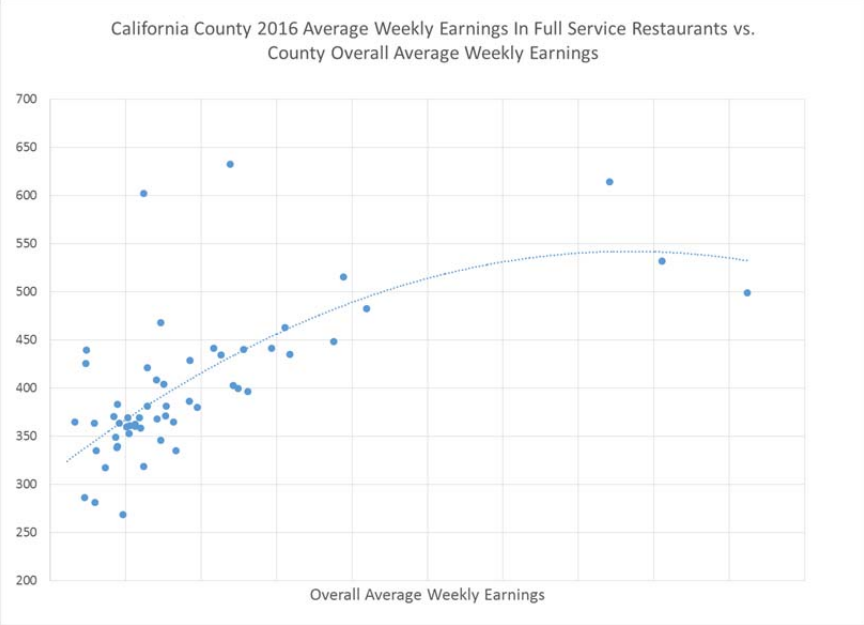


Figure 3 20016 Employees per Establishment vs. County Avg. Wkly. Earnings

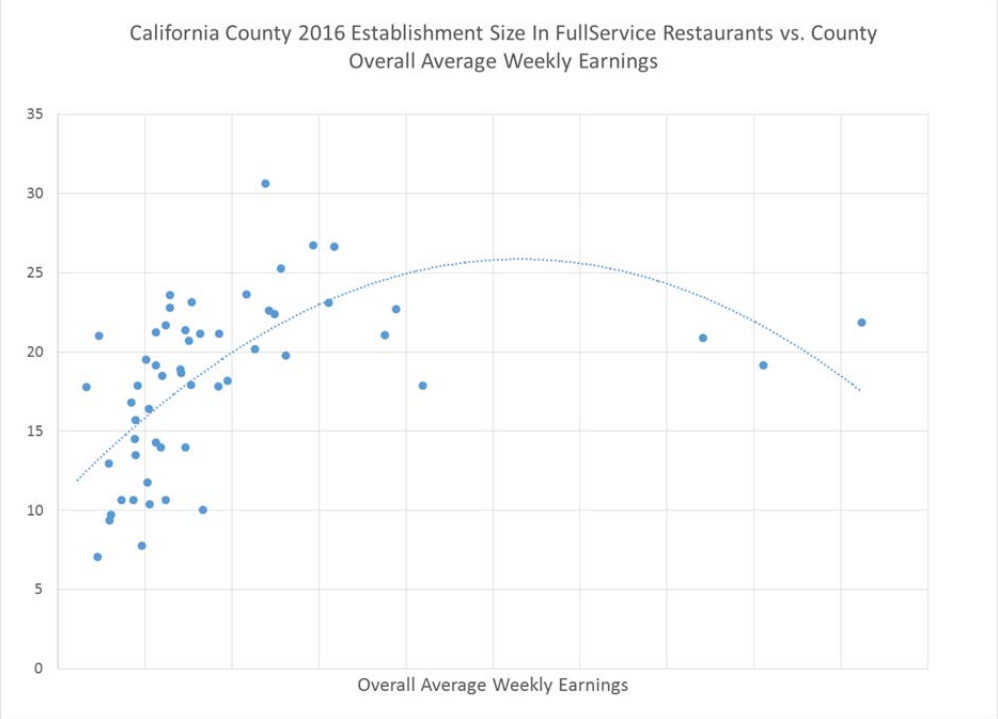
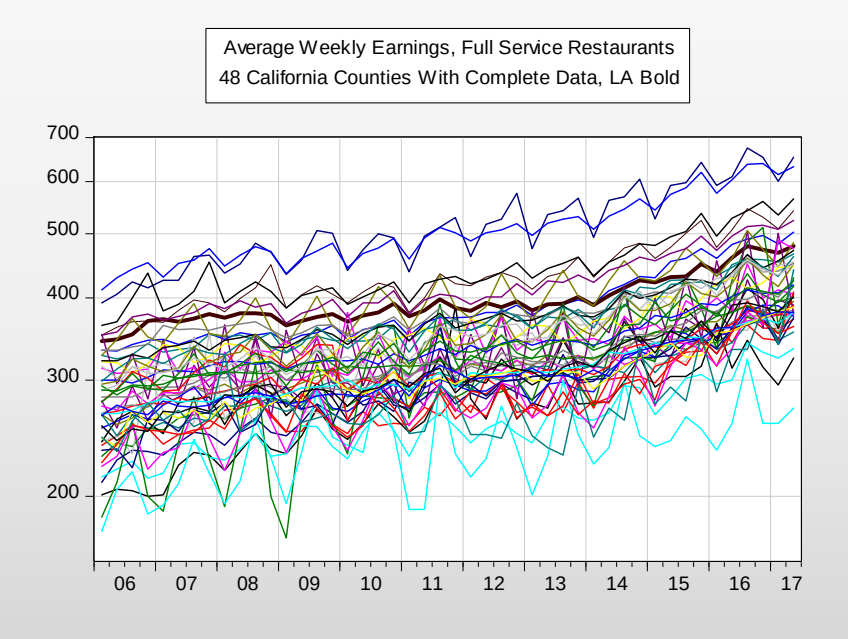


Figure 4 **Limited and Full Service Restaurants, Average Weekly Wages**



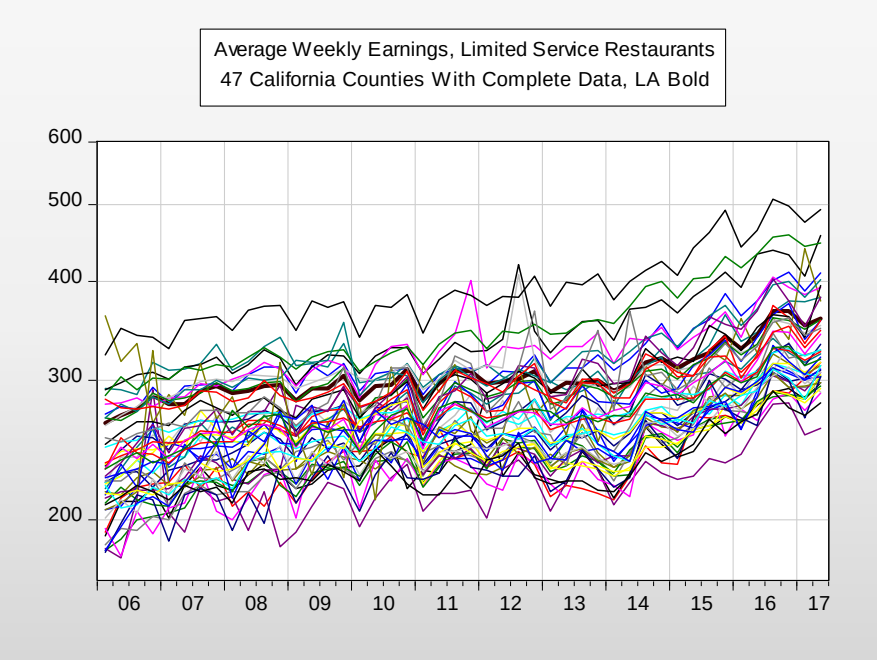


Figure 5 **Average Weekly Wages: All Sectors**

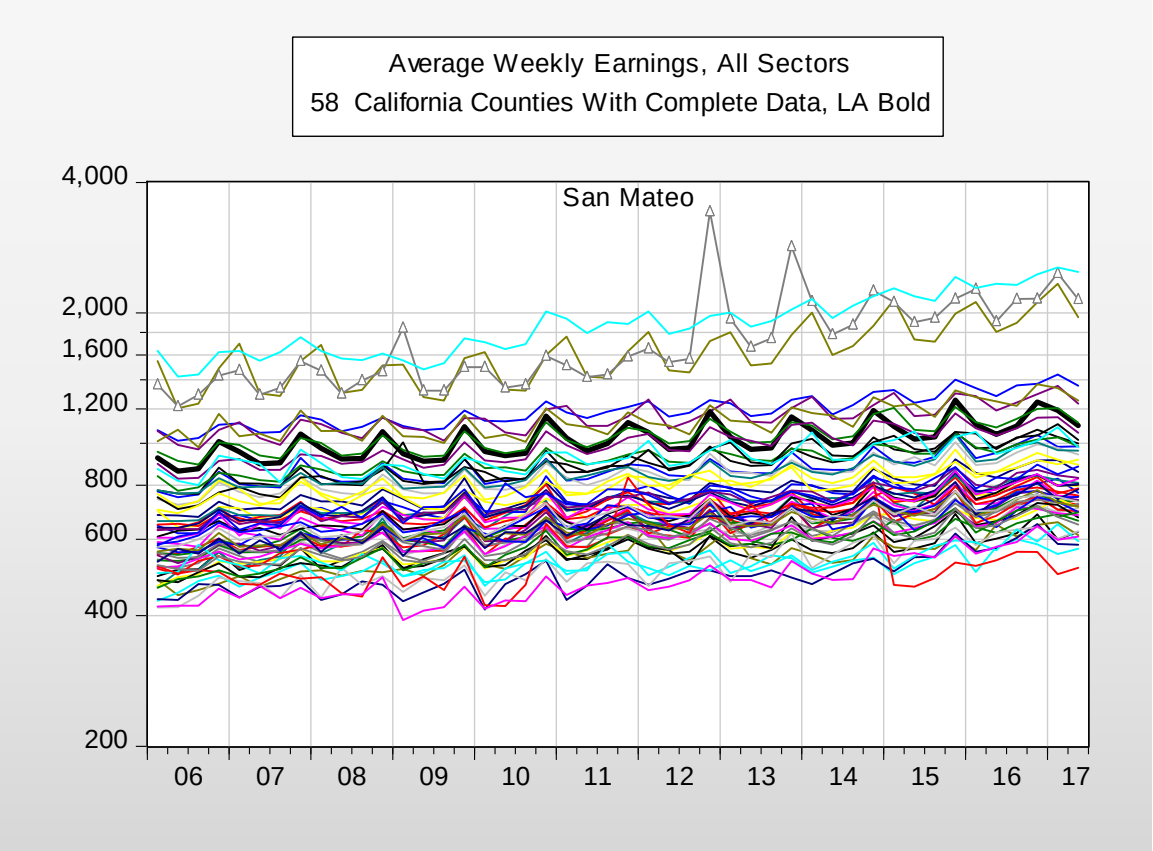
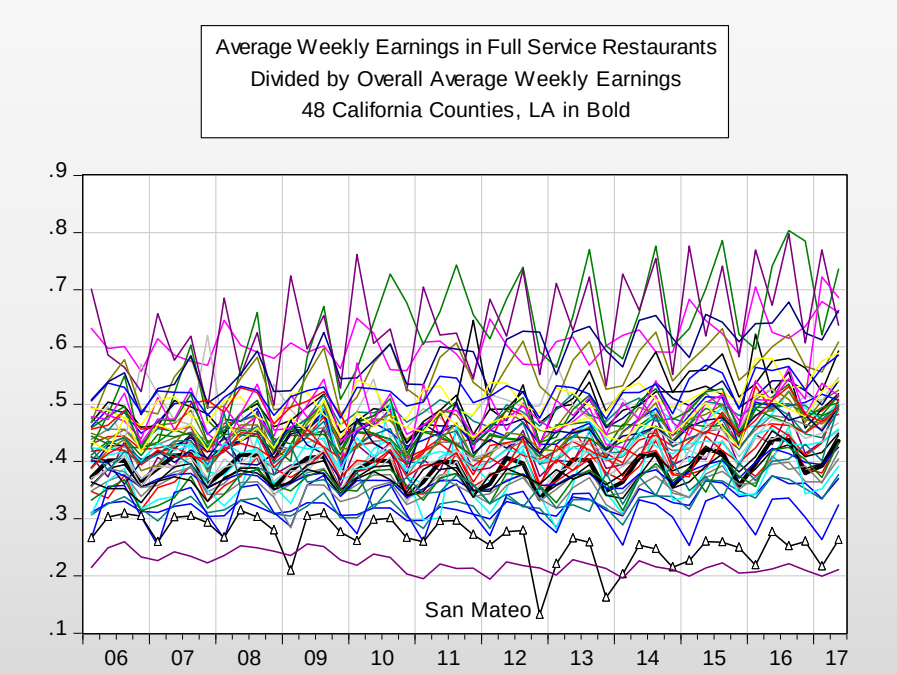


