View metadata, citation and similar papers at core.ac.uk
brought to you by CORE
provided by IssueLab

The Wage and Employment Impact of Minimum-Wage Laws in Three Cities

John Schmitt and David Rosnick

March 2011

Center for Economic and Policy Research
1611 Connecticut Avenue, NW, Suite 400
Washington, D.C. 20009
202-293-5380
www.cepr.net

Contents

About the Authors

John Schmitt is a Senior Economist and David Rosnick is an economist at the Center for Economic and Policy Research, in Washington, D.C.

Acknowledgments

The Center for Economic and Policy Research is grateful to the Russell Sage Foundation and the Institute for Research on Labor and Employment at the University of California at Berkeley for their financial support. The authors thank the Bureau of Labor Statistics for access to and assistance with the confidential Quarterly Census of Employment and Wage data. We also thank Arindrajit Dube, Michael Reich, Dean Baker, Eileen Appelbaum, Michele Mattingly, and Heather Boushey for many helpful comments and suggestions.

Executive Summary

This report analyzes the wage and employment effects of the first three city-specific minimum wages in the United States –San Francisco (2004), Santa Fe (2004), and Washington, DC (1993). We use data from a virtual census of employment in each of the three cities, surrounding suburbs, and nearby metropolitan areas, to estimate the impact of minimum-wage laws on wages and employment in fast food restaurants, food services, retail trade, and other low-wage and small establishments.

We evaluate these impacts using the general approach outlined in Card and Krueger's (1994, 2000) studies of the 1992 New Jersey state minimum-wage increase. In our setting, the Card and Krueger methodology involves comparing wages and employment before and after the city minimum-wage with changes over the same period in wages and employment in comparable establishments in nearby areas unaffected by the citywide minimum wage.

The results for fast food, food services, retail, and low-wage establishments in San Francisco and Santa Fe support the view that a citywide minimum wages can raise the earnings of low-wage workers, without a discernible impact on their employment. Moreover, the lack of an employment response held for three full years after the implementation of the measures, allaying concerns that the shorter time periods examined in some of the earlier research on the minimum wage was not long enough to capture the true disemployment effects.

Our estimated employment responses generally cluster near zero, and are more likely to be positive than negative. Few of our point estimates are precise enough to rule out either positive or negative employment effects, but statistically significant positive employment responses outnumber statistically significant negative elasticities.

In general, our findings are consistent with earlier research by Card and Krueger (1994, 1995, 2000), Dube, Lester, and Reich (2011), and others who have found – at the federal and state level – that policy makers tend to set levels of the minimum wage that raise wages of low-wage workers without significant negative effects on the employment of low-wage workers. Our findings are also consistent with earlier studies of the citywide minimum wages in San Francisco (Dube, Naidu, and Reich, 2006) and Santa Fe (Potter, 2006).

We also find that the minimum-wage increase implemented in Washington, DC, in 1993 was too small to raise wages in fast food, food services, retail, and other low-wage establishments. Data for Washington show that a relatively low share of the city's hourly workers were in the wage range affected by the new city minimum and also suggest that the measure was not enforced (more workers earned below the new city minimum after it was enacted than had earned in that range before the law went into effect). The citywide minimum wage in Washington therefore does not constitute a meaningful policy experiment, and does not allow us to draw conclusions about the employment effects of binding citywide minimum wages.

The experience of smaller establishments in San Francisco and Santa Fe – whether they were initially below or just above the size exempted by the new laws – suggests that small establishments do not respond to minimum wages differently than larger firms. Small establishments below the size cutoffs in those cities did not experience systematic changes in employment. The same was true for small establishments just above the size cutoffs in these cities.

Introduction

The United States has extensive experience with minimum-wage legislation. In 1938, the Fair Labor Standards Act established a national minimum wage, which has been raised periodically ever since (most recently in 2007, 2008, and 2009). Beginning in the 1980s, and especially in the 1990s and 2000s when the federal minimum wage spent long periods at the same nominal level, more than half of U.S. states enacted state-level minimum wages above the federal level. Most recently, four cities – Washington, DC (1993), San Francisco (2004), Santa Fe (2004), and Albuquerque (2007) – implemented city-wide minimum wages at levels set above the prevailing national or state minimum wages.

Economists have produced a large body of research on the economic impacts of the federal and state minimum-wage laws,[1] but little research analyzes the impact of citywide minimum wages.[2] The economic effects, especially on employment, of city-specific minimum wages could differ from national and state minimum wages because the much smaller geographic area covered by city laws might make it easier for employers affected by the minimum wage to relocate employment outside of city boundaries; citywide minimum wages might also act to reduce the product-market competitiveness of covered firms relative to uncovered firms in nearby suburbs or cities.

In this paper, we analyze the wage and employment effects of the first three city-specific minimum wages – Washington, DC, San Francisco, and Santa Fe.[3] We use data from a virtual census of employment in each of the three cities, surrounding suburbs, and nearby metropolitan areas, to estimate the impact of each city's minimum-wage law on wages and employment in small businesses, low-wage establishments, and several low-wage industries, including fast food restaurants and retail trade. We evaluate these impacts using the general approach outlined in Card and Krueger's (1994, 2000) studies of the 1992 New Jersey state minimum-wage increase. In our setting, the Card and Krueger methodology involves comparing wages and employment before and after the city minimum-wage with changes over the same time frame in wages and employment in comparable establishments in nearby areas unaffected by the citywide minimum wage.

Our research extends earlier minimum-wage research in several dimensions. First, we focus narrowly on the effects of citywide minimum wages, a new area of policy innovation where research is thin. Second, we present side-by-side analysis of the first three citywide minimum wages, including the first look at the Washington, DC citywide minimum wage. Third, we complement Dube, Naidu, and Reich's (2006) analysis, based on their own survey of restaurants in San Francisco and nearby areas,

1 For reviews of the empirical research on the minimum wage, see Brown, Gilroy, and Kohen (1982), Card and Krueger (1995), Brown (1999), Neumark and Wascher (2006), and Flinn (2011).

2 Dube, Naidu, and Reich (2006) conducted an empirical analysis of the 2004 San Francisco minimum wage based on their own survey and other data. Potter (2006) analyzed microdata from the New Mexico state unemployment insurance system to study the 2004 Santa Fe increase. Dube, Kaplan, Reich, and Su (2006) have written a summary of the available research on San Francisco and Santa Fe. To our knowledge, no comparable research covers the 1993 Washington or the 2007 Albuquerque minimum wage. Card and Krueger (1994, 2000) and Dube, Lester, and Reich (forthcoming) focus on local discontinuities in the minimum wage across state borders, but don't specifically address citywide minimum wages.

3 On January 1, 2007, Albuquerque implemented a citywide minimum wage set at $6.75 per hour, increasing to $7.15 per hour on January 1, 2008, and then to $7.50 per hour on January 1, 2009 (with a lower rate for employers providing health-insurance benefits above a $2,500 per year threshold). Data lags and the desire to analyze effects over three years after the increase have forced us to exclude Albuquerque from this analysis.

with data from the Bureau of Labor Statistics (BLS) Quarterly Census of Employment and Wages (QCEW) program, which is a virtual census of employment conducted in connection with state-level unemployment insurance systems. Fourth, we look beyond the traditional work horses of the minimum-wage literature – fast-food restaurants and food services more broadly – to other low-wage industries, including retail trade, and to low-wage establishments, independent of industry. Fifth, we also examine the impact of citywide minimum wages on establishments of different sizes, allowing us to evaluate the particular impact on small firms. Sixth, in each case, we are able to track employment and wage changes for three full years after implementation, permitting us to address concerns that the one-year (and shorter) post-increase evaluation period in many earlier studies may not be long enough to capture the full economic impacts. Finally, in recognition of the potential sensitivity of difference-in-difference estimators to the control group chosen, for each city we report results from three different control groups: the city's suburbs, a nearby city, and a nearby city and that city's suburbs.