Figure 6 **Ratio of Restaurant to Overall Average Weekly Wages**



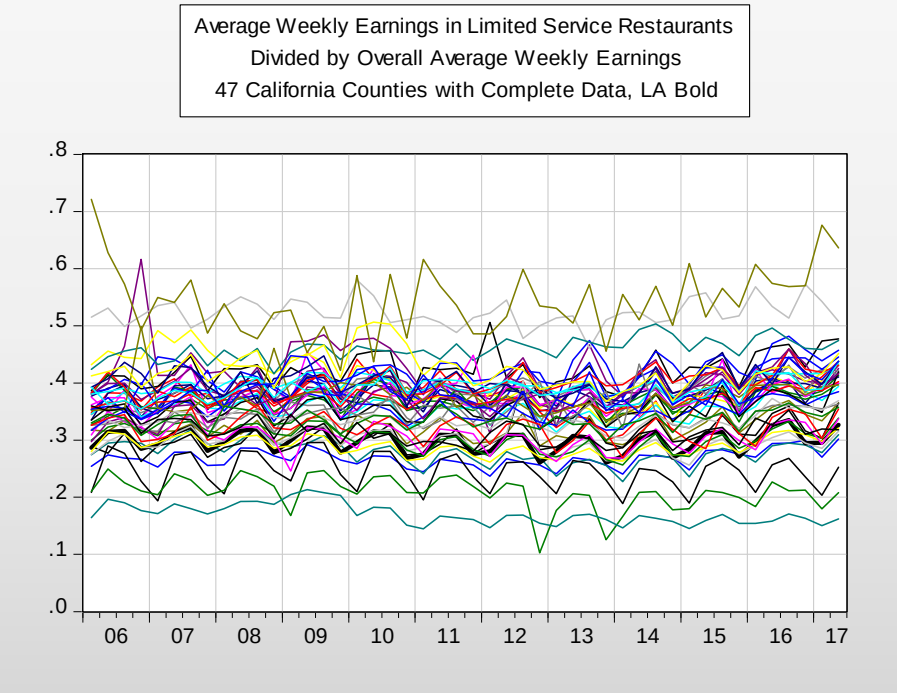
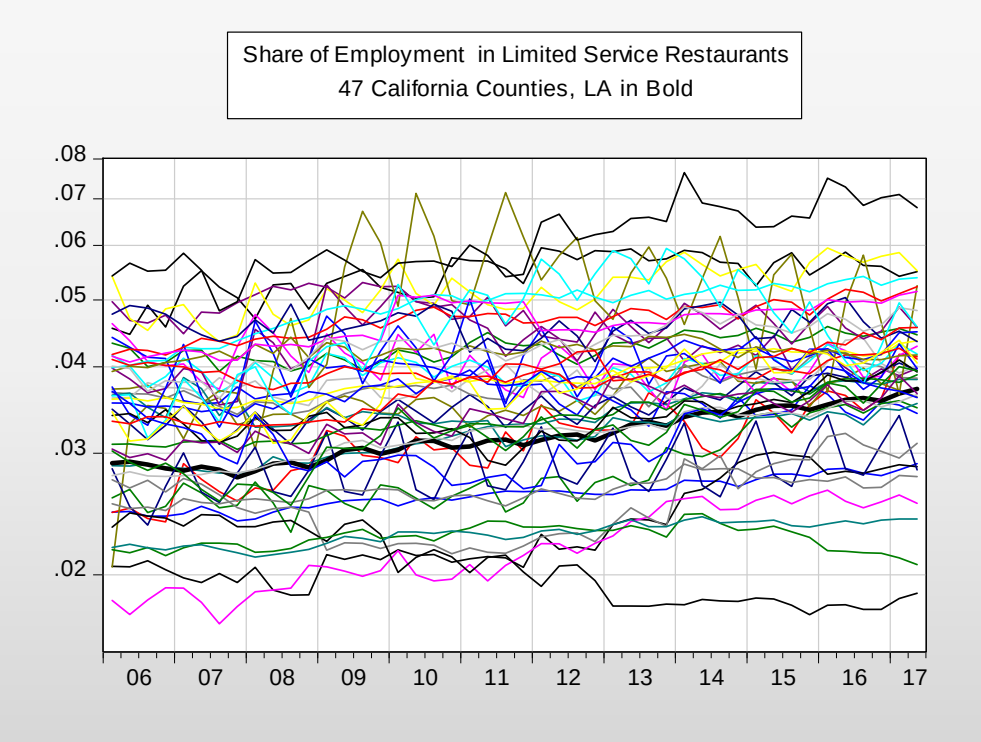


Figure 7 **Share of Employment in Restaurants**



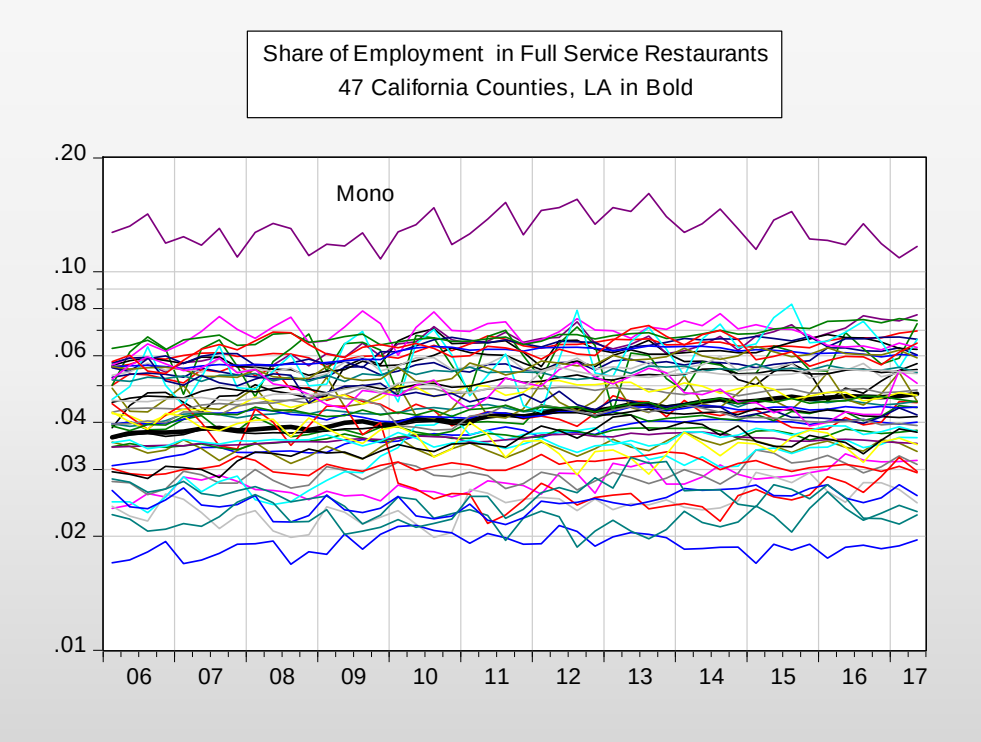
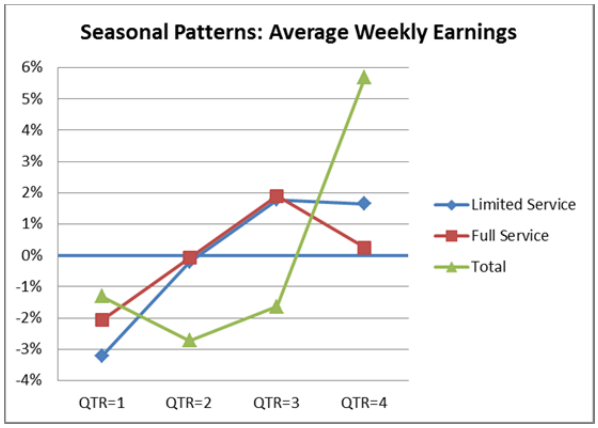
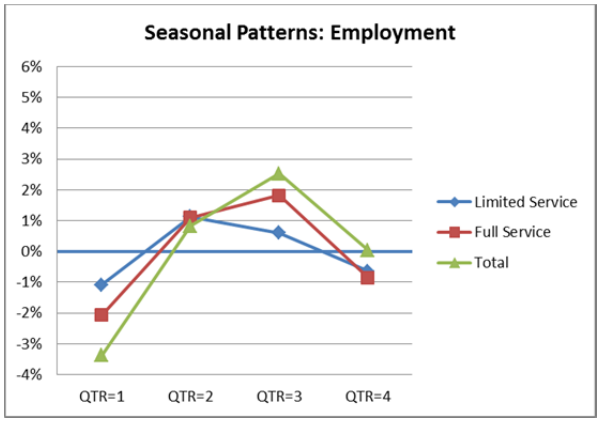


Figure 8 Seasonal Patterns, 2006 – 2017q2, From Regressions that also control for trend





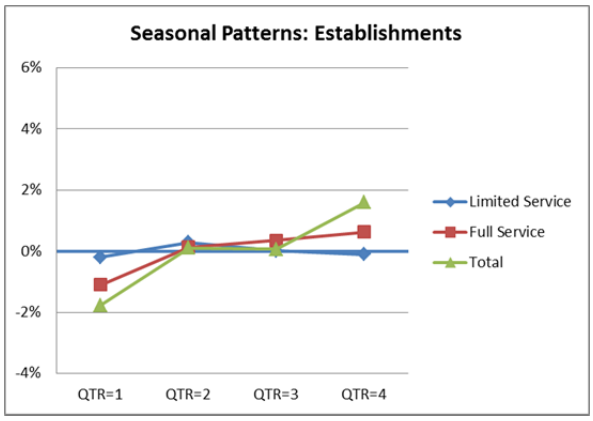


Figure 9 Average Weekly Earnings: Detrended and Deseasonalized

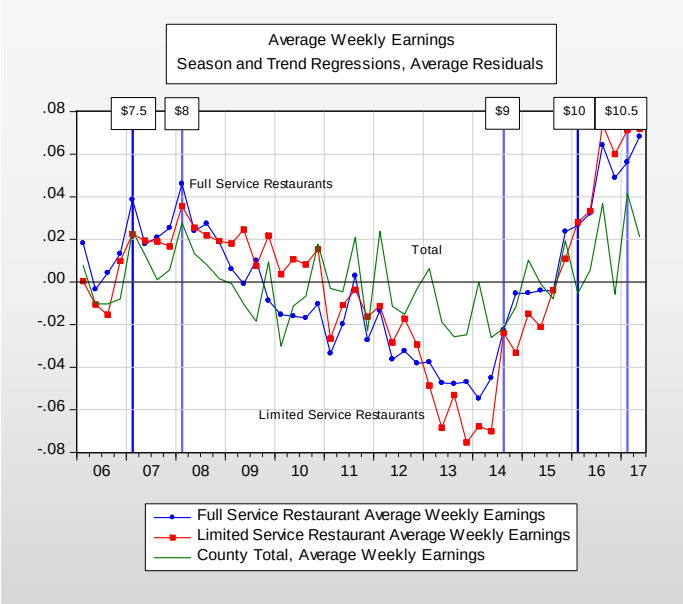


Figure 10 **Employment: Detrended and Deseasonalized**

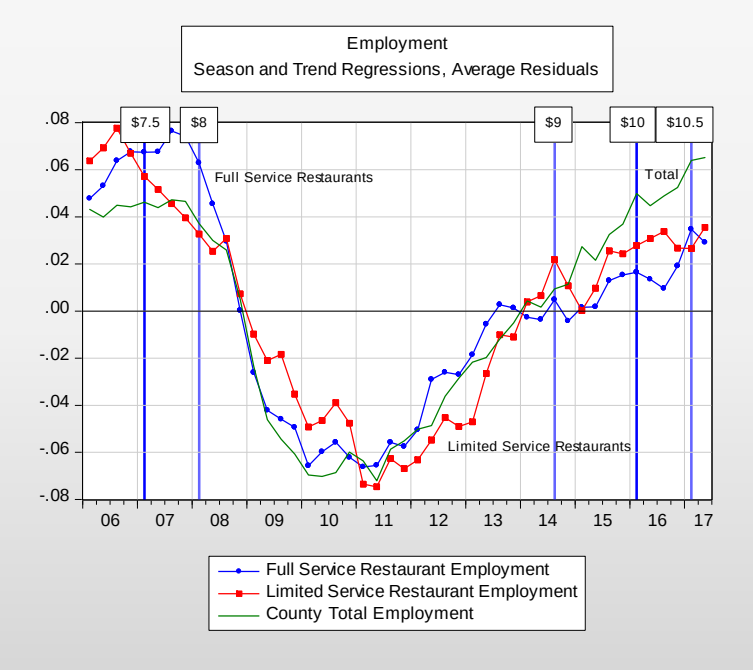


Figure 11 **Establishments: Detrended and Deseasonalized**

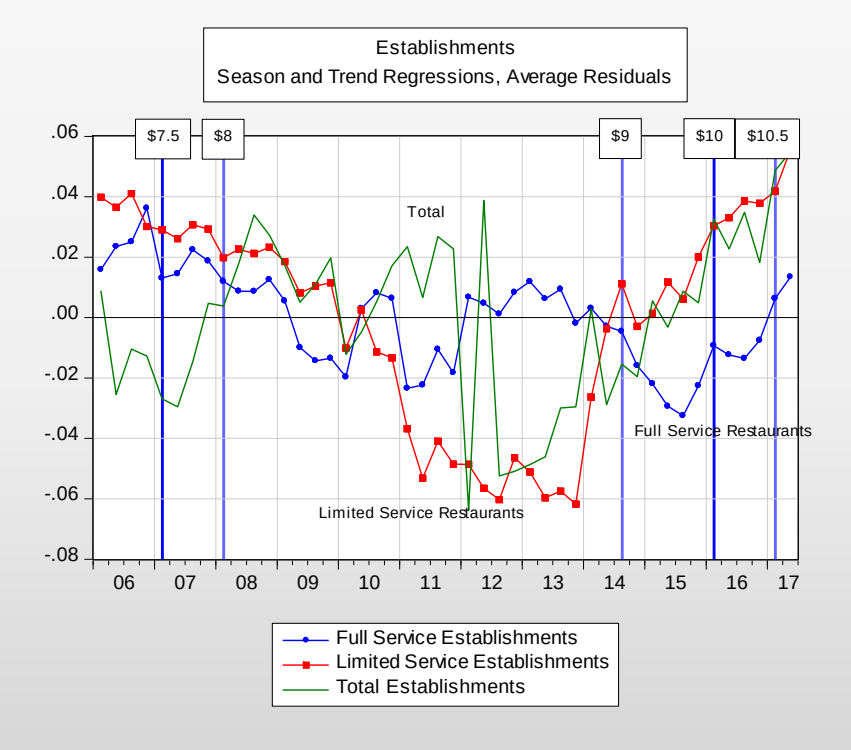
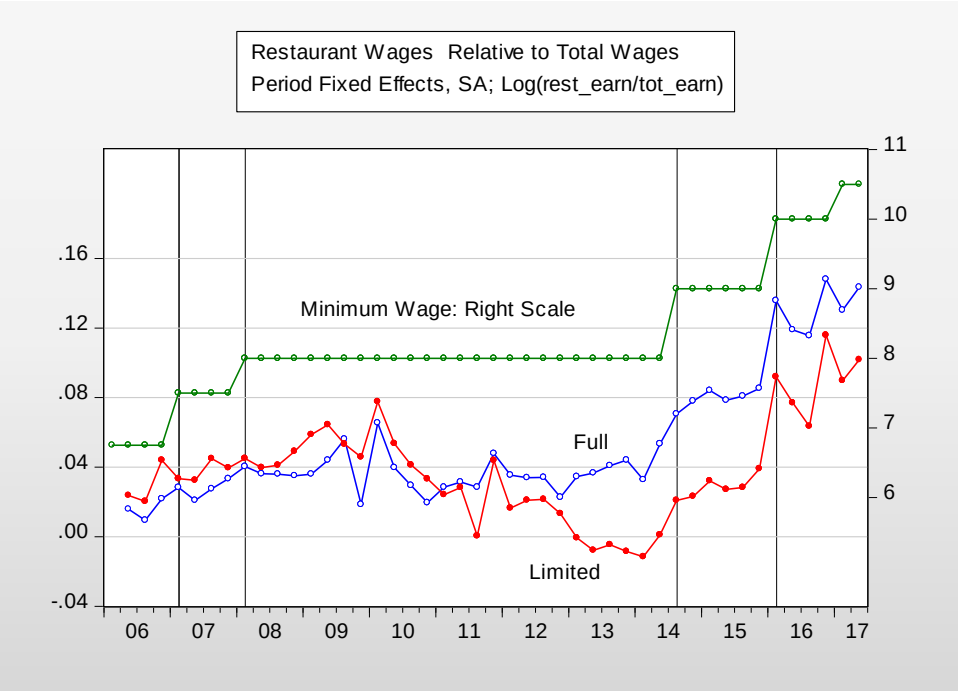


Figure 12 **Period Fixed Effects, Seasonally Adjustment, Ratios to County Totals**



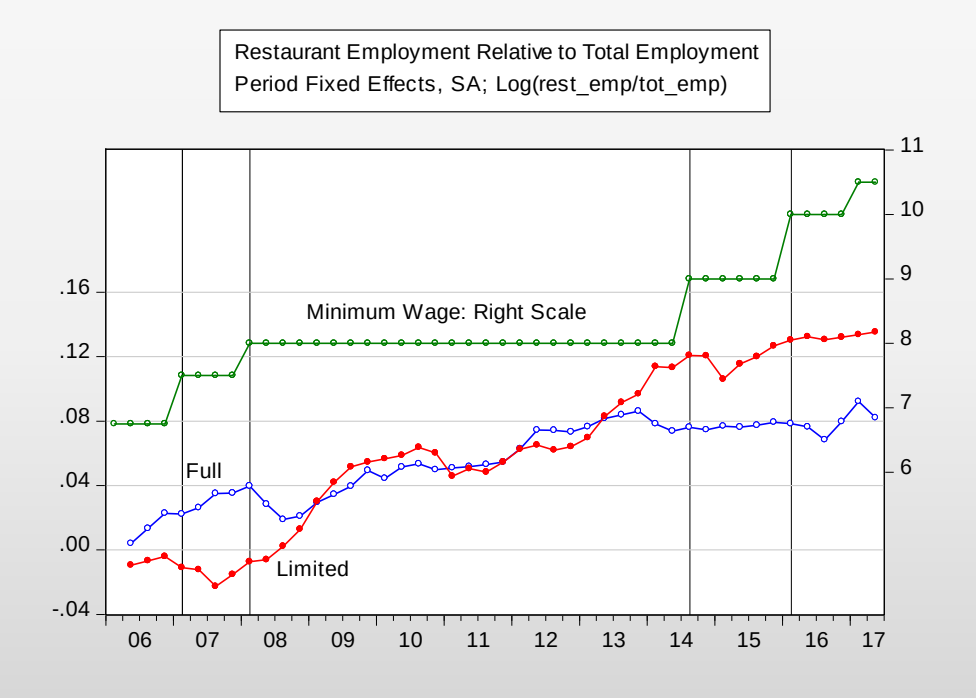


Figure 13 **Minimum Wage 40 Hours Divided by Overall Average Weekly Earnings**

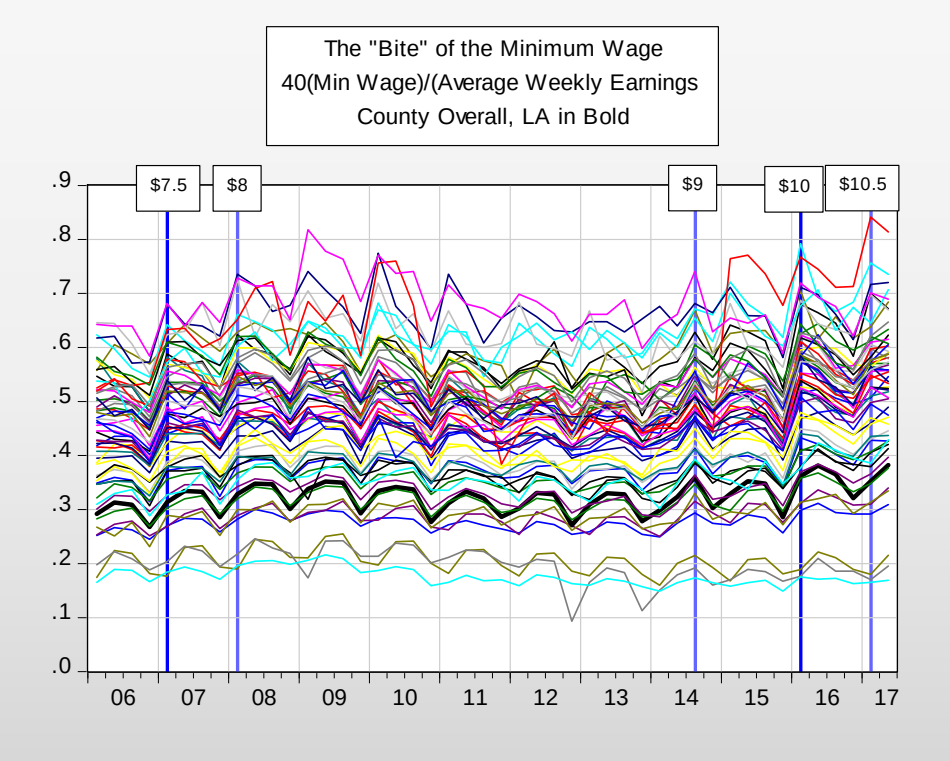


Figure 14 **Minimum Wage 30 Hours Divided by Average Weekly Earnings in Limited Service Restaurants**

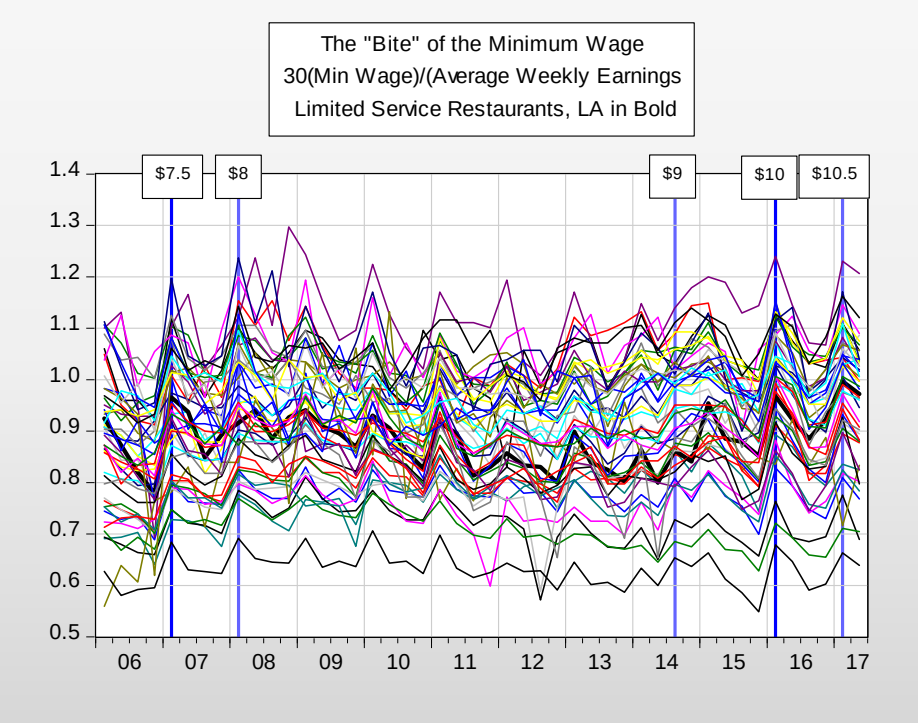
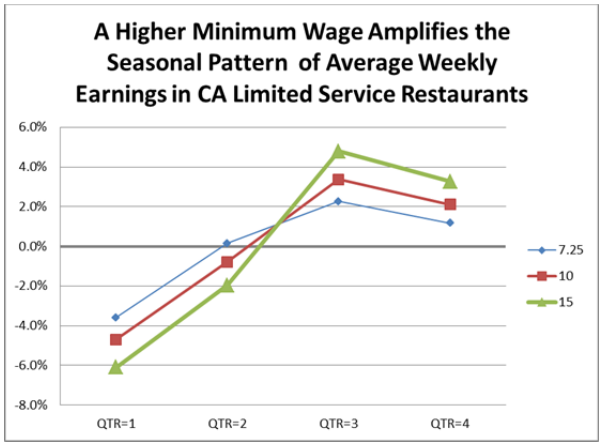
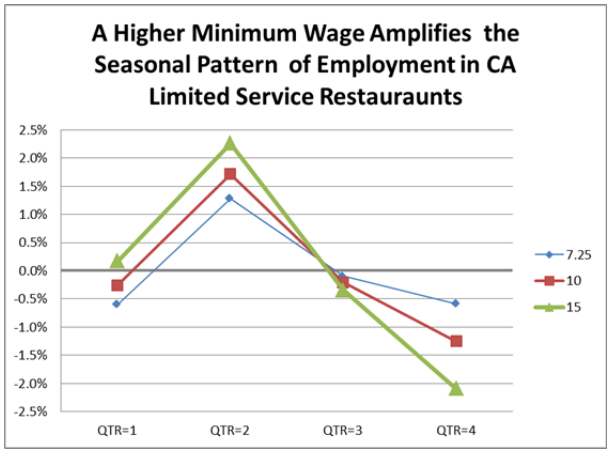
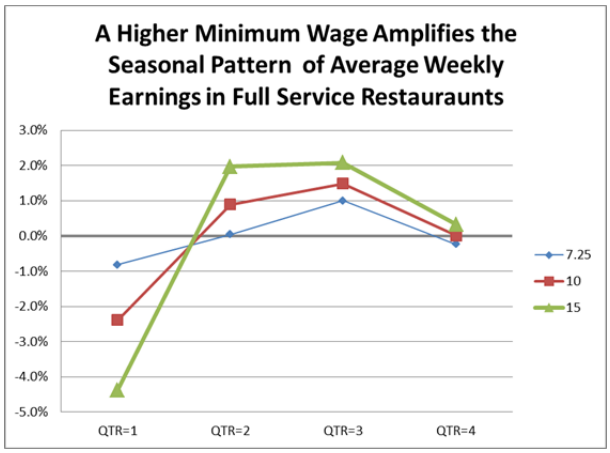


Figure 15 **Estimated Impact of California Minimum Wage on Seasonals**







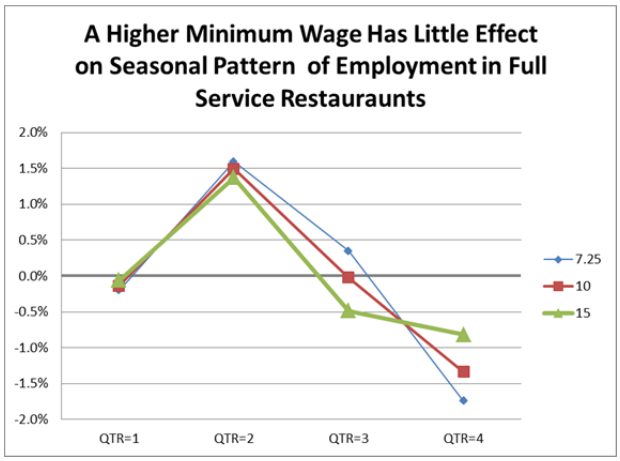
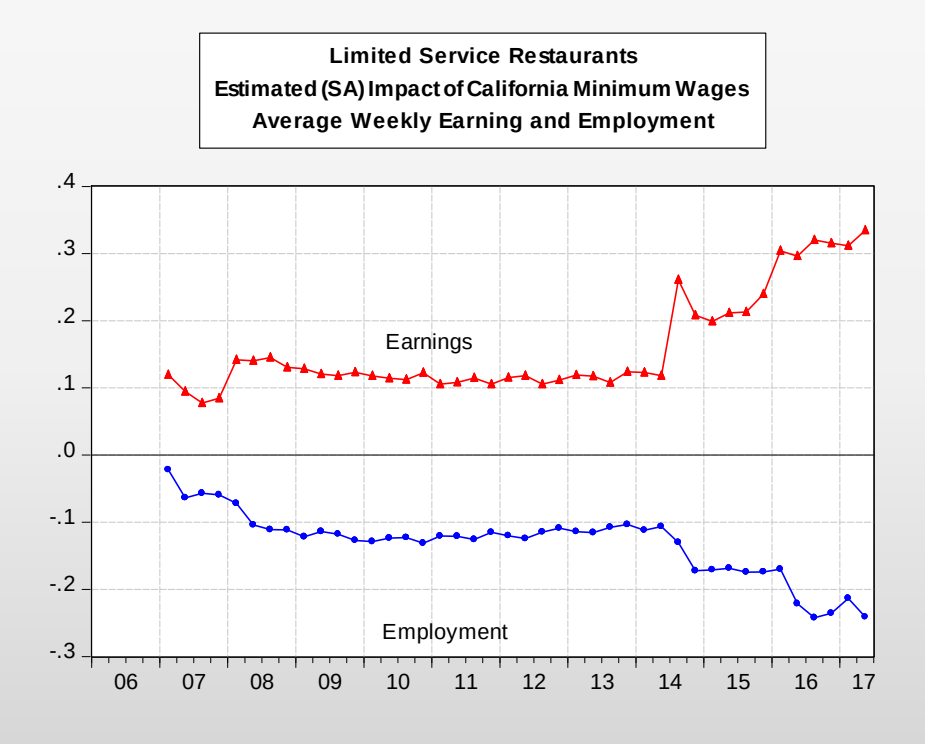
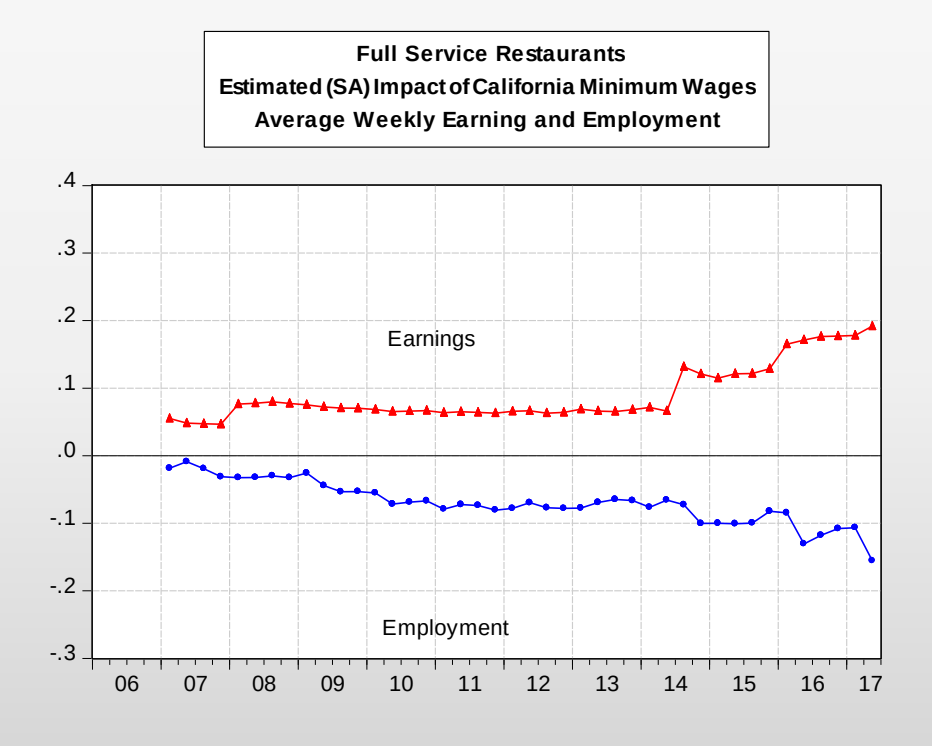