Overall, we find little evidence that the three citywide minimum wages had any systematic effect on employment in low-wage establishments, including the fast-food industry, the broader food-services sector, and retail trade. Our estimated minimum-wage policy elasticities generally cluster near zero, and are slightly more likely to be positive than negative. Relatively few of our point estimates are precise enough to rule out either positive or negative employment effects, but more of the positive elasticities are based on underlying statistically significant employment and wage effects than are the negative elasticities. These findings on the lack of discernible employment effects hold for three years after the implementation of the minimum wage and across the three different geographic control groups we use to benchmark the minimum-wage effects.

Estimation and Data

Our approach draws heavily on Card and Krueger's (1994, 2000) methodology. In general, we compare establishments affected by the citywide minimum wage with establishments in nearby areas not covered by the city's new minimum wage.[4] As in Card and Krueger (2000), we use confidential data drawn from each state's unemployment insurance system, which covers about 98 percent of all employees.

Estimation

We take the city minimum wage (see **Table 1**) as exogenous and designate establishments covered by each of the new laws as three separate treatment groups. For each of our three cities, we also define three separate control groups, chosen for their geographic proximity: the treatment city's suburbs, a nearby city, and a nearby city and its suburbs.[5]

4 Since both San Francisco (during a phase-in) and Santa Fe (indefinitely) exempted smaller firms from their citywide minimum wages, we can also compare wage and employment outcomes across firms of different sizes within the same geographic area. In San Francisco, establishments with fewer than 10 employees or that operated as nonprofit organizations were not covered by the citywide minimum-wage law for the first two years it was in effect. In Santa Fe, firms with fewer than 25 employees are not covered.

5 For San Francisco, we define the suburbs as Marin, San Mateo, and San Francisco counties; the control city as Oakland; and the Oakland suburbs as Alameda and Contra Costa counties. For Santa Fe, the suburbs are Los Alamos and Santa Fe counties; the control city, Albuquerque; and the Albuquerque suburbs, Bernalillo, Sandoval, and Valencia counties. For Washington, the suburbs are Montgomery and Prince George's counties in Maryland and Arlington and

TABLE 1
City Minimum-wage Laws

	San Francisco	Santa Fe	Washington, DC
Entered into effect	February 23, 2004	June 22, 2004	October 1, 1993
Initial rate	$8.50	$8.50	$5.25
Subsequent increases	Indexed to inflation	Scheduled increases to $9.50 on January 1, 2006, and $10.50 on January 1, 2008; the $10.50 increase was not implemented, instead at the end of 2007, the city council voted to index future rate increases to inflation	Federal minimum wage plus $1
Exemptions	Two-year phase in for establishments with fewer than 10 employees and for non-profit 501(c)(3) organizations	Establishments with fewer than 25 employees exempt; at the end of 2007, the city council voted to extend coverage to all establishments, regardless of size	None

Following Card and Krueger (1994, 2000), Dube, Naidu, and Reich (2006), Potter (2006), and others, we use a simple (regression-adjusted) difference-in-differences estimator.[6] For different types of establishments (by industry, by initial employee-size, or average initial wage level), we take data for each establishment, j, in treatment city, i, and calculate (separately) the change in our two variables of interest, y (average establishment wage or total establishment employment), before and after the implementation of the minimum-wage. We then compare these changes in the treatment group with analogous changes in the same variables of interest in each of the three control groups, k:

$$E(y_{ij,t+1} - y_{ij,t} \mid \text{Treatment}_{ij}=1) - E(y_{ij,t+1} - y_{ij,t} \mid \text{Treatment}_{ij}=0, \text{Control}_{ijk}=1)$$

where k = 1 own suburb
k = 2 control city
k = 3 control city and control suburb

In the case of the third control group, the estimator is actually a difference-in-difference-in-differences estimator, since we first compare the treatment city before and after the minimum wage with the surrounding (untreated) suburbs before and after the minimum wage, and then compare this result with a comparison of the (untreated) control city before and after the minimum wage relative to the (untreated) suburbs of the control city over the same period. Effectively, we are

Fairfax counties and the cities of Alexandria, Fairfax, and Falls Church in Virginia; the control city, Baltimore; and the Baltimore suburbs, Anne Arundel, and Baltimore counties.

6 See Bertrand, Duflo, and Mullainathan (2004) and Dube, Lester, and Reich (forthcoming) for critiques of difference-in-difference estimators.

asking how the treatment city performed relative to its suburbs, using how the control city performed relative to its suburbs as a benchmark.

In the tables reported below, we implement this framework in a regression context that incorporates (where appropriate) a variety of control variables including establishment size and industry.[7]

As in earlier research, we report results for fast-food restaurants (see Card and Krueger, 1994, 2000; Neumark and Wascher, 2000; Dube, Naidu, and Reich, 2006; and others) and food services (Dube, Naidu, and Reich, 2006). The QCEW data, however, also allow us to analyze the wage and employment impacts of citywide minimum wages on other low-wage industries including retail trade.[8]

With the QCEW data, we can also conduct similar analyses of changes in employment and wages by initial establishment size. This feature of the data lets us examine concerns that citywide minimum wages might have a particularly negative impact on small firms. Similarly, we can use the QCEW data to focus on the impact of the minimum wage on all low-wage establishments within each city, regardless of the establishment's industry.

Data

We analyze confidential data from the Quarterly Census of Employment and Wages, a dataset constructed and maintained by the BLS from administrative data gathered by each of the state-level unemployment insurance systems. Since the unemployment insurance system covers about 98 percent of all employees (agricultural workers are the principal group missing from the dataset), the QCEW data constitute a virtual census of employment, providing large samples even at the local level.

For each calendar quarter, the QCEW shows each establishment's average total employment (at one point in time during each of the three months). The dataset also gives the total wages and salaries paid out to these employees over the full quarter. In addition, the QCEW reports detailed information on the establishment's location and main industry.

The main features of the QCEW are its large size and nearly universal coverage, which allows for a fine-grained analysis of the economic impacts of the minimum wage, even at the local level. The data set, however, has several important limitations.

First, the QCEW contains no information on hourly earnings. The state unemployment insurance agencies gather and report data on total employment and on the total wages and salaries paid over the quarter. These data allow us to calculate an average quarterly employment level for the establishment and an average quarterly (or monthly) wage per worker, but do not allow us to calculate an average hourly wage rate.

---

7 The two dependent variables are the differences in the natural logarithm of the establishments average quarterly wage and quarterly average total employment (plus one, to deal with establishment births and deaths). The regressions are estimated using ordinary least squares (with robust standard errors) and weighted by average establishment size over the full period covered in each regression.

8 Potter (2006) also uses state unemployment insurance data from New Mexico to analyze the employment impacts of the Santa Fe minimum wage on a variety of industries.

Second, reporting errors and inconsistencies create problems with both identifying the geographical location of some establishments and with tracking the establishments over time. A complete set of programs used to identify and match establishments are available upon request.

Third, since the QCEW is compiled from self-reported administrative data, the dataset does not automatically track births and deaths of establishments. Since the birth of a new establishment or the death of an old establishment after the implementation of the minimum wage could have an important impact on overall employment in the treatment and control areas, we have created records with zero employment and missing values for wages for establishments that were born or died during the course of our analysis. For example, if an establishment existed in the year before the minimum wage, but closed down in the year after the minimum wage, the QCEW would contain no record for the establishment after the minimum wage. For this analysis, we create a record for the establishment – with total employment of zero and a missing value for wages – and link the record to the same establishment before the minimum wage.

Finally, the QCEW data are confidential and we are restricted in the results we can report. In order to comply with confidentiality requirements, we have limited what we present here largely to regression coefficients (and to regressions with thirty or more degrees of freedom).

Minimum-Wage "Bite"

All three minimum wages were high relative to the previously prevailing state or federal minimum wage. **Table 2** shows the size of the minimum-wage policy "treatment" for each of the three cities. The first column shows the minimum wage prevailing in each city before and after the implementation of the minimum wage. At each point in time, the prevailing minimum wage in each city is the maximum of the applicable federal, state, or citywide minimum wage. The second column shows the prevailing minimum wage at the state level, which is the maximum of the federal or any state minimum wage. The third column reports the federal minimum wage. (Wherever minimum wage laws changed in the middle of a period, the reported minimum wage is the time-weighted average of the nominal value of the minimum wage over the period.)

TABLE 2
Nominal Value of Minimum Wage Applicable at the City, State, and National Levels

Period	City	State	Federal	Differential (percent)
(a) San Francisco				
2003:Q1 - 2003:Q4	6.75	6.75	5.15	0.0
2004:Q1	8.50	6.75	5.15	25.9
2004:Q2 - 2005:Q1	8.53	6.75	5.15	26.4
2005:Q2 - 2006:Q1	8.67	6.75	5.15	28.4
2006:Q2 - 2007:Q1	8.90	6.94	5.15	28.3
(b) Santa Fe				
2003:Q2 - 2004:Q1	5.15	5.15	5.15	0.0
2004:Q2	8.50	5.15	5.15	65.0
2004:Q3 - 2005:Q2	8.50	5.15	5.15	65.0
2005:Q3 - 2006:Q2	9.00	5.15	5.15	74.8
2006:Q3 - 2007:Q2	9.50	5.15	5.15	84.5
(c) Washington, DC				
1992:Q4 - 1993:Q3	4.25	4.25	4.25	0.0
1993:Q4	5.25	4.25	4.25	23.5
1994:Q1 - 1994:Q4	5.25	4.25	4.25	23.5
1995:Q1 - 1995:Q4	5.25	4.25	4.25	23.5
1996:Q1 - 1996:Q4	5.38	4.38	4.38	22.9

Notes: See Table 1 for coverage details. Date in bold indicates effective date for implementation. Differential between city and surrounding minimum wage is with respect to larger of federal or state minimum wage. Albuquerque, which is the control city for Santa Fe had a minimum wage of $6.75 per hour from January 1, 2007 through the end of the period covered in this analysis.

The final column in the table calculates the difference (in percent terms) between the minimum wage in each city and the binding (highest) minimum wage in the surrounding state (or, in the case of Washington, DC, the federal minimum wage). The San Francisco law increased the minimum wage there in January 2004 to $8.50 per hour, about 26 percent above the California state minimum wage of $6.75. The June 2004 minimum wage[9] in Santa Fe raised the applicable minimum wage to $8.50, an increase of 65 percent from the federal minimum of $5.15. With subsequent increases in Santa Fe, the gap between the city and the federal minimum wages rose over three years to over 80 percent. The implementation in October 1993 of the citywide minimum wage in Washington, DC, to a level $1.00 above the prevailing federal minimum wage of $4.25 increased the legal minimum wage for Washington establishments by about 24 percent.[10]

9 Since the June 22, 2004 increase did not go into effect until the last week of the second quarter – after the monthly reporting period for the QCEW employment numbers – our analysis treats the third quarter of 2004 as the effective implementation date. We also produced identical estimates using the effective implementation date in the first quarter (when the law was originally supposed to go into effect until blocked by a court order) and the second quarter (which includes the actual implementation date of June 22), but found results qualitatively similar to those presented below (results available upon request).

10 Neither of the two states bordering Washington – Maryland and Virginia – had a state minimum wage.

An increase in the prevailing legal level of the minimum wage is a necessary, but not sufficient, condition for the city minimum wage to "bite." An increase in the legal minimum wage would have no impact on wages if the new minimum were set below what workers in the city's low-wage labor market were already receiving. In addition, even if a city has a substantial pool of workers earning below the new minimum wage, the law might have no effect on wages if it is not enforced.

Table 3 reports results of a simple analysis of the initial, overall "bite" of the city minimum wages in each of the three cities. The table uses data on hourly paid workers from the Current Population Survey (CPS) in the twelve months immediately before each city minimum wage went into effect. The CPS data have severe limitations in this context. Technically speaking, the sub-state data for San Francisco and Santa Fe are not representative, since the CPS is not designed to provide valid samples at the sub-state level. The data for Santa Fe have the additional limitation that the survey does not allow us to distinguish between "central city" and suburban residents; and for San Francisco the data after April 2004 do not distinguish between San Francisco and other nearby areas, including Oakland (and, therefore, observations from May 2004 are not included in panel (b) of Table 3). But, the most serious limitation – and the main reason we turn below to the QCEW data – is that the sample sizes for San Francisco and Santa Fe are very small. For Washington however, the sample is technically valid, because the city is treated as a state in the CPS. The Washington sample is also small, but can give a rough a picture of the city's wage distribution, especially relative to the nation as a whole.

TABLE 3
Share of Hourly Paid Employees Affected by City Minimum Wage

	San Francisco	Santa Fe	Washington, DC	United States excluding Washington, DC
(a) Before	Feb 2003-Jan 2004	Jun 2003-May 2004	Oct 1992-Sep 1993	Oct 1992-Sep 1993
Below range (%)	3	3	2	3
In range (%)	13	18	10	19
Above range (%)	84	79	88	79
Sample size	131	76	684	105,473
(b) After	Mar 2004-Apr 2004	Jul 2004-Jun 2005	Nov 1993-Oct 1994	Nov 1993-Oct 1994
Below range (%)	0	0	2	3
In range (%)	6	19	14	17
Above range (%)	94	81	84	80
Sample size	17	85	639	104,080

Notes: Authors' analysis of National Bureau of Economic Research extracts of the Current Population Survey Outgoing Rotation Group files. Weighted share of hourly paid workers earning (1) less than the binding federal or state minimum wage prevailing in the 12 months before the city minimum wage ("Below range"); (2) at least the binding federal or state minimum wage but less than the city minimum wage ("In range"); and (3) at least the city minimum wage ("Above range"). From May 2004, the city of San Francisco cannot be distinguished in the public CPS data from Oakland or San Jose and therefore these observations are excluded from the calculations. The CPS data do not distinguish between "central city", suburbs, and other areas in the Santa Fe metropolitan area.

The CPS data, while too limited to be definitive, suggest that the minimum wage in Washington was not binding. The city, relative to the nation as a whole, had high wages before the city minimum wage went into effect, and the new minimum was set at a level that affected relatively few workers. In the year before the increase went into effect, only about 10 percent of the city's paid hourly workers earned somewhere between the $4.25 per hour set by the federal government and the $5.25 imposed by the new law (see panel (a) of Table 3). By comparison, about 19 percent of workers in the United States were in this pay range. More importantly, the CPS data suggest that the higher city minimum was not enforced. While the change in coverage was not statistically significant, the share of workers earning less than the new minimum wage actually increased (to about 14 percent) in the twelve months after the minimum wage went into effect. If the minimum wage had been binding, and enforced, we would have expected the share of workers earning between $4.25 and $5.25 per hour to have declined not increased after the new law went into effect.

These CPS data provide some context for the results we find below with the much larger QCEW sample. While we find many cases where the city minimum wage increased the average wage in fast food, food services, retail, and low-wage establishments in San Francisco and Santa Fe, we do not find a single case where the Washington minimum wage was associated with higher wages in these same typically low-wage establishments. We conclude from the CPS and QCEW data that the minimum-wage increase enacted in Washington was not large enough to constitute a reasonable test of the employment impacts of the minimum wage. For completeness' sake, however, in the rest of the paper, we report our results for Washington alongside those of San Francisco and Santa Fe.

Results

In this section, we review, city-by-city, the results of our analysis. For each city, we begin with the fast-food industry and food services more broadly, then look at retail trade, another typically low-wage industry. We then step back and look at outcomes in low-wage establishments (those in the city's bottom fifth of average pay), regardless of industry. Finally, given concerns that minimum-wage laws may have a negative impact on smaller firms, we study the impact of the minimum wage laws on firms by establishment size.

San Francisco

Table 4 reports our estimates of the impact of these minimum-wage laws on wages and employment in fast-food restaurants. Panel (a) presents our estimates of the impact on the average wage in fast-food restaurants. For each city, we give nine estimates: the effect of the new law after one, two, and three years, using each of the three controls: own suburbs, control city, control city and suburbs. According to our estimates, the 26 to 28 percent increase in the prevailing minimum wage in San Francisco appears to have raised the average fast-food wage there 4 to 5 percent[11] in the first year after the law was enacted, relative to the three geographic benchmarks where the minimum wage did not increase. The estimated wage impact was generally larger over time – 5 to 11 percent in

11 The coefficients in Tables 3 through 9 are log points. A 0.1 log point change is approximately equal to a 10 percent change. For larger changes, the log-point measure understates the percent change. For ease of exposition, we convert the log-point changes to percent changes assuming rough equivalence.

the second year and 9 to 11 percent in the third year.[12] Six of the nine estimates are statistically significant at the five percent level or better; the other three are statistically significant at the ten percent level. Taken together, these results suggest that the San Francisco law had an economically and statistically significant impact on the wages paid in fast-food restaurants.