Figure 16 Estimated Impact of the Increments in the California minimum wage





VII. Tables

Table 1 California 2016 QCEW NAICS 6-digit Low-Wage Sectors, Sorted by Average Weekly "Wage"

NAICS	Description	Avg Wkly Wage	Emp	EMP Share	Cum Share	Establish.	Size
624120	Services for the elderly and disabled	263	529,754	3.7%	3.7%	448606	1.2
512132	Drive-in motion picture theaters	290	441	0.0%	3.7%	20	22.1
812113	Nail salons	298	20,646	0.1%	3.9%	4040	5.1
512131	Motion picture theaters, except drive-ins	302	19,346	0.1%	4.0%	460	42.1
448130	Children's and infants' clothing stores	332	7,255	0.1%	4.1%	684	10.6
722513	Limited-service restaurants	343	501,869	3.5%	7.6%	27478	18.3
722515	Snack and nonalcoholic beverage bars	357	112,915	0.8%	8.4%	9200	12.3
451120	Hobby, toy, and game stores	359	17,865	0.1%	8.5%	1183	15.1
713120	Amusement arcades	363	2,256	0.0%	8.5%	135	16.7
713940	Fitness and recreational sports centers	365	76,516	0.5%	9.1%	3856	19.8
451130	Sewing, needlework, and piece goods stores	373	4,914	0.0%	9.1%	487	10.1
445292	Confectionery and nut stores	379	4,004	0.0%	9.1%	508	7.9
485119	Other urban transit systems	385	10	0.0%	9.1%	3	3.3
445120	Convenience stores	387	18,055	0.1%	9.3%	2778	6.5
722410	Drinking places, alcoholic beverages	388	30,308	0.2%	9.5%	2850	10.6
611691	Exam preparation and tutoring	389	20,430	0.1%	9.6%	1550	13.2
452112	Discount department stores	394	104,099	0.7%	10.4%	1072	97.1
722514	Cafeterias, grill buffets, and buffets	397	14,710	0.1%	10.5%	686	21.4
611620	Sports and recreation instruction	398	15,235	0.1%	10.6%	1739	8.8
452990	All other general merchandise stores	404	39,585	0.3%	10.8%	2472	16.0
448140	Family clothing stores	410	60,610	0.4%	11.3%	3015	20.1
811192	Car washes	410	27,078	0.2%	11.5%	1699	15.9
448120	Women's clothing stores	412	32,608	0.2%	11.7%	3106	10.5
451211	Book stores	413	9,276	0.1%	11.8%	715	13.0
611630	Language schools	417	4,354	0.0%	11.8%	347	12.5
722330	Mobile food services	421	2,181	0.0%	11.8%	348	6.3
453991	Tobacco stores	424	2,923	0.0%	11.8%	1037	2.8
713950	Bowling centers	426	5,385	0.0%	11.9%	180	29.9
713990	All other amusement and recreation industries	428	19,579	0.1%	12.0%	1637	12.0
812310	Coin-operated laundries and drycleaners	432	4,296	0.0%	12.0%	971	4.4
445299	All other specialty food stores	441	8,606	0.1%	12.1%	877	9.8
812320	Drycleaning and laundry services	452	14,339	0.1%	12.2%	2568	5.6
453110	Florists	453	4,700	0.0%	12.2%	1042	4.5
722511	Full-service restaurants	454	639,511	4.5%	16.7%	28512	22.4
812199	Other personal care services	454	17,968	0.1%	16.9%	2152	8.3
813410	Civic and social organizations	455	40,876	0.3%	17.1%	2415	16.9
448210	Shoe stores	457	28,780	0.2%	17.3%	2602	11.1
311811	Retail bakeries	461	13,791	0.1%	17.4%	1067	12.9
447110	Gasoline stations with convenience stores	464	50,018	0.4%	17.8%	5873	8.5
611610	Fine arts schools	464	12,370	0.1%	17.9%	1564	7.9
722320	Caterers	464	23,859	0.2%	18.1%	1350	17.7
721191	Bed-and-breakfast inns	468	2,156	0.0%	18.1%	249	8.7
453220	Gift, novelty, and souvenir stores	469	17,179	0.1%	18.2%	2123	8.1
115115	Farm labor contractors and crew leaders	473	143,525	1.0%	19.2%	1193	120.3
453310	Used merchandise stores	475	18,331	0.1%	19.3%	1590	11.5
111331	Apple orchards	480	572	0.0%	19.3%	80	7.2
812191	Diet and weight reducing centers	480	2,297	0.0%	19.3%	320	7.2
812112	Beauty salons	483	35,095	0.2%	19.6%	6447	5.4
812930	Parking lots and garages	484	27,818	0.2%	19.8%	1827	15.2
445310	Beer, wine, and liquor stores	489	15,784	0.1%	19.9%	3516	4.5
451110	Sporting goods stores	490	31,021	0.2%	20.1%	2540	12.2
448190	Other clothing stores	493	14,950	0.1%	20.2%	1234	12.1
453910	Pet and pet supplies stores	494	15,594	0.1%	20.3%	1188	13.1
812910	Pet care, except veterinary, services	495	11,517	0.1%	20.4%	1617	7.1
447190	Other gasoline stations	497	8,822	0.1%	20.5%	831	10.6
624310	Vocational rehabilitation services	497	34,578	0.2%	20.7%	1021	33.9
713920	Skiing facilities	500	4,231	0.0%	20.8%	21	201.5
111334	Berry, except strawberry, farming	501	10942	0.1%	20.8%	111	98.6

623210	Residential developmental disability homes	501	21837	0.2%	21.0%	1571	13.9
711310	Promoters with facilities	501	10559	0.1%	21.1%	352	30.0
812111	Barber shops	504	2095	0.0%	21.1%	301	7.0
611692	Automobile driving schools	507	1786	0.0%	21.1%	294	6.1
442299	All other home furnishings stores	508	22919	0.2%	21.2%	1477	15.5
721214	Recreational and vacation camps	515	2655	0.0%	21.3%	180	14.8
445210	Meat markets	519	5939	0.0%	21.3%	662	9.0
561720	Janitorial services	519	109798	0.8%	22.1%	5575	19.7
112410	Sheep farming	520	256	0.0%	22.1%	61	4.2
623312	Assisted living facilities for the elderly	520	54673	0.4%	22.5%	3241	16.9
452111	Department stores, except discount	522	65606	0.5%	22.9%	474	138.4
541921	Photography studios, portrait	524	5033	0.0%	23.0%	902	5.6
561612	Security guards and patrol services	527	117933	0.8%	23.8%	1687	69.9
445220	Fish and seafood markets	529	1788	0.0%	23.8%	185	9.7
611699	Miscellaneous schools and instruction	529	9761	0.1%	23.9%	861	11.3
444110	Home centers	533	68564	0.5%	24.4%	764	89.7
624410	Child day care services	538	67120	0.5%	24.8%	7275	9.2
811191	Automotive oil change and lubrication shops	539	5724	0.0%	24.9%	678	8.4
446120	Cosmetic and beauty supply stores	543	20152	0.1%	25.0%	1845	10.9
532292	Recreational goods rental	543	2322	0.0%	25.0%	253	9.2
813110	Religious organizations	544	27428	0.2%	25.2%	2649	10.4
713910	Golf courses and country clubs	560	34446	0.2%	25.5%	653	52.8
721211	RV parks and campgrounds	567	2727	0.0%	25.5%	240	11.4
811430	Footwear and leather goods repair	572	414	0.0%	25.5%	105	3.9
445110	Supermarkets and other grocery stores	575	295699	2.1%	27.6%	7244	40.8
812922	One-hour photofinishing	576	91	0.0%	27.6%	28	3.3
446130	Optical goods stores	577	6108	0.0%	27.6%	985	6.2
491110	Postal service	583	720	0.0%	27.6%	113	6.4
111320	Citrus, except orange, groves	584	2084	0.0%	27.6%	213	9.8
111339	Other noncitrus fruit farming	586	12597	0.1%	27.7%	975	12.9
712120	Historical sites	586	365	0.0%	27.7%	34	10.7
111333	Strawberry farming	588	25501	0.2%	27.9%	321	79.4
446191	Food, health, supplement stores	590	8459	0.1%	28.0%	1220	6.9
452910	Warehouse clubs and supercenters	596	107008	0.8%	28.7%	456	234.7
451140	Musical instrument and supplies stores	597	3383	0.0%	28.7%	381	8.9
111336	Fruit and tree nut combination farming	598	4858	0.0%	28.8%	277	17.5

Table 2 **Counts of California County Data, 2006q1 to 2017q2**

Counts of County Observations from 2006q1 to 2017q2

	ID	County	Average TOT EMP	Number of Obs. TOT	LIM	FULL		ID	County	Average TOT EMP	Number of Obs. TOT	LIM	FULL
1	6001	Alameda	579,782	46	46	46	30	6059	Orange	1,316,260	46	46	46
2	6003	Alpine	428	40			31	6061	Placer	119,976	46	44	46
3	6005	Amador	7,190	46	46	46	32	6063	Plumas	3,961	46	32	46
4	6007	Butte	60,505	46	46	46	33	6065	Riverside	492,971	46	46	46
5	6009	Calaveras	5,952	46	46	46	34	6067	Sacramento	433,173	46	46	46
6	6011	Colusa	6,391	46	21	38	35	6069	San Benito	12,761	46	46	46
7	6013	Contra Costa	289,425	46	46	46	36	6071	San Bernardi	531,687	46	46	46
8	6015	Del Norte	4,443	46	46	39	37	6073	San Diego	1,090,958	46	46	46
9	6017	El Dorado	40,328	46	46	46	38	6075	San Francisco	503,603	46	46	46
10	6019	Fresno	285,382	46	46	46	39	6077	San Joaquin	180,838	46	46	46
11	6021	Glenn	6,166	46	46	40	40	6079	San Luis Obis	86,955	46	46	46
12	6023	Humboldt	34,552	46	46	46	41	6081	San Mateo	319,685	46	46	46
13	6025	Imperial	42,451	46	46	46	42	6083	Santa Barbara	153,349	46	46	46
14	6027	Inyo	4,511	46	31	44	43	6085	Santa Clara	839,168	46	46	46
15	6029	Kern	233,597	46	46	46	44	6087	Santa Cruz	79,848	46	46	46
16	6031	Kings	29,666	46	46	46	45	6089	Shasta	50,156	46	46	46
17	6033	Lake	11,036	46	46	46	46	6091	Sierra	298	46		19
18	6035	Lassen	4,054	46	40	44	47	6093	Siskiyou	9,317	46	46	46
19	6037	Los Angeles	3,543,652	46	46	46	48	6095	Solano	102,435	46	46	46
20	6039	Madera	35,647	46	46	46	49	6097	Sonoma	161,358	46	46	46
21	6041	Marin	93,578	46	46	46	50	6099	Stanislaus	144,434	46	46	46
22	6043	Mariposa	3,397	46	20	46	51	6101	Sutter	23,436	46	46	46
23	6045	Mendocino	24,332	46	46	46	52	6103	Tehama	12,713	46	44	44
24	6047	Merced	55,645	46	46	46	53	6105	Trinity	1,531	46	40	44
25	6049	Modoc	1,470	46	32	38	54	6107	Tulare	118,481	46	46	46
26	6051	Mono	5,378	46	46	46	55	6109	Tuolumne	11,535	46	46	46
27	6053	Monterey	143,635	46	46	46	56	6111	Ventura	267,835	46	46	46
28	6055	Napa	59,353	46	46	46	57	6113	Yolo	63,554	46	46	46
29	6057	Nevada	23,644	46	46	46	58	6115	Yuba	9,773	46	46	46
									All	220,800	2662	2466	2558

Table 3 Limited and Full Service Restaurants, 2016 County Averages, Sorted by LIM Weekly Earnings