TABLE 4
Wage and Employment Effects of City Minimum-wage Laws, Fast Food Restaurants

	San Francisco			Santa Fe			Washington, DC		
Control group	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs
(a) Change in ln (average establishment wage)									
One year	0.05	0.04	0.04	0.08	0.03	0.03	0.01	0.01	-0.01
	(0.01)**	(0.02)*	(0.02)#	(0.04)*	(0.02)	(0.05)	(0.02)	(0.02)	(0.03)
Two years	0.11	0.05	0.08	0.09	0.09	0.03	-0.04	-0.03	-0.02
	(0.03)**	(0.03)#	(0.04)#	(0.04)#	(0.03)**	(0.05)	(0.03)	(0.04)	(0.04)
Three years	0.11	0.09	0.09	0.01	0.07	-0.06	-0.06	-0.05	-0.06
	(0.02)**	(0.03)**	(0.03)**	(0.11)	(0.03)*	(0.12)	(0.03)*	(0.03)	(0.04)#
(b) Change in ln (average establishment employment)									
One year	-0.11	-0.01	-0.04	0.24	-0.03	0.38	-0.20	-0.16	-0.10
	(0.07)#	(0.10)	(0.12)	(0.16)	(0.09)	(0.18)*	(0.06)**	(0.06)*	(0.08)
Two years	0.08	-0.07	0.05	0.31	-0.12	0.49	-0.43	-0.16	-0.17
	(0.18)	(0.13)	(0.24)	(0.21)	(0.11)	(0.23)*	(0.14)**	(0.12)	(0.16)
Three years	0.05	-0.072	0.03	0.36	-0.08	0.61	-0.56	-0.35	-0.30
	(0.20)	(0.15)	(0.25)	(0.21)#	(0.13)	(0.24)*	(0.16)**	(0.15)*	(0.19)
(c) Labor-demand elasticities									
One year	-2.3	-0.2	-1.0	2.8	-0.9	12.8	-26.2	-26.5	9.7
Two years	0.7	-1.3	0.7	3.7	-1.3	16.6	11.9	5.8	8.1
Three years	0.5	-0.8	0.4	63.9	-1.2	-10.5	9.2	7.4	5.1
(d) Employment-to-minimum-wage elasticities									
One year	-0.4	0.0	-0.1	0.4	0.0	0.7	-0.7	-0.5	-0.4
Two years	0.3	-0.2	0.2	0.5	-0.1	0.8	-1.5	-0.6	-0.6
Three years	0.2	-0.2	0.1	0.5	-0.1	1.0	-1.9	-1.3	-1.1

Notes: Authors' estimates using QCEW data. Ordinary least squares; robust standard errors in parentheses: **, 1 percent; *, 5 percent; #, 10 percent. All regressions include controls for firm size (10-24, 25-99, 100-999 and 1,000 or more).

The wage estimates in panel (a) suggest that we have a meaningful policy experiment: the minimum wage appears to have increased wages substantially in San Francisco. Panel (b) of Table 4 presents corresponding estimates of the employment impact of the minimum-wage laws. For San Francisco, all three of the one-year estimates are negative. The smallest two of these estimates (-1 to -4 percent) are not statistically significant; the largest (-11 percent) is statistically significant at the 10 percent

12 Adjustment costs could plausibly lead employers to phase in employment changes in the wake of a minimum wage; it is more difficult to explain how adjustment costs might affect wage changes over time.

level. None of the two- and three-year estimates, however, are different from zero at standard levels of statistical significance (four of these results are positive, two are negative).

Taken together, the results for San Francisco in panels (a) and (b) give little support to the view that the minimum wage there had a negative effect on employment in fast food. While wages rose by an economically and statistically significant amount in nine of the nine policy experiments, employment did not change by a statistically significant amount in eight of those nine cases (and was only statistically significant at the ten percent level in the remaining case).

Panels (c) and (d) present these wage and employment findings more formally. Panel (c) calculates the standard labor-demand elasticity:

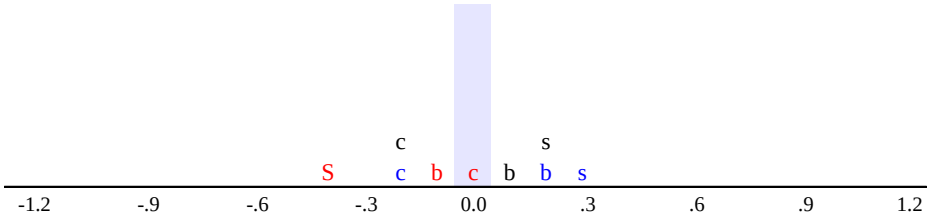
$$\frac{\%\Delta \text{ Employment}}{\%\Delta \text{ Wage}}$$

calculated as the ratio of entries in Panel (b) – roughly the percent change in employment – to the corresponding entry in Panel (a) – roughly the percent change in wages. Panel (d) presents the elasticity that is commonly reported in the minimum-wage literature, which relates the percent change in employment in a subpopulation (here, fast-food workers) to the percent change in the minimum wage:

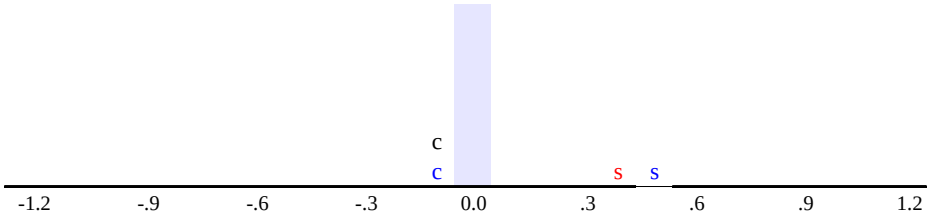
$$\frac{\%\Delta \text{ Employment in Subpopulation}}{\%\Delta \text{ Minimum Wage}}$$

Focusing on the policy elasticities in panel (d), the minimum wage was associated with employment increases in four cases, zero change in one, and employment declines in four cases. Eight of the nine estimates were narrowly distributed in the range between -0.3 and 0.3, consistent with most earlier research (see **Figure 1**). Only one of the nine cases was based on a statistically significant (at the 10 percent level) employment decline: in the first year after the increase, using the San Francisco suburbs as a benchmark. The estimated policy elasticity in that case was -0.4.

FIGURE 1
Employment-to-minimum-wage Elasticities, Fast Food Restaurants
(a) San Francisco



(b) Santa Fe



Notes: These histograms summarize all of the cases where the minimum-wage legislation was associated with an increase in the average establishment wage in the industry (where the increase was statistically significant at at least the 10 percent level). If the minimum wage consistently lowered employment, then the estimated policy elasticities would all be to the left of the bar above zero. Elasticities based on own suburbs labeled S; reference city, C; reference city and its suburbs, B. Elasticities for year one, in red; year two, in blue; year three, in black. Elasticities in lower-case are not statistically significantly different from zero; estimates in upper case are significant at the 10 percent level; in upper case and bold, at the 5 percent level or better. Estimates based on statistically insignificant increases in average wages, or declines in wages, not shown. A maximum of nine possible elasticity estimates per city.
Source: See Table 4.

Table 5 presents the results from an identical analysis for the broader category of food services, which includes fast food, but also sit-down restaurants. As with fast-food restaurants, the San Francisco minimum wage led to a statistically significant increase in food service wages relative to all three control groups in all three years (see panel (a)). By our estimates, the average wage in San Francisco food services increased 3 to 7 percent in the first year, about 6 percent in the second year, and about 7 percent in the third year, relative to the three geographic benchmarks where the minimum wage did not increase. Over the same period, food service employment in San Francisco increased relative to employment in all three geographic control groups in all three years (see panel (b)). In two of these cases, the employment increases were statistically significant at the five percent level; in the third case, at the ten percent level. The estimated employment changes appeared to be strongly tied to the geographic control. Employment changes were smallest relative to the immediate San Francisco suburbs (1 to 6 percent); larger relative to the nearby control city of Oakland (15 to 17 percent); and largest when the San Francisco employment change relative to its suburbs was compared to the Oakland employment change relative to its suburbs (22 to 29 percent).

TABLE 5
Wage and Employment Effects of City Minimum-wage Laws, Food Services

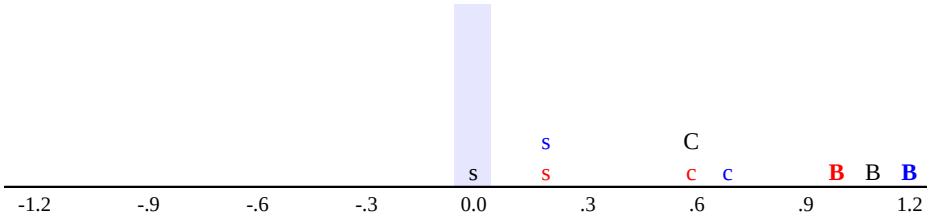
	San Francisco			Santa Fe			Washington, DC		
Control group	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs
(a) Change in ln (average establishment wage)									
One year	0.03	0.07	0.06	0.05	0.01	0.03	0.01	0.02	0.01
	(0.01)**	(0.02)**	(0.02)*	(0.02)*	(0.02)	(0.03)	(0.01)	(0.02)	(0.02)
Two years	0.06	0.06	0.06	0.02	0.02	-0.03	-0.01	-0.01	0.00
	(0.01)**	(0.02)*	(0.02)**	(0.03)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)
Three years	0.07	0.07	0.07	-0.02	0.04	-0.04	-0.04	0.00	-0.03
	(0.01)**	(0.03)**	(0.03)**	(0.05)	(0.02)	(0.05)	(0.02)*	(0.03)	(0.03)
(b) Change in ln (average establishment employment)									
One year	0.04	0.15	0.22	0.22	0.14	0.36	-0.12	-0.03	-0.06
	(0.03)	(0.11)	(0.11)*	(0.12)#	(0.07)*	(0.14)**	(0.05)*	(0.06)	(0.07)
Two years	0.06	0.17	0.29	0.29	0.05	0.35	-0.18	0.07	0.03
	(0.07)	(0.13)	(0.14)*	(0.18)	(0.12)	(0.22)	(0.07)*	(0.08)	(0.11)
Three years	0.01	0.17	0.26	0.33	-0.07	0.39	-0.22	0.10	0.12
	(0.07)	(0.13)	(0.15)#	(0.18)#	(0.11)	(0.21)#	(0.08)**	(0.17)	(0.17)
(c) Labor-demand elasticities									
One year	1.3	2.4	4.0	4.1	10.6	11.0	-16.5	-2.0	-8.8
Two years	1.0	3.1	4.5	15.7	2.0	-10.5	13.1	-10.6	-18.9
Three years	0.1	2.3	3.6	-19.1	-1.9	-9.2	5.7	22.7	-4.4
(d) Employment-to-minimum-wage elasticities									
One year	0.2	0.6	1.0	0.4	0.2	0.7	-0.4	-0.1	-0.2
Two years	0.2	0.7	1.2	0.5	0.1	0.6	-0.7	0.3	0.1
Three years	0.0	0.6	1.1	0.5	-0.1	0.6	-0.9	0.5	0.6

Notes: Authors' estimates using QCEW data. Ordinary least squares; robust standard errors in parentheses: **, 1 percent; *, 5 percent; #, 10 percent. All regressions include controls for firm size (10-24, 25-99, 100-999 and 1,000 or more).

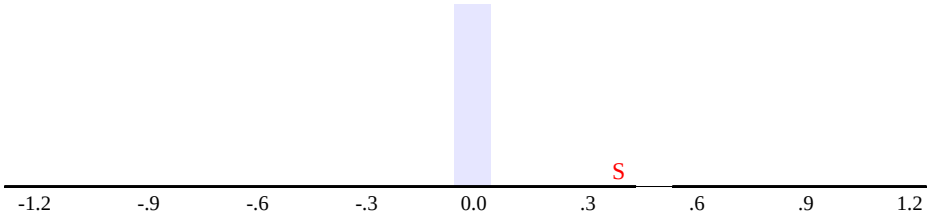
The estimated wage and employment effects in panels (a) and (b) produce nine positive estimates of the labor demand elasticity (see panel (c)) and eight positive policy elasticities (see panel (d) and **Figure 2**). Among the policy elasticities, three were based on large, statistically significant changes in employment relative to Oakland and its suburbs. The other policy elasticities were based on cases where the underlying employment increases were not statistically significant.

FIGURE 2
Employment-to-minimum-wage Elasticities, Food Services

(a) San Francisco



(b) Santa Fe



Notes: These histograms summarize all of the cases where the minimum-wage legislation was associated with an increase in the average establishment wage in the industry (where the increase was statistically significant at at least the 10 percent level). If the minimum wage consistently lowered employment, then the estimated policy elasticities would all be to the left of the bar above zero. Elasticities based on own suburbs labeled S; reference city, C; reference city and its suburbs, B. Elasticities for year one, in red; year two, in blue; year three, in black. Elasticities in lower-case are not statistically significantly different from zero; estimates in upper case are significant at the 10 percent level; in upper case and bold, at the 5 percent level or better. Estimates based on statistically insignificant increases in average wages, or declines in wages, not shown. A maximum of nine possible elasticity estimates per city.
Source: See Table 5.

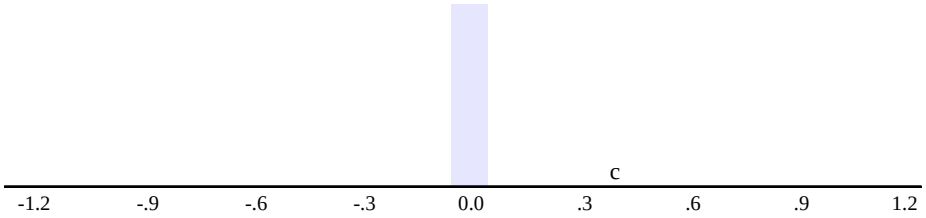
Table 6 summarizes results for retail trade, another sector with a significant share of low-wage workers. The San Francisco minimum wage, however, appears to have had little impact on wages in retail trade. Eight of the nine estimates of the wage impact hover near zero and only one – relative to wages in Oakland, in the third year after implementation – shows a statistically significant increase in wages of about 4 percent (see panel (a)). Since the minimum wage was associated with an average wage increase in only one of the nine cases, we have only one "policy experiment" to consider in panel (b) – the case of Oakland in the third year after the increase. The employment changes in the other eight cases correspond to situations where the minimum wage did not change relative wages and therefore could not be expected to have an effect on relative employment. In the one case where San Francisco retail establishments saw their average wages increase in connection with the minimum wage, employment rose about 10 percent, but the increase was not statistically significant. The corresponding policy elasticity was 0.4 (see panel (d) and **Figure 3**).