Average, 2016q1 2016q4

		Limited Service Restaurants					Full Service Restaurants					Ratio: LIM/FULL			
		Obs.	EMP	Avg. Earn	Estab.	Size	Obs.	EMP	Avg. Earn	Estab.	Size	EMP	Avg. Earn	Estab.	Size
1	Del Norte	4	172	266	13	13.2	4	301	363	23	12.9	0.57	0.73	0.56	1.02
2	Trinity	4	99	276	8	12.8	4	67	286	10	7.1	1.48	0.96	0.82	1.81
3	Tehama	4	478	276	32	14.9	4	370	318	35	10.6	1.29	0.87	0.92	1.40
4	Yuba	4	746	277	35	21.1	4	253	335	25	10.0	2.95	0.83	1.40	2.11
5	Colusa	1	215	277	13	16.5	2	260	602	12	21.7	0.83	0.46	1.08	0.76
6	Glenn	4	281	279	20	14.4	1	176	369	15	11.7	1.60	0.76	1.30	1.23
7	Butte	4	2,949	280	141	21.0	4	2,755	360	130	21.2	1.07	0.78	1.08	0.99
8	Kings	4	1,817	280	88	20.6	4	834	360	43	19.5	2.18	0.78	2.06	1.06
9	Tulare	4	5,311	280	267	19.9	4	3,307	371	197	16.8	1.61	0.76	1.36	1.18
10	Amador	4	256	282	19	13.8	4	283	361	27	10.4	0.91	0.78	0.68	1.33
11	Madera	4	1,329	282	76	17.6	4	701	369	50	13.9	1.90	0.76	1.50	1.26
12	Calaveras	4	368	282	31	12.1	4	315	335	33	9.7	1.17	0.84	0.94	1.25
13	Lassen	4	305	286	13	23.4	4	155	340	12	13.5	1.97	0.84	1.13	1.74
14	Siskiyou	4	457	286	31	14.8	4	401	349	38	10.6	1.14	0.82	0.82	1.39
15	Humboldt	4	1,445	287	102	14.2	4	2,188	363	123	17.9	0.66	0.79	0.83	0.80
16	Plumas	2	63	289	11	5.8	4	260	269	34	7.8	0.24	1.07	0.33	0.74
17	Shasta	4	2,165	290	114	19.1	4	2,118	358	115	18.5	1.02	0.81	0.99	1.03
18	Lake	4	418	294	31	13.4	4	417	317	39	10.6	1.00	0.93	0.80	1.26
19	Merced	4	2,729	294	134	20.3	4	1,411	353	86	16.4	1.93	0.83	1.56	1.24
20	Stanislaus	4	7,242	296	343	21.1	4	5,975	365	283	21.2	1.21	0.81	1.22	1.00
21	Sutter	4	1,049	298	65	16.3	4	877	362	46	19.2	1.20	0.82	1.41	0.85
22	Fresno	4	11,904	299	639	18.6	4	10,718	381	471	22.8	1.11	0.78	1.36	0.82
23	Tuolumne	4	470	299	28	17.1	4	713	362	50	14.3	0.66	0.83	0.55	1.20
24	Kern	4	10,375	302	549	18.9	4	7,793	368	418	18.6	1.33	0.82	1.31	1.01
25	San Joaquin	4	8,240	302	420	19.6	4	6,029	371	337	17.9	1.37	0.81	1.25	1.10
26	Sacramento	4	19,473	304	1,012	19.2	4	20,358	402	901	22.6	0.96	0.76	1.12	0.85
27	El Dorado	4	1,669	306	111	15.0	4	3,157	386	177	17.8	0.53	0.79	0.63	0.84
28	Placer	4	5,466	308	319	17.1	4	7,549	440	299	25.3	0.72	0.70	1.07	0.68
29	Imperial	4	1,888	310	105	18.1	4	1,412	365	80	17.8	1.34	0.85	1.31	1.02
30	Monterey	4	4,699	315	250	18.8	4	7,449	468	349	21.3	0.63	0.67	0.72	0.88
31	San Bernardino	4	29,781	316	1,430	20.8	4	22,087	381	955	23.1	1.35	0.83	1.50	0.90
32	Yolo	4	2,525	316	134	18.9	4	2,385	380	131	18.2	1.06	0.83	1.02	1.04
33	Riverside	4	29,977	316	1,419	21.1	4	26,476	421	1,124	23.6	1.13	0.75	1.26	0.90
34	Nevada	4	767	318	53	14.5	4	1,556	408	83	18.9	0.49	0.78	0.64	0.77
35	Mendocino	4	860	325	59	14.6	4	1,686	383	108	15.7	0.51	0.85	0.55	0.93
36	Solano	4	5,504	327	295	18.6	4	4,436	396	224	19.8	1.24	0.82	1.32	0.94
37	Ventura	4	12,026	331	602	20.0	4	12,687	400	567	22.4	0.95	0.83	1.06	0.89
38	San Luis Obispo	4	3,885	340	225	17.2	4	6,932	404	335	20.7	0.56	0.84	0.67	0.83
39	Sonoma	4	4,731	341	308	15.4	4	9,600	434	477	20.1	0.49	0.79	0.65	0.76
40	Orange	4	49,871	342	2,712	18.4	4	68,400	435	2,569	26.6	0.73	0.79	1.06	0.69
41	San Diego	4	45,118	343	2,456	18.4	4	64,229	441	2,404	26.7	0.70	0.78	1.02	0.69
42	Mono	4	259	346	18	14.8	4	672	425	32	21.0	0.39	0.81	0.55	0.71
43	Modoc	4	40	347	6	6.9	4	75	281	8	9.3	0.53	1.23	0.72	0.74
44	San Benito	4	553	349	24	23.3	4	391	346	28	14.0	1.41	1.01	0.85	1.67
45	Santa Barbara	4	6,258	350	338	18.5	4	8,990	441	381	23.6	0.70	0.79	0.89	0.78
46	Los Angeles	4	135,120	351	7,408	18.2	4	176,589	463	7,647	23.1	0.77	0.76	0.97	0.79
47	Contra Costa	4	11,877	356	655	18.1	4	14,103	448	670	21.0	0.84	0.80	0.98	0.86
48	Santa Cruz	4	3,075	374	171	18.0	4	5,231	428	247	21.2	0.59	0.87	0.69	0.85
49	Napa	4	1,664	379	78	21.3	4	4,280	633	140	30.6	0.39	0.60	0.56	0.69
50	Santa Clara	4	22,825	379	1,353	16.9	4	34,379	499	1,574	21.8	0.66	0.76	0.86	0.77
51	Alameda	4	18,151	388	1,162	15.6	4	25,968	482	1,455	17.9	0.70	0.80	0.80	0.88
52	Inyo	1	187	395	15	12.4	4	373	338	26	14.5	0.50	1.17	0.58	0.86
53	Marin	4	2,786	424	172	16.2	4	6,583	515	290	22.7	0.42	0.82	0.59	0.72
54	San Mateo	4	7,769	441	509	15.3	4	15,187	532	794	19.1	0.51	0.83	0.64	0.80
55	San Francisco	4	10,871	478	818	13.3	4	36,623	614	1,756	20.9	0.30	0.78	0.47	0.64
56	Alpine	0					0								
57	Mariposa	0					4	196	439	10	20.6				
58	Sierra	0													
	All	212	9,438	321	517	18.3	219	11,661	399	520	22.4	0.81	0.81	0.99	0.81

Table 4 County Totals and Ratios, Restaurants to Totals, Sorted by Overall Weekly Earnings

Average, 2016q1 2016q4

		County Totals				Lim. Service Rest./TOT				Full Service Rest./TOT			
		EMP	Avg. Earn	Estab.	Size	EMP	Avg. Earn	Estab.	Size	EMP	Avg. Earn	Estab.	Size
1	Sierra	228	545	91	3								
2	Imperial	44785	567	6815	7	4%	55%	2%	275%	3%	64%	1%	270%
3	Trinity	1648	592	348	5	6%	47%	2%	270%	4%	48%	3%	149%
4	Mono	5471	596	548	10	5%	58%	3%	148%	12%	71%	6%	210%
5	Mariposa	3207	598	421	8					6%	73%	2%	0%
6	Del Norte	4311	618	693	6	4%	43%	2%	213%	7%	59%	3%	208%
7	Modoc	1489	619	276	5	3%	56%	2%	128%	5%	45%	3%	173%
8	Alpine	494	623	76	7								
9	Calaveras	6490	624	1195	5	6%	45%	3%	222%	5%	54%	3%	178%
10	Lake	11941	647	2894	4	3%	45%	1%	324%	3%	49%	1%	258%
11	Tulare	129299	670	9474	14	4%	42%	3%	146%	3%	55%	2%	123%
12	Siskiyou	9632	675	1489	6	5%	42%	2%	228%	4%	52%	3%	164%
13	Inyo	4620	678	611	8	4%	58%	2%	164%	8%	50%	4%	191%
14	Mendocino	25237	679	3934	6	3%	48%	1%	227%	7%	56%	3%	244%
15	Lassen	3961	680	553	7	8%	42%	2%	327%	4%	50%	2%	188%
16	Humboldt	35129	685	4468	8	4%	42%	2%	181%	6%	53%	3%	227%
17	Plumas	3772	695	762	5	2%	42%	1%	116%	7%	39%	4%	157%
18	Kings	31363	704	3458	9	6%	40%	3%	228%	3%	51%	1%	215%
19	Glenn	6923	708	1111	6	4%	39%	2%	232%	3%	52%	1%	188%
20	Merced	59629	710	6103	10	5%	41%	2%	208%	2%	50%	1%	168%
21	Amador	7111	712	976	7	4%	40%	2%	190%	4%	51%	3%	142%
22	Butte	65616	726	7684	9	4%	39%	2%	245%	4%	50%	2%	249%
23	Tuolumne	12168	726	1452	8	4%	41%	2%	204%	6%	50%	3%	170%
24	Sutter	25373	726	2999	8	4%	41%	2%	192%	3%	50%	2%	227%
25	Madera	38016	738	3820	10	3%	38%	2%	177%	2%	50%	1%	140%
26	Shasta	52138	741	6359	8	4%	39%	2%	233%	4%	48%	2%	225%
27	Colusa	6862	749	756	9	3%	37%	2%	182%	4%	80%	2%	239%
28	Tehama	13686	749	1682	8	3%	37%	2%	184%	3%	42%	2%	131%
29	Fresno	307208	759	32120	10	4%	39%	2%	195%	3%	50%	1%	238%
30	Riverside	563374	759	57940	10	5%	42%	2%	217%	5%	55%	2%	242%
31	Nevada	24592	783	3403	7	3%	41%	2%	201%	6%	52%	2%	261%
32	Kern	252088	785	16901	15	4%	38%	3%	127%	3%	47%	2%	125%
33	San Benito	14077	794	1518	9	4%	44%	2%	251%	3%	44%	2%	151%
34	Monterey	156110	794	12747	12	3%	40%	2%	153%	5%	59%	3%	174%
35	San Luis Obispo	93631	802	9612	10	4%	42%	2%	177%	7%	50%	3%	212%
36	San Joaquin	198103	807	16568	12	4%	37%	3%	164%	3%	46%	2%	150%
37	San Bernardino	586665	809	53880	11	5%	39%	3%	191%	4%	47%	2%	212%
38	Stanislaus	156094	828	14381	11	5%	36%	2%	194%	4%	44%	2%	195%
39	Yuba	10412	835	1469	7	7%	33%	2%	298%	2%	40%	2%	141%
40	El Dorado	43335	870	5046	9	4%	35%	2%	175%	7%	44%	4%	207%
41	Santa Cruz	85628	871	9224	9	4%	43%	2%	193%	6%	49%	3%	228%
42	Yolo	68045	891	6209	11	4%	35%	2%	172%	4%	43%	2%	166%
43	Santa Barbara	162011	935	14716	11	4%	37%	2%	168%	6%	47%	3%	215%
44	Sonoma	174390	953	18964	9	3%	36%	2%	167%	6%	46%	3%	219%
45	Napa	64911	979	5416	12	3%	39%	1%	177%	7%	65%	3%	256%
46	Sacramento	465217	986	49627	9	4%	31%	2%	205%	4%	41%	2%	241%
47	Ventura	274775	999	25408	11	4%	33%	2%	185%	5%	40%	2%	207%
48	Placer	138119	1013	12031	11	4%	30%	3%	149%	5%	43%	2%	220%
49	Solano	110687	1024	10362	11	5%	32%	3%	175%	4%	39%	2%	185%
50	San Diego	1177782	1088	104207	11	4%	32%	2%	163%	5%	41%	2%	236%
51	Los Angeles	3782657	1124	460164	8	4%	31%	2%	222%	5%	41%	2%	281%
52	Orange	1412148	1137	112866	13	4%	30%	2%	147%	5%	38%	2%	213%
53	Contra Costa	312810	1253	30767	10	4%	28%	2%	178%	5%	36%	2%	207%
54	Marin	98841	1278	12060	8	3%	33%	1%	198%	7%	40%	2%	277%
55	Alameda	643256	1340	59710	11	3%	29%	2%	145%	4%	36%	2%	166%
56	San Francisco	605382	1984	58524	10	2%	24%	1%	128%	6%	31%	3%	202%
57	San Mateo	359924	2121	26925	13	2%	21%	2%	114%	4%	25%	3%	143%
58	Santa Clara	957437	2348	68542	14	2%	16%	2%	121%	4%	21%	2%	156%
	All	239,833	874	23,834	10.1	3.9%	36.7%	2.2%	181%	4.9%	45.6%	2.2%	223%

Table 5 Seas. Adjust. Regression, Avg. Weekly Earnings, Limited Service Restaurants

Dependent Variable: LOG(LIM_AVG_WKLY_WAGE)
Method: Panel EGLS (Cross-section weights)
Date: 12/17/17 Time: 09:25
Sample: 2006Q1 2017Q2 IF AREA_FIPS>6000 AND AREA_FIPS<6999
AND EXCLUDE_LIM=0
Periods included: 46
Cross-sections included: 47
Total panel (balanced) observations: 2162
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
QTR=1	-0.04872	0.003072	-15.8588	0
QTR=2	-0.018538	0.003071	-6.03652	0
QTR=3	0.001358	0.003138	0.432839	0.6652
C	5.49199	0.002908	1888.493	0
@TREND/4	0.023659	3.27E-04	72.33867	0

Effects Specification

Cross-section fixed (dummy variables)

Weighted Statistics

R-squared	0.886162	Mean dependent var	6.362745
Adjusted R-squared	0.883466	S.D. dependent var	1.6643
S.E. of regression	0.059067	Sum squared resid	7.365135
F-statistic	328.6592	Durbin-Watson stat	0.766577
Prob(F-statistic)	0		

Unweighted Statistics

R-squared	0.861516	Mean dependent var	5.607852
Sum squared resid	7.378721	Durbin-Watson stat	0.843715

QTR=1	-0.032
QTR=2	-0.002
QTR=3	0.018
QTR=4	0.016

Table 6 Period Fixed Effects for Log(Full_EMP/TOT_EMP)

Dependent Variable: LOG(FULL_EMP/TOT_EMP)
Method: Panel Least Squares
Date: 12/16/17 Time: 13:31
Sample: 2006Q1 2017Q2 IF AREA_FIPS>6000 AND AREA_FIPS<6999 AND EXCLUDE_FULL=0
Periods included: 46
Cross-sections included: 48
Total panel (balanced) observations: 2208