TABLE 6
Wage and Employment Effects of City Minimum-wage Laws, Retail

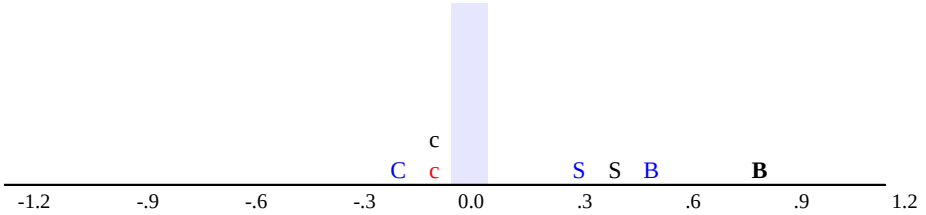
	San Francisco			Santa Fe			Washington, DC		
Control group	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs
(a) Change in ln (average establishment wage)									
One year	0.00	0.00	0.00	0.02	0.02	0.03	-0.02	-0.01	-0.01
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)#	(0.03)	(0.02)	(0.02)	(0.02)
Two years	0.00	0.01	-0.01	0.06	0.02	0.09	-0.01	0.00	0.01
	(0.02)	(0.01)	(0.02)	(0.02)**	(0.01)#	(0.03)**	(0.02)	(0.02)	(0.02)
Three years	0.01	0.04	0.01	0.05	0.03	0.07	0.01	0.00	0.02
	(0.02)	(0.02)*	(0.02)	(0.02)*	(0.02)#	(0.03)*	(0.02)	(0.02)	(0.03)
(b) Change in ln (average establishment employment)									
One year	0.05	0.04	0.13	0.12	-0.04	0.22	-0.16	0.01	-0.02
	(0.03)#	(0.07)	(0.07)#	(0.09)	(0.04)	(0.11)*	(0.05)**	(0.07)	(0.09)
Two years	0.00	0.09	0.21	0.21	-0.14	0.29	-0.25	-0.04	-0.05
	(0.06)	(0.14)	(0.14)	(0.13)#	(0.07)#	(0.15)#	(0.06)**	(0.08)	(0.11)
Three years	0.00	0.10	0.18	0.30	-0.10	0.52	-0.42	-0.16	-0.21
	(0.06)	(0.15)	(0.16)	(0.16)#	(0.10)	(0.26)*	(0.11)**	(0.13)	(0.16)
(c) Labor-demand elasticities									
One year	-18.3	13.5	-75.8	5.7	-2.1	7.7	10.4	-0.5	1.8
Two years	-0.3	6.2	-41.0	3.5	-5.9	3.2	35.4	-13.3	-4.7
Three years	-0.2	2.6	16.6	5.9	-3.8	7.8	-34.2	49.1	-12.5
(d) Employment-to-minimum-wage elasticities									
One year	0.2	0.2	0.5	0.2	-0.1	0.4	-0.6	0.0	-0.1
Two years	0.0	0.3	0.8	0.3	-0.2	0.5	-0.9	-0.2	-0.2
Three years	0.0	0.4	0.7	0.4	-0.1	0.8	-1.5	-0.7	-0.8

Notes: Authors' estimates using QCEW data. Ordinary least squares; robust standard errors in parentheses: **, 1 percent; *, 5 percent; #, 10 percent. All regressions include controls for firm size (10-24, 25-99, 100-999 and 1,000 or more).

FIGURE 3
Employment-to-minimum-wage Elasticities, Retail
(a) San Francisco



(b) Santa Fe



Notes: These histograms summarize all of the cases where the minimum-wage legislation was associated with an increase in the average establishment wage in the industry (where the increase was statistically significant at at least the 10 percent level). If the minimum wage consistently lowered employment, then the estimated policy elasticities would all be to the left of the bar above zero. Elasticities based on own suburbs labeled S; reference city, C; reference city and its suburbs, B. Elasticities for year one, in red; year two, in blue; year three, in black. Elasticities in lower-case are not statistically significantly different from zero; estimates in upper case are significant at the 10 percent level; in upper case and bold, at the 5 percent level or better. Estimates based on statistically insignificant increases in average wages, or declines in wages, not shown. A maximum of nine possible elasticity estimates per city.
Source: See Table 6.

The estimated labor-demand elasticities for San Francisco in panel (c) illustrate one pitfall of attempting to interpret results in cases where there was not a meaningful policy experiment. Wage changes that are small in economic magnitude – and therefore also unlikely to be statistically significantly different from zero – can produce implausibly large positive or negative labor demand elasticities because the elasticity is the ratio of the employment change in panel (b) to the wage change in panel (a). The estimated demand elasticities of 13.5 and -75.8, for example, are the product of plausible employment changes in panel (b) and very small (and statistically insignificant) wage changes in panel (a).

Most earlier research on the minimum wage focused on industries (fast food) or particular groups of workers (teenagers) that are likely to be low wage. The QCEW data allow us to examine the wage and employment impacts of the minimum wage across all low-wage establishments, regardless of industry or workforce composition. In Table 7 we display results from separate analyses of the bottom (**Table 7A**) and top (**Table 7B**) quintiles of the average establishment wage.[13] We would expect that the wage and employment effects of the minimum wage would be most concentrated among establishments in the bottom quintile of the wage distribution; similarly, we would expect

13 We calculate quintiles separately for each of the three cities (together with their suburbs and the control cities and their suburbs).

that the minimum wage would have little or no impact on the average wage and employment in establishments in the top quintile of the wage distribution.

TABLE 7A
Wage and Employment Effects of City Minimum-wage Laws, Bottom Wage Quintile

	San Francisco			Santa Fe			Washington, DC		
Control group	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs
(a) Change in ln (average establishment wage)									
One year	0.03	0.10	0.10	0.11	0.05	0.11	-0.01	0.02	-0.02
	(0.03)	(0.04)*	(0.05)#	(0.03)**	(0.02)**	(0.03)**	(0.02)	(0.02)	(0.03)
Two years	0.05	0.08	0.08	0.13	0.08	0.12	0.02	0.05	0.01
	(0.03)#	(0.03)**	(0.04)*	(0.03)**	(0.03)**	(0.04)**	(0.02)	(0.02)#	(0.03)
Three years	0.11	0.12	0.10	0.14	0.10	0.15	0.00	0.05	-0.01
	(0.04)**	(0.04)**	(0.04)*	(0.05)**	(0.03)**	(0.05)**	(0.03)	(0.04)	(0.03)
(b) Change in ln (average establishment employment)									
One year	0.01	-0.12	0.00	0.26	0.06	0.31	0.02	-0.20	-0.08
	(0.10)	(0.13)	(0.15)	(0.17)	(0.13)	(0.19)#	(0.13)	(0.20)	(0.25)
Two years	-0.01	-0.13	0.00	-0.35	-0.31	-0.45	-0.16	-0.26	-0.11
	(0.10)	(0.14)	(0.16)	(0.41)	(0.26)	(0.44)	(0.12)	(0.19)	(0.23)
Three years	-0.10	-0.10	-0.03	-1.46	-0.42	-1.63	-0.29	-0.32	-0.32
	(0.11)	(0.14)	(0.16)	(0.30)**	(0.26)	(0.34)**	(0.10)**	(0.17)#	(0.21)
(c) Labor-demand elasticities									
One year	0.3	-1.2	0.0	2.4	1.2	2.8	-2.1	-9.6	4.8
Two years	-0.3	-1.7	0.0	-2.8	-3.9	-3.7	-7.5	-5.6	-13.0
Three years	-0.9	-0.8	-0.3	-10.6	-4.3	-11.0	108.5	-6.5	42.1
(d) Employment-to-minimum-wage elasticities									
One year	0.0	-0.4	0.0	0.5	0.1	0.6	0.1	-0.7	-0.3
Two years	0.0	-0.4	0.0	-0.4	-0.4	-0.5	-0.6	-1.0	-0.4
Three years	-0.3	-0.3	-0.1	-0.9	-0.4	-1.0	-1.1	-1.2	-1.2

Notes: Authors' estimates using QCEW data. Ordinary least squares; standard errors in parentheses: **, 1 percent; *, 5 percent; #, 10 percent. All regressions include controls for 19 industries and 4 establishment sizes.

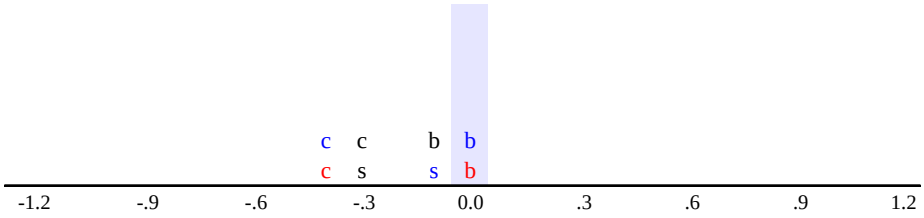
TABLE 7B
Wage and Employment Effects of City Minimum-wage Laws, Top Wage Quintile

	San Francisco			Santa Fe			Washington, DC		
Control group	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs
(a) Change in ln (average establishment wage)									
One year	-0.03	-0.02	-0.02	-0.02	0.01	0.01	-0.01	-0.03	-0.04
	(0.02)#	(0.02)	(0.02)	(0.02)	(0.01)	(0.03)	(0.03)	(0.02)	(0.03)
Two years	-0.02	-0.02	-0.03	0.00	0.01	0.04	0.01	0.02	0.00
	(0.02)	(0.02)	(0.03)	(0.03)	(0.02)	(0.04)	(0.01)	(0.03)	(0.02)
Three years	-0.02	-0.01	-0.01	0.00	0.03	0.03	0.02	0.04	-0.01
	(0.02)	(0.03)	(0.03)	(0.05)	(0.03)	(0.06)	(0.01)	(0.03)	(0.03)
(b) Change in ln (average establishment employment)									
One year	0.01	0.24	0.28	0.06	0.04	0.11	0.03	-0.08	0.04
	(0.05)	(0.18)	(0.18)	(0.08)	(0.06)	(0.17)	(0.05)	(0.09)	(0.07)
Two years	0.06	0.22	0.23	0.13	0.05	0.14	0.02	0.08	-0.02
	(0.07)	(0.20)	(0.18)	(0.12)	(0.07)	(0.22)	(0.07)	(0.19)	(0.09)
Three years	0.10	0.30	0.25	0.29	0.02	0.24	0.04	0.02	-0.05
	(0.09)	(0.22)	(0.20)	(0.19)	(0.09)	(0.28)	(0.08)	(0.20)	(0.11)
(c) Labor-demand elasticities									
One year	-0.5	-9.6	-13.9	-2.9	3.8	14.8	-2.0	2.3	-1.1
Two years	-2.9	-9.5	-8.8	-514.5	6.3	3.4	2.3	3.6	5.3
Three years	-6.4	-22.3	-27.9	94.8	0.7	7.3	2.8	0.4	4.4
(d) Employment-to-minimum-wage elasticities									
One year	0.1	1.0	1.2	0.1	0.1	0.2	0.1	-0.3	0.2
Two years	0.2	0.9	0.9	0.2	0.1	0.2	0.1	0.3	-0.1
Three years	0.4	1.2	1.0	0.4	0.0	0.3	0.2	0.1	-0.2

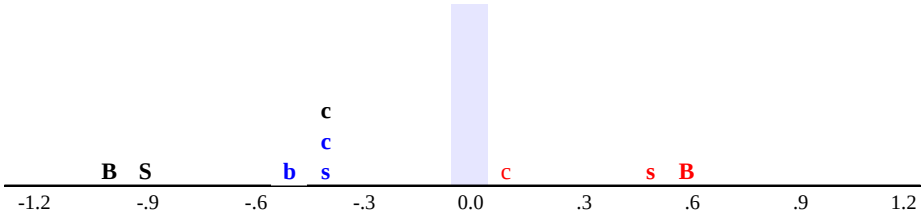
Notes: Authors' estimates using QCEW data. Ordinary least squares; standard errors in parentheses: **, 1 percent; *, 5 percent; #, 10 percent. All regressions include controls for 19 industries and 4 establishment sizes.

In San Francisco, the citywide minimum wage was associated with an economically important and statistically significant increase in the average wage of low-wage establishments. The estimated wage increases were between 3 and 12 percent, and were statistically significant at at least the ten percent level in eight of nine cases (see panel (a)). The corresponding employment changes, however, were not significantly different from zero in any of the eight cases where wages rose (see panel (b)). The corresponding policy elasticities range from 0.0 to -0.4, but none are based on statistically significant changes in employment (see panel (d) and **Figure 4**).

FIGURE 4
Employment-to-minimum-wage Elasticities, Lowest Wage Quintile Establishments
(a) San Francisco



(b) Santa Fe



Notes: These histograms summarize all of the cases where the minimum-wage legislation was associated with an increase in the average wage in establishments in the lowest quintile of the average establishment wage distribution (where the increase was statistically significant at at least the 10 percent level). If the minimum wage consistently lowered employment, then the estimated policy elasticities would all be to the left of the bar above zero. Elasticities based on own suburbs labeled S; reference city, C; reference city and its suburbs, B. Elasticities for year one, in red; year two, in blue; year three, in black. Elasticities in lower-case are not statistically significantly different from zero; estimates in upper case are significant at the 10 percent level; in upper case and bold, at the 5 percent level or better. Estimates based on statistically insignificant increases in average wages, or declines in wages, not shown. A maximum of nine possible elasticity estimates per city.
Source: See Table 7A.

As might be expected, the San Francisco minimum wage had no discernible effect on the average wage of establishments in the top quintile of the area's wage distribution. In one case (in the first year after implementation, relative to the suburbs), the average wage appeared to fall, though the effect was relatively small (3 percent) and only marginally significant.[14]

Some opponents of the San Francisco minimum-wage law expressed concerns that the legislation would harm small employers. As a result, San Francisco exempted establishments with fewer than 10 employees (as well as all nonprofit organizations) during the first two years that the new minimum-wage law was in effect.

In San Francisco (**Table 8A**), the minimum wage appears to have had little impact on average wage at any establishment size up to 100 employees. For the smallest firms (0-9 employees), which were exempt from the new minimum for the first two years, the average wage change ranged from 0 to 1 percent in the first two years, but none of these changes was statistically significant. In the third year – when establishments with 0-9 employees became covered by the citywide minimum wage – the average wage in these small firms rose a statistically significant 2 percent, relative to San Francisco's own suburbs, and about 3 percent relative to Oakland and Oakland and its suburbs, but these

14 In any event, there is no plausible story, in the context of either a standard competitive model or a dynamic monopsony model by which raising the minimum wage would reduce wages.

slightly larger increases were not statistically significant. For the next size class (10-24) employees, which were covered from the initial implementation of the law, all the estimated wage effects are small (ranging from -1 to 1 percent) and none were statistically significant. For the third size class (25-100 employees), the estimated wage effects on these covered establishments were also not large (from -2 to 1 percent), mostly negative, and not statistically significant.[15]

TABLE 8A
Wage and Employment Effects of City Minimum-wage Laws, by Establishment Size, San Francisco

	0-9 employees			10-24 employees			25-100 employees		
Control group	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs
(a) Change in ln (average establishment wage)									
One year	0.01	0.00	0.01	-0.01	0.00	0.00	-0.02	-0.02	-0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)
Two years	0.01	0.00	0.01	0.00	-0.01	0.00	-0.01	0.00	0.00
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)
Three years	0.02	0.03	0.03	0.00	0.00	0.01	-0.01	0.01	0.00
	(0.01)*	(0.02)	0.02	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.02)
(b) Change in ln (average establishment employment)									
One year	0.12	-0.07	0.10	-0.02	0.02	0.04	0.02	0.04	0.05
	(0.05)*	(0.09)	(0.10)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(0.04)
Two years	0.13	-0.07	0.16	0.02	0.08	0.10	-0.01	0.05	0.05
	(0.06)*	(0.10)	(0.11)	(0.03)	(0.03)*	(0.04)*	(0.03)	(0.05)	(0.05)
Three years	0.10	-0.04	0.14	0.05	0.14	0.13	-0.03	0.04	0.02
	(0.08)	(0.11)	(0.13)	(0.04)	(0.04)**	(0.05)**	(0.04)	(0.05)	(0.06)
(c) Labor-demand elasticities									
One year	17.7	-30.9	19.0	4.0	4.9	-8.8	-1.3	-1.9	-6.3
Two years	13.3	-46.5	25.3	-3.9	-12.2	-38.7	0.9	-43.2	-24.0
Three years	5.5	-1.3	4.5	19.9	172.5	20.8	3.0	5.4	-21.6
(d) Employment-to-minimum-wage elasticities									
One year	0.5	-0.3	0.4	0.0	0.0	0.1	0.1	0.1	0.2
Two years	0.5	-0.2	0.6	0.0	0.1	0.1	0.0	0.2	0.2
Three years	0.4	-0.1	0.5	0.1	0.2	0.2	-0.1	0.2	0.1

Notes: Authors' estimates using QCEW data. Ordinary least squares; standard errors in parentheses: **, 1 percent; *, 5 percent; #, 10 percent. All regressions include controls for 19 industries.