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.189516	0.012009	-265.5878	0.0000
YR_QTR=2006.2	0.007531	0.016984	0.443429	0.6575
YR_QTR=2006.3	0.014955	0.016984	0.880543	0.3787
YR_QTR=2006.4	0.013627	0.016984	0.802357	0.4224
YR_QTR=2007.1	0.025991	0.016984	1.530324	0.1261
YR_QTR=2007.2	0.030414	0.016984	1.790782	0.0735
YR_QTR=2007.3	0.036519	0.016984	2.150219	0.0317
YR_QTR=2007.4	0.025922	0.016984	1.526308	0.1271
YR_QTR=2008.1	0.042723	0.016984	2.515516	0.0120
YR_QTR=2008.2	0.033784	0.016984	1.989232	0.0468
YR_QTR=2008.3	0.020503	0.016984	1.207223	0.2275
YR_QTR=2008.4	0.010898	0.016984	0.641674	0.5212
YR_QTR=2009.1	0.031281	0.016984	1.841837	0.0656
YR_QTR=2009.2	0.041463	0.016984	2.441328	0.0147
YR_QTR=2009.3	0.041994	0.016984	2.472606	0.0135
YR_QTR=2009.4	0.038321	0.016984	2.256355	0.0242
YR_QTR=2010.1	0.044497	0.016984	2.619984	0.0089
YR_QTR=2010.2	0.060327	0.016984	3.552080	0.0004
YR_QTR=2010.3	0.056915	0.016984	3.351131	0.0008
YR_QTR=2010.4	0.037380	0.016984	2.200909	0.0279
YR_QTR=2011.1	0.049923	0.016984	2.939440	0.0033
YR_QTR=2011.2	0.061642	0.016984	3.629457	0.0003
YR_QTR=2011.3	0.057118	0.016984	3.363108	0.0008
YR_QTR=2011.4	0.041712	0.016984	2.455979	0.0141
YR_QTR=2012.1	0.061447	0.016984	3.617977	0.0003
YR_QTR=2012.2	0.084569	0.016984	4.979455	0.0000
YR_QTR=2012.3	0.078465	0.016984	4.619997	0.0000
YR_QTR=2012.4	0.060447	0.016984	3.559098	0.0004
YR_QTR=2013.1	0.075707	0.016984	4.457624	0.0000
YR_QTR=2013.2	0.090926	0.016984	5.353704	0.0000
YR_QTR=2013.3	0.087396	0.016984	5.145873	0.0000
YR_QTR=2013.4	0.074376	0.016984	4.379244	0.0000
YR_QTR=2014.1	0.078144	0.016984	4.601123	0.0000
YR_QTR=2014.2	0.081772	0.016984	4.814760	0.0000
YR_QTR=2014.3	0.079042	0.016984	4.653989	0.0000
YR_QTR=2014.4	0.063588	0.016984	3.744056	0.0002
YR_QTR=2015.1	0.077842	0.016984	4.583340	0.0000
YR_QTR=2015.2	0.083357	0.016984	4.908088	0.0000
YR_QTR=2015.3	0.079471	0.016984	4.679233	0.0000
YR_QTR=2015.4	0.068866	0.016984	4.054805	0.0001
YR_QTR=2016.1	0.080057	0.016984	4.713780	0.0000
YR_QTR=2016.2	0.083192	0.016984	4.898378	0.0000
YR_QTR=2016.3	0.069763	0.016984	4.107622	0.0000
YR_QTR=2016.4	0.069684	0.016984	4.102994	0.0000
YR_QTR=2017.1	0.094148	0.016984	5.543450	0.0000
YR_QTR=2017.2	0.088649	0.016984	5.219638	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.949857	Mean dependent var	-3.134378
Adjusted R-squared	0.947676	S.D. dependent var	0.363736
S.E. of regression	0.083203	Akaike info criterion	-2.093867
Sum squared resid	14.64149	Schwarz criterion	-1.853792
Log likelihood	2404.629	Hannan-Quinn criter.	-2.006157
F-statistic	435.4815	Durbin-Watson stat	0.590322
Prob(F-statistic)	0.000000		

Table 7 Regressions Explaining Log of Average Weekly Earnings

Dependent Variable: Log(**)	LIM_AVG_WKLY_WAGE		FULL_AVG_WKLY_WAGE	
Variable	Coefficient	t-Statistic	Coefficient	t-Statistic
C	0.652	3.9	2.156	10.1
LOG(**_AVG_WKLY_WAGE(-1))	0.284	13.8	0.223	10.3
LOG(**_AVG_WKLY_WAGE(-2))	0.377	19.1	0.258	12.1
LOG(TOT_AVG_WKLY_WAGE)	0.074	3.3	0.111	3.8
LOG(TOT_AVG_WKLY_WAGE(-1))	-0.003	-0.2	-0.057	-3.3
LOG(TOT_AVG_WKLY_WAGE(-2))	0.026	1.8	-0.001	-0.1
DLOG(TOT_EMP)	-3.292	-3.8	0.049	0.1
DLOG(TOT_EMP(-1))	-0.358	-0.8	-0.037	-0.1
U	0.008	1.4	0.004	0.7
D(U)	-0.107	-3.2	-0.041	-1.2
QTR=1	0.078	1.8	0.106	2.5
QTR=2	0.105	2.2	-0.034	-0.7
QTR=3	-0.001	0.0	-0.002	0.0
@TREND/4	-0.001	-1.5	0.009	11.8
LOG(MIN_WAGE)	0.299	7.8	0.222	5.6
LOG(MIN_WAGE)*40*MIN_WAGE/TOT_AVG_WKLY_WAGE	0.014	0.5	0.030	0.9
DLOG(MIN_WAGE)	0.118	4.3	0.039	1.4
LOG(MIN_WAGE)*U	-0.005	-1.7	-0.004	-1.3
LOG(MIN_WAGE)*D(U)	0.052	3.3	0.023	1.4
LOG(MIN_WAGE)*DLOG(TOT_EMP)	1.634	4.0	0.165	0.4
LOG(MIN_WAGE)*DLOG(TOT_EMP(-1))	0.193	0.9	0.119	0.6
LOG(MIN_WAGE)*(QTR=1)	-0.063	-3.1	-0.057	-2.8
LOG(MIN_WAGE)*(QTR=2)	-0.058	-2.6	0.019	0.8
LOG(MIN_WAGE)*(QTR=3)	0.006	0.2	0.007	0.3
Cross-section fixed (dummy variables)				
Sample (adjusted): 2006Q3 2017q3				
Cross-sections included	47		48	
Total panel (unbalanced) observations	2068		2112	
	Weighted Statistics		Weighted Statistics	
R-squared	0.963		0.971	
Adjusted R-squared	0.962		0.970	
S.E. of regression	0.039		0.049	
F-statistic	752.47		973.27	
Prob(F-statistic)	0.000		0.000	
Mean dependent var	7.310		9.046	
S.D. dependent var	2.853		4.101	
Sum squared resid	3.093		4.875	
Durbin-Watson stat	2.038		2.044	

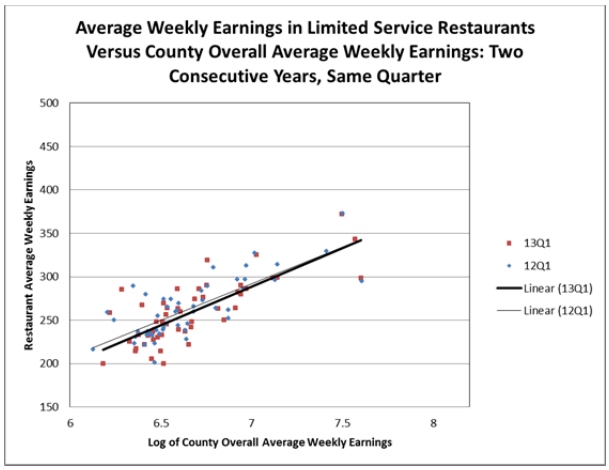
Table 8 Regressions Explaining Employment

Dependent Variable: Log(**)	LIM_EMP		FULL_EMP	
	Coefficient	t-Statistic	Coefficient	t-Statistic
C	0.592	2.5	0.012	0.0
LOG(**_EMP(-1))	0.792	35.7	0.733	33.4
LOG(**_EMP(-2))	0.082	3.7	0.050	2.3
LOG(TOT_AVG_WKLY_WAGE)	-0.028	-1.5	0.028	1.5
LOG(TOT_AVG_WKLY_WAGE(-1))	-0.015	-1.3	-0.031	-2.6
LOG(TOT_AVG_WKLY_WAGE(-2))	0.001	0.1	-0.002	-0.2
LOG(TOT_EMP)	0.072	3.6	0.166	6.4
DLOG(TOT_EMP)	0.914	1.4	0.037	0.0
U	0.005	1.2	0.008	1.2
D(U)	0.017	0.7	-0.074	-2.1
QTR=1	-0.062	-2.1	0.037	1.0
QTR=2	-0.049	-1.6	0.065	1.7
QTR=3	-0.029	-0.9	0.069	1.6
@TREND/4	0.007	13.7	0.005	8.9
LOG(MIN_WAGE)	-0.070	-2.6	-0.075	-2.5
LOG(MIN_WAGE)*40*MIN_WAGE/TOT_AVG_WKLY_WAGE	-0.004	-0.2	0.045	1.7
DLOG(MIN_WAGE)	0.061	3.3	0.043	1.9
LOG(MIN_WAGE)*U	-0.003	-1.4	-0.004	-1.3
LOG(MIN_WAGE)*D(U)	-0.009	-0.8	0.034	2.0
LOG(MIN_WAGE)*DLOG(TOT_EMP)	-0.411	-1.3	0.140	0.3
LOG(MIN_WAGE)*DLOG(TOT_EMP(-1))	-0.015	-1.8	0.010	0.7
LOG(MIN_WAGE)*(QTR=1)	0.031	2.3	-0.011	-0.6
LOG(MIN_WAGE)*(QTR=2)	0.034	2.3	-0.016	-0.9
LOG(MIN_WAGE)*(QTR=3)	0.017	1.1	-0.024	-1.2
Cross-section fixed (dummy variables)				
Sample (adjusted): 2006Q3 2017q3				
Cross-sections included	47		48	
Total panel (unbalanced) observations	2068		2112	
	Weighted Statistics		Weighted Statistics	
R-squared	0.9998		0.9996	
Adjusted R-squared	0.9998		0.9996	
S.E. of regression	0.037		0.053	
F-statistic	150943		77849	
Prob(F-statistic)	0.000		0.000	
Mean dependent var	14.036		16.493	
S.D. dependent var	10.453		12.597	
Sum squared resid	2.731		5.761	
Durbin-Watson stat	2.034		2.058	

VIII. Appendices

Scatter Diagrams of Average Weekly Earnings in Limited Service Restaurants

Figure 17 **Q1: Avg Wkly Earnings, Lim Serve Rest v. Total, Two scatters in each image, one year apart.**



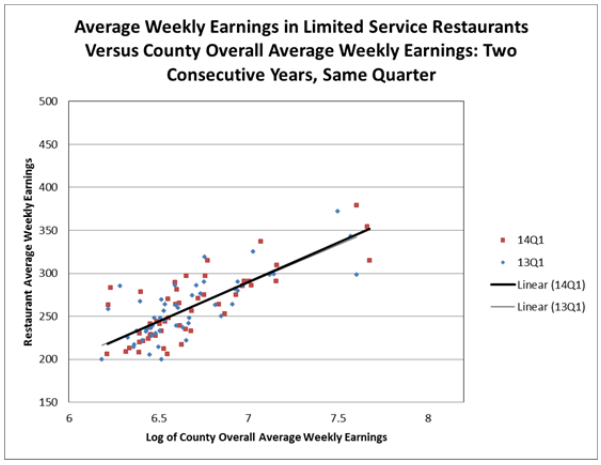
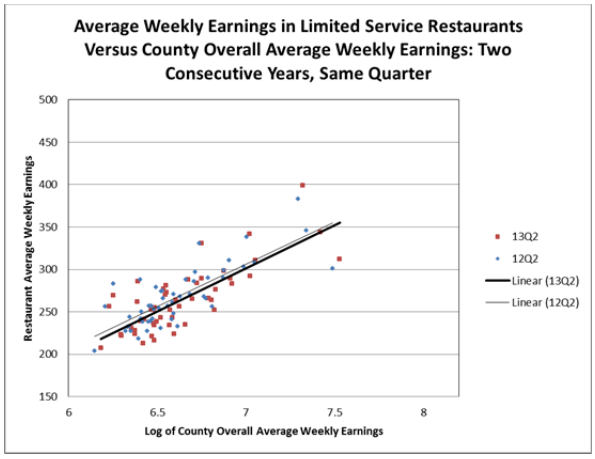


Figure 18 **Q2: Avg Wkly Earnings, Lim Serve Rest v. Total, Two scatters in each image, one year apart.**



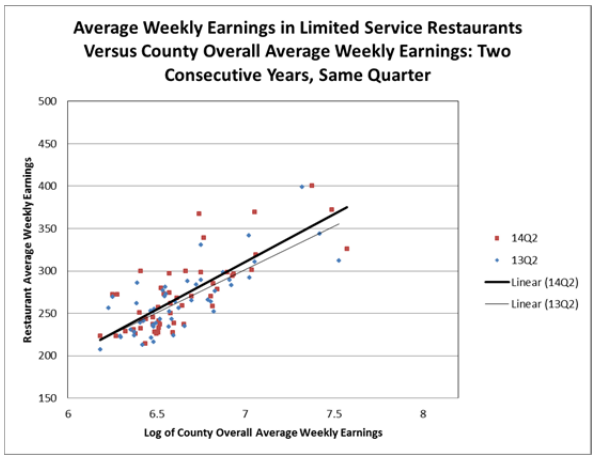


Figure 19 **Q3: Avg Wkly Earnings, Lim Serve Rest v. Total, Two scatters in each image, one year apart.**