Relative to San Francisco suburbs, employment increased in small, initially exempt, establishments in the first two years after the increase, even though average wages in these establishments were essentially unchanged. Employment remained above the suburban control group after the minimum wage began to apply to these same small establishments in the third year after the increase, though the employment increase was not statistically significant.

15 We also conducted, but do not report results for larger establishment 100-999 and 1000 or more employees. Since there are relatively few firms in these size classes, particularly in the suburbs, we were not always able to produce estimates that fit our sample-size restrictions; results available upon request.

Relative wages increased in only one of the 21 potential policy experiments summarized in **Table 8B**.[16] Nevertheless, indirect effects may be at play here, with the minimum wage potentially driving employment into smaller exempt firms, discouraging smaller firms from growing larger, raising the going wage in the low-wage labor market regardless of the exemption, or through some other channel. However, to the extent that there is an indirect effect, the small relative employment changes across all of the small establishment sizes suggest that these indirect effects were small.

TABLE 8B
Wage and Employment Effects of City Minimum-wage Laws, by Establishment Size, Santa Fe

	0-9 employees			10-24 employees			25-100 employees		
Control group	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs	Own suburbs	Other nearby city	Other cities & suburbs
(a) Change in ln (average establishment wage)									
One year	-0.01	0.00	0.01	0.02	0.01	0.01	0.06	0.03	0.08
	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)**	(0.01)**	(0.02)**
Two years	0.02	0.01	0.04	0.03	0.02	0.04	0.04	0.03	0.05
	(0.02)	(0.01)	(0.02)	(0.03)	(0.01)#	(0.03)	(0.02)#	(0.01)*	(0.03)
Three years	0.01	0.02	0.04	0.04	0.03	0.07	0.02	0.03	0.02
	(0.02)	(0.01)	(0.03)	(0.04)	(0.01)*	(0.04)#	(0.04)	(0.02)*	(0.05)
(b) Change in ln (average establishment employment)									
One year	0.10	-0.07	0.23	0.11	-0.06	0.11	-0.05	0.02	0.07
	(0.08)	(0.05)	(0.14)#	(0.05)*	(0.03)#	(0.07)	(0.07)	(0.04)	(0.13)
Two years	-0.59	-0.35	-0.59	0.19	-0.09	0.19	0.05	0.05	0.21
	(0.68)	(0.16)*	(0.71)	(0.08)*	(0.04)*	(0.10)#	(0.10)	(0.05)	(0.17)
Three years	-3.21	-0.56	-3.26	0.13	-0.09	0.13	0.16	0.07	0.33
	(0.66)**	(0.20)**	(0.70)**	(0.10)	(0.05)#	(0.12)	(0.13)	(0.05)	(0.19)#
(c) Labor-demand elasticities									
One year	-11.7	342.2	21.1	5.8	-4.3	7.5	-0.9	0.9	0.9
Two years	-36.4	-35.4	-15.0	6.6	-3.8	5.3	1.2	2.1	4.6
Three years	-278.7	-29.3	-90.8	3.1	-3.0	1.8	9.1	2.1	19.4
(d) Employment-to-minimum-wage elasticities									
One year	0.4	-0.3	1.0	0.2	-0.1	0.2	-0.2	0.1	0.3
Two years	-1.6	-1.0	-1.6	0.3	-0.1	0.3	0.2	0.2	1.0
Three years	-3.4	-1.5	-3.4	0.2	-0.1	0.2	0.7	0.3	1.7

Notes: Authors' estimates using QCEW data. Ordinary least squares; standard errors in parentheses: **, 1 percent; *, 5 percent; #, 10 percent. All regressions include controls for 19 industries.

Overall, the QCEW data show little support for the idea that the citywide minimum wage implemented in San Francisco in 2004 cost the city jobs, either initially or up to three years after the law went into effect. In the overwhelming majority of cases where the minimum wage was

16 Nine cases each for establishments with 10-24 and 25-100 employees, and three – in year three – for establishments with 0-9 employees.

associated with increases in the average establishment wage in fast food, food services, retail, or among all low-wage establishments (regardless of industry), employment did not change by a statistically significant amount. In those cases where employment did appear to respond in a statistically significant way to minimum-wage-related wage increases, employment actually increased in four cases (all in food services) and declined in one (fast food). The San Francisco minimum wage also appears to have had little or no effect on wages and employment at small establishments, including those that were initially exempt and those that were just above the initial cutoff.

Santa Fe

In mid-2004, Santa Fe implemented a minimum-wage law that increased the prevailing minimum wage in the city about 65 percent in the first year after enactment, about 75 percent in the second year, and about 85 percent in the third year. Table 4 reports the wage and employment impact for fast-food restaurants. As panel (a) shows, in five of the nine cases considered, the citywide minimum wage was associated with statistically significant increases in fast-food wages of between 7 and 9 percent (relative to fast-food wages in the three geographic controls); in four cases, wages also increased by smaller amounts – 1 to 3 percent – but these changes were not statistically insignificant levels; in a final case fast-food wages fell by a statistically insignificant amount (about 6 percent). None of the statistically significant wage increases, however, was associated with a statistically significant change in employment (see panel (b)). Figure 1 displays the policy elasticities associated with each of the four cases where the average fast-food wage increased by a statistically significant margin relative to the three geographic controls. Two were positive, two were negative, but none were based on statistically significant changes in employment. As was the case with San Francisco, the results for Santa Fe give little support to the view that the city's minimum wage hurt employment in fast food.

Table 5 displays the results for the broader category of food services, which also includes sit-down restaurants. The Santa Fe minimum wage appears to have had less impact on wages in food services than in the narrower category of fast food. Only one of the nine cases studied – in the first year after implementation, relative to the Santa Fe suburbs – showed an increase in the wages of food-service establishments. This estimated increase of about 5 percent was associated with a large, marginally significant increases in employment (see panel (b)). As Figure 2 shows, the implied policy elasticity in this casewas 0.4. While the minimum-wage increase in Santa Fe did not have a large impact on average wages in food services, where it was associated with a wage increase, employment rose, not fell.

Table 6 extends the analysis to retail trade, where the city minimum wage appears to have had a substantial impact on wages. In the first three years after the increase, the average wage rose by 2 to 9 percent, depending on time period and geographic control, with seven of the nine changes statistically significant or marginally significant (see panel (a)). In two of these cases of significant wage increases, the corresponding employment changes were negative but not statistically significantly different from zero; in four of these cases, employment increased after the wage increases (with the increase significant at the ten percent level in three cases and the five percent level in the other case); and in one of these cases, employment fell (significant at the 10 percent level). Figure 3 summarizes the related policy elasticities. Four are positive, ranging from 0.3 to 0.8, and based on statistically or marginally significant increases in employment. Two are negative but not statistically significantly different from zero. And one is negative, marginally significant, and at -0.2, in the range of historical estimates of disemployment effects.

In Table 7A, we broaden the analysis to include all low-wage establishments in Santa Fe, regardless of industry. As in San Francisco, the Santa Fe minimum wage appeared to have an important impact on establishments in the lowest average-wage quintile before the increase. The estimated wage increases were between 5 and 15 percent, and were statistically significant in all nine cases (see panel (a)). Of these nine cases, the corresponding employment changes were positive and marginally significant in one case; negative and statistically significant in two cases; and statistically indistinguishable from zero in the remaining six cases (four negative and two positive). Figure 3 shows the related policy elasticities.

As was the case with San Francisco, the Santa Fe legislation had no discernible effect on the average wage of establishments in the top quintile of the area's wage distribution (see Table 7B).

Finally, we turn to the results by establishment size. In Santa Fe, the law exempted establishments with fewer than 25 employees.[17] Not surprisingly, then, the increase did not appear to have much impact on the wages paid in establishments below the size cutoff. In the first year after the increase, wages in the smallest two establishment sizes we examined (0-9 and 10-24 employees) barely changed relative to the three geographic control groups, with changes ranging from -1 to 2 percent, with none statistically significant (see panel (a) of Table 8B). In the second year after the increase, relative wages changes of 1 to 4 percent, though only one of these cases was marginally significant. In the third year, wages increased by statistically significant or marginally significant levels of 3 to 7 percent in two of six cases, with statistically insignificant increases of 1 to 4 percent