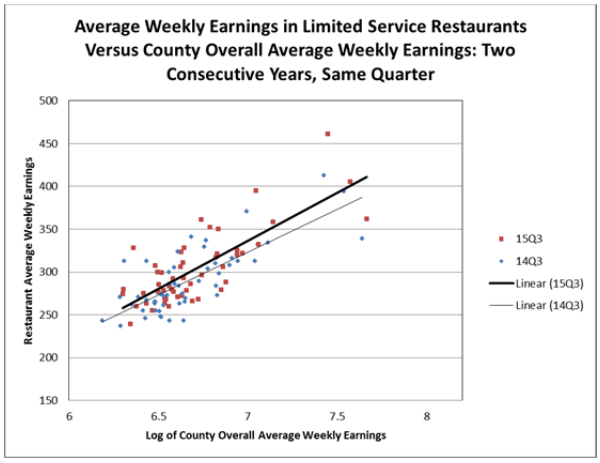
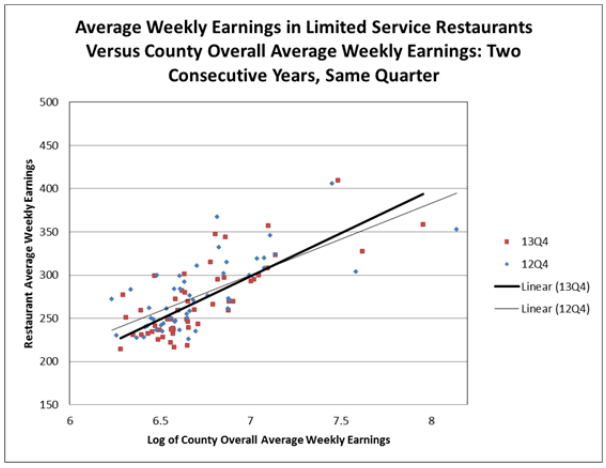
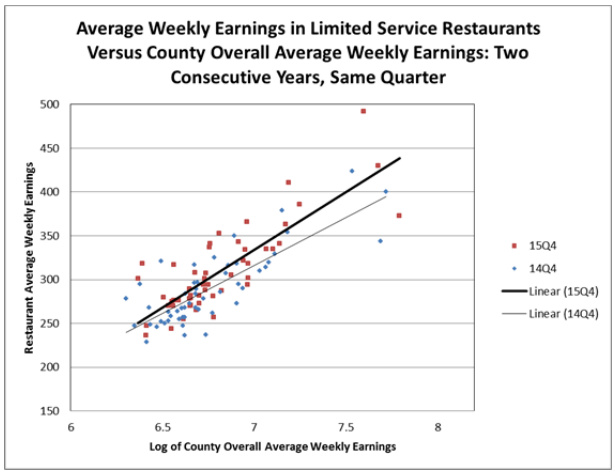


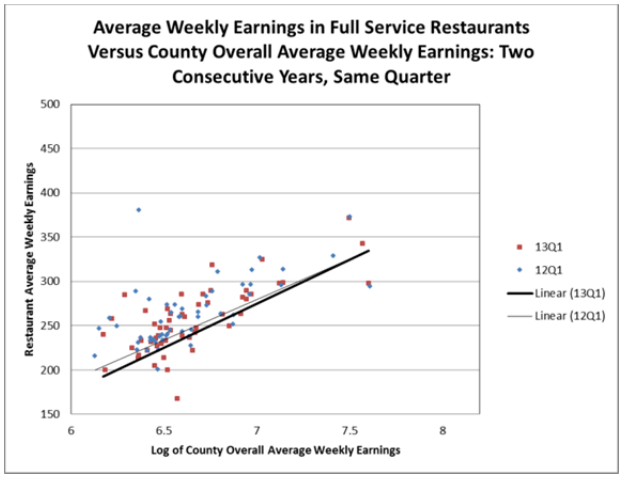
Figure 20 **Q4: Avg Wkly Earnings, Lim Serve Rest v. Total, Two scatters in each image, one year apart.**

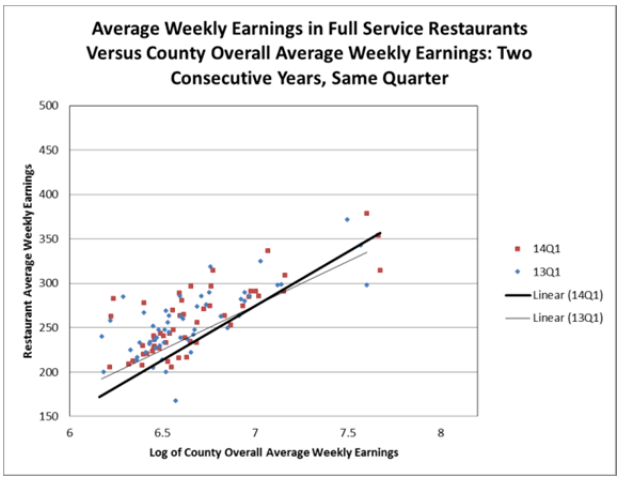


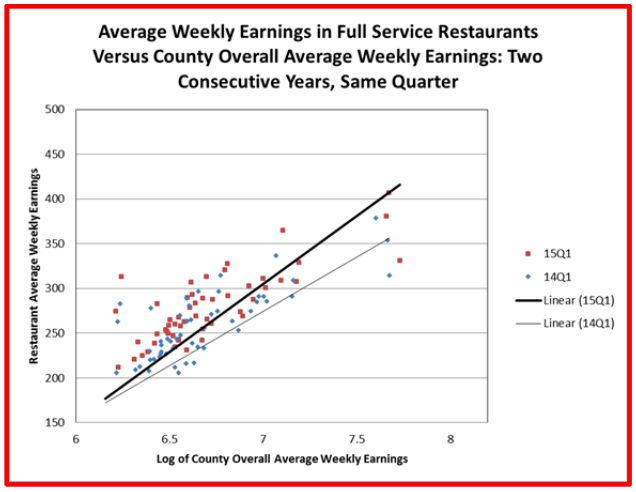


Scatter Diagrams of Average Weekly Earnings in Full Service Restaurants

Figure 21 **Q1: Avg Wkly Earnings, Full Serve Rest v. Total, Two scatters in each image, one year apart.**







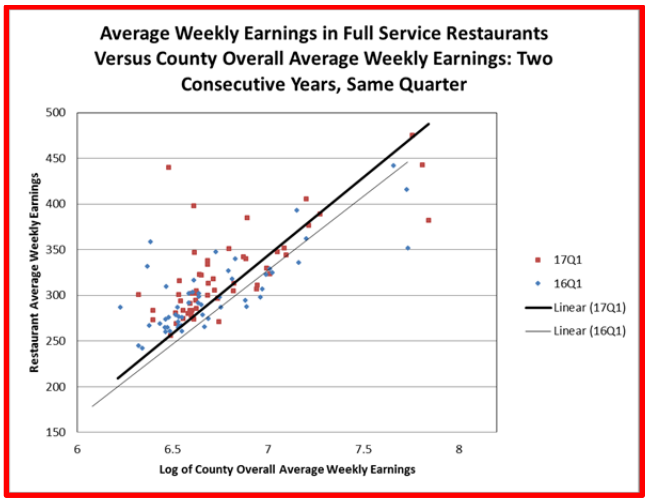
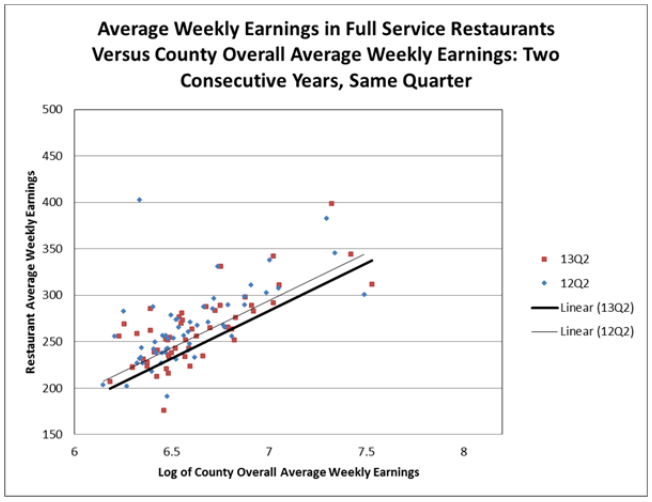


Figure 22 **Q2: Avg Wkly Earnings, Full Serve Rest v. Total, Two scatters in each image, one year apart.**



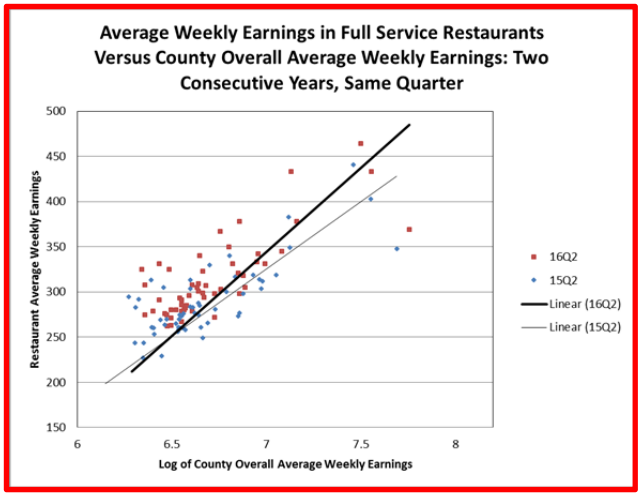
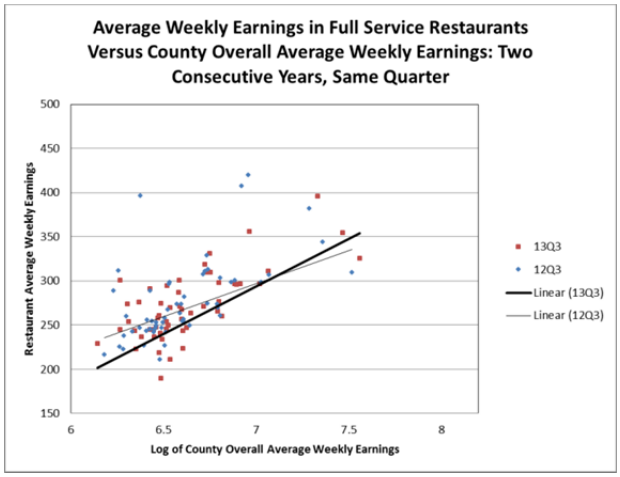
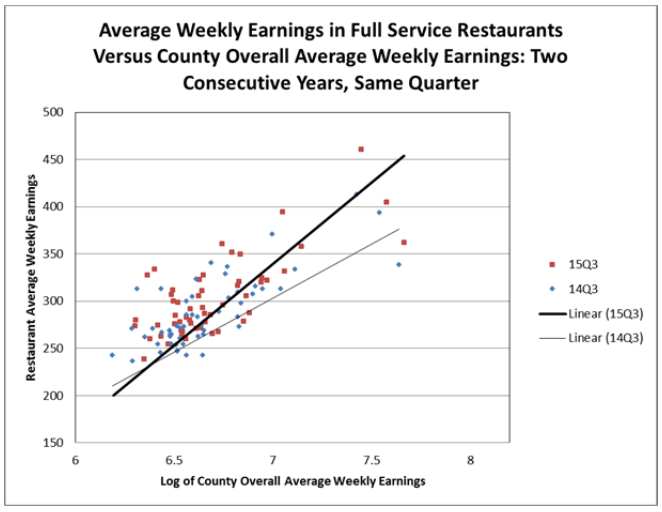


Figure 23 **Q3: Avg Wkly Earnings, Full Serve Rest v. Total, Two scatters in each image, one year apart.**





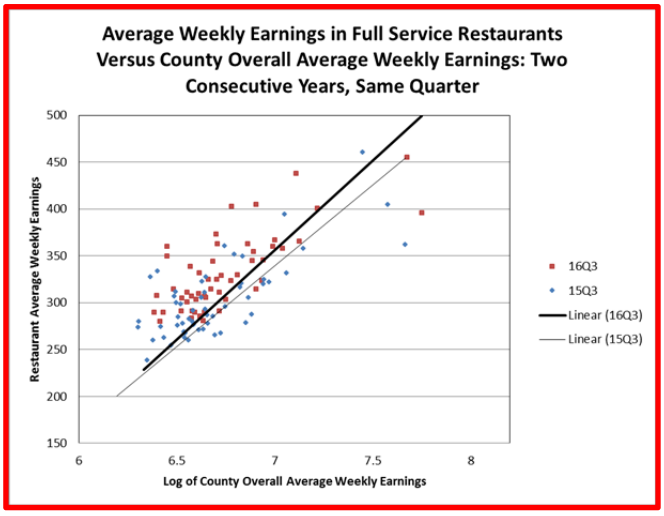
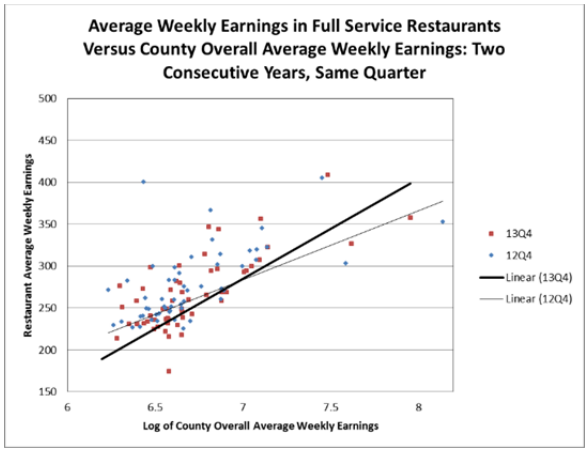
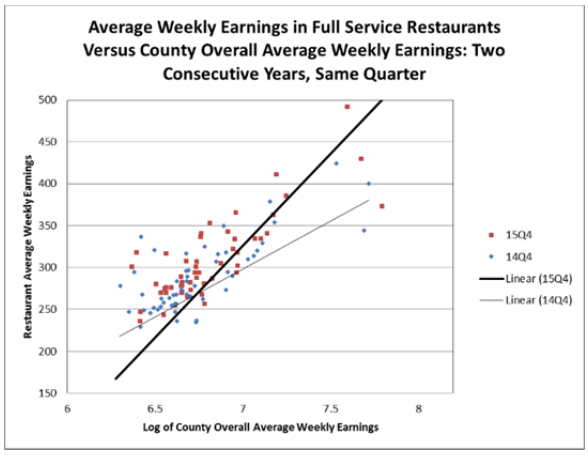
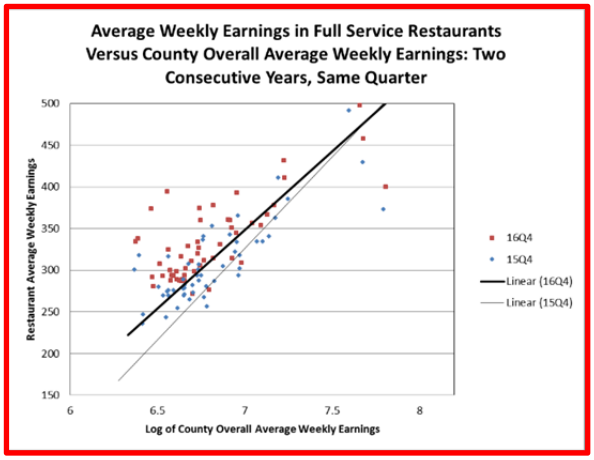


Figure 24 **Q4: Avg Wkly Earnings, Full Serve Rest v. Total, Two scatters in each image, one year apart.**







Time Series Plots

The residuals from seasonal adjustment equation reported in Table 5 are illustrated in **Figure 25** with the Los Angeles data represented by the bold black line. **Figure 26** and **Figure 27** illustrate the similarly adjusted data for average weekly earnings in full service restaurants and for all sectors. The full service positive and negatives are similar to the limited service data, and there is an appearance of a minimum wage effect here as well.

These seasonally adjusted series offer a clearer picture of the overall change in earnings than the unadjusted data in Figure 4 because the seasonal effects are so strong that they mask the other changes in the series, but all the county detail masks the movement of the county averages illustrated in Figure 9 Figure 10 and Figure 11. In particular, the rise in California's restaurant average weekly earnings after 2013 is quite evident in most counties and apparently coincident with the increments in California's minimum wage.

Figure 28, Figure 29 and **Figure 30** are the seasonally adjusted series for employment in limited service restaurants, full service restaurants and overall. The decline in overall jobs in the recession of 2008/09 is quite substantial (about 8%) while jobs in restaurants held pretty steady at that time. The approximate 10% growth of overall employment from 2009 to 2016 was more than matched by a 15% increase in employment in limited service restaurants, leaving the restaurant share of total employment in 2016 approximately 3.5 % compared with 3% in 2006.

Figure 25 Log of Average Weekly Earnings, SA, 47 Counties, Limited Service Restaurants

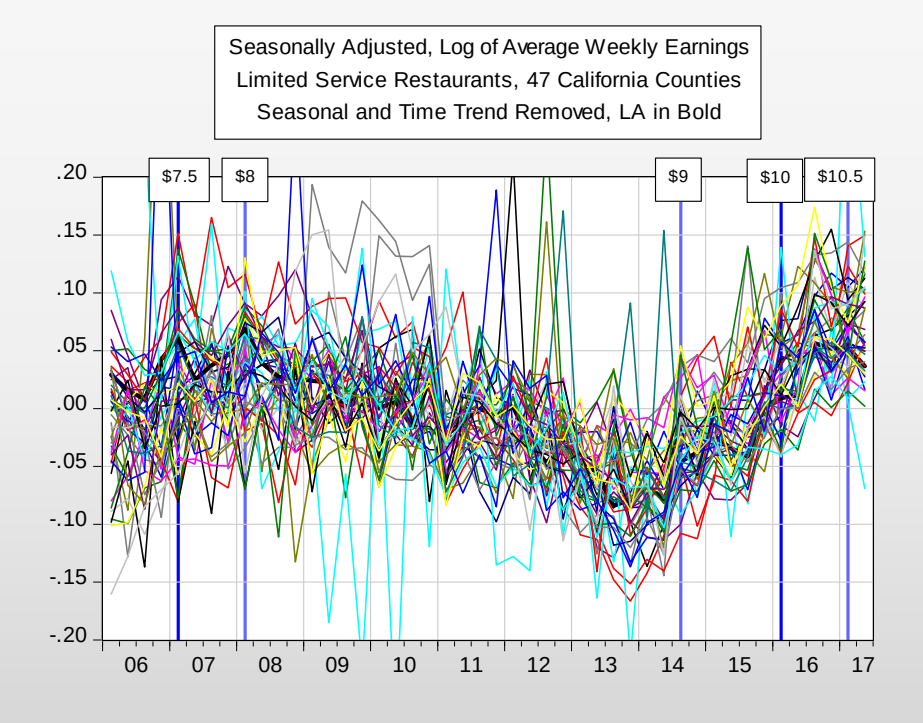


Figure 26 Log of Average Weekly Earnings, SA, 48 Counties, Full Service Restaurants

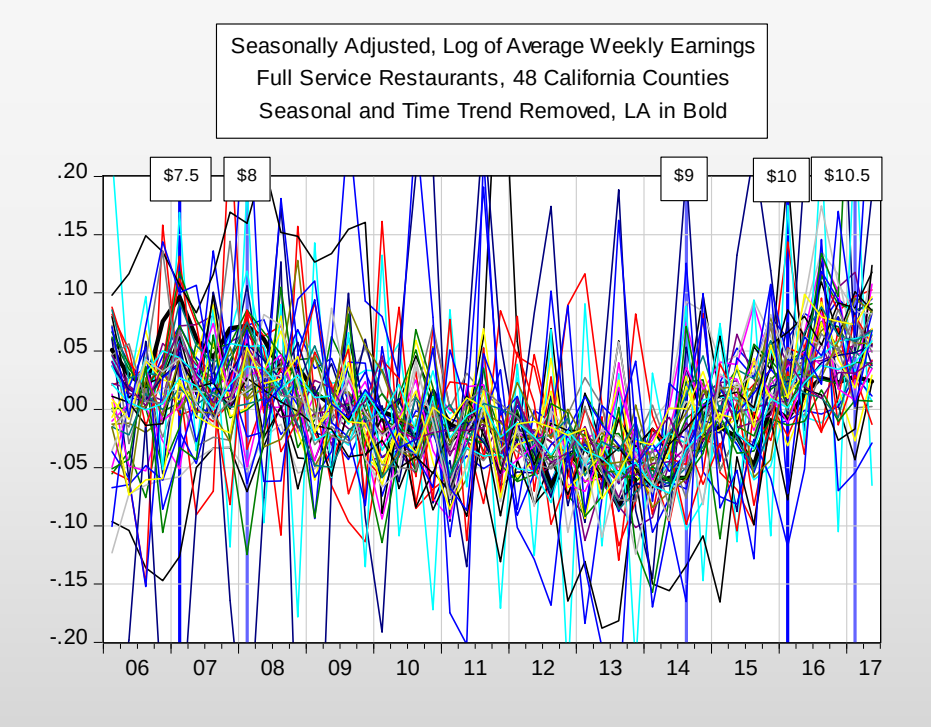


Figure 27 **Log of Average Weekly Earnings in All Sectors, SA, 57 California Counties**

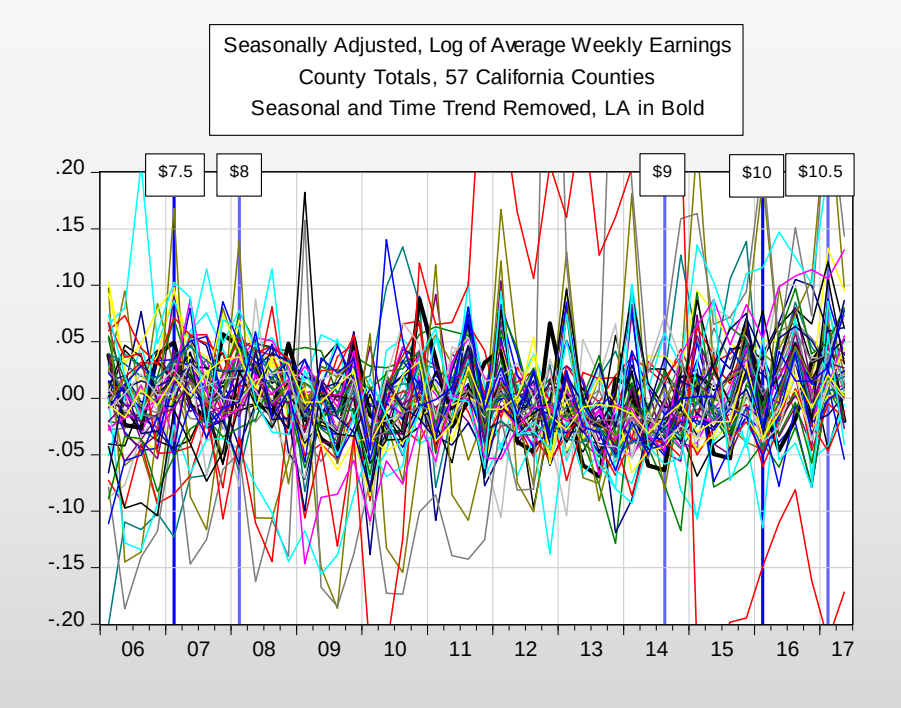


Figure 28 **Log of Employment SA, 47 California Counties, Limited Service Restaurants**

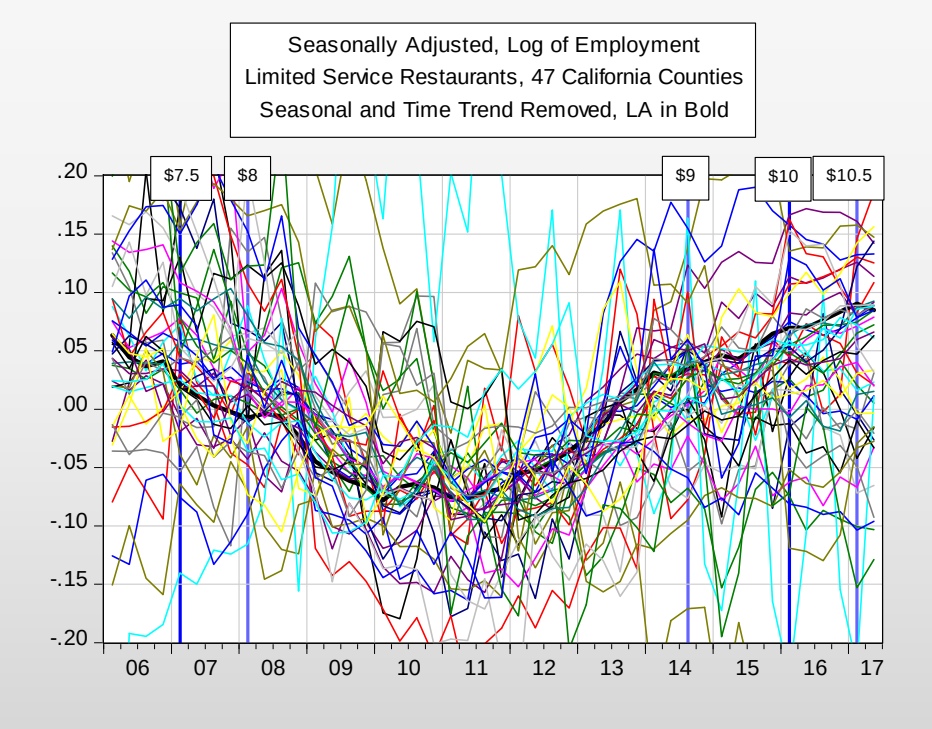


Figure 29 **Log of Employment SA, 48 California Counties, Full Service Restaurants**

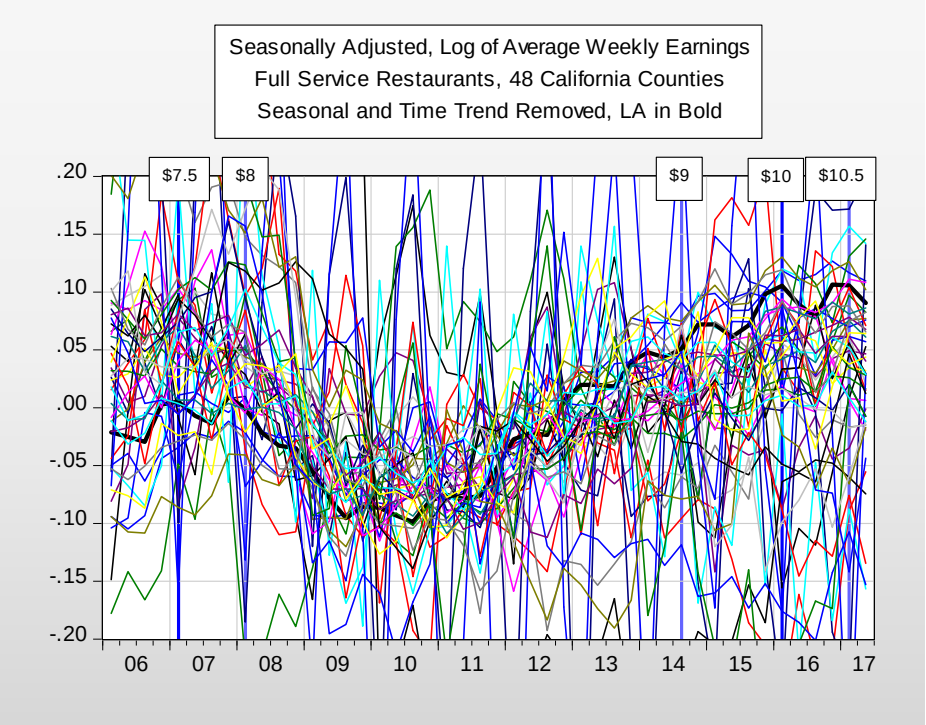
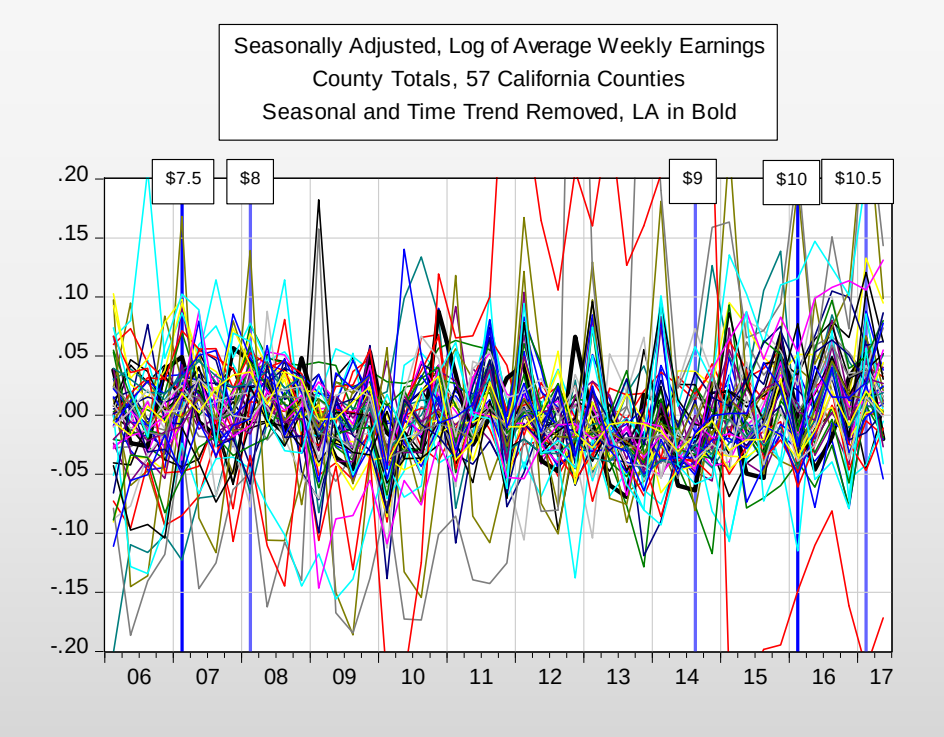


Figure 30 **Log of Employment in All Sectors, SA, 50 Counties**



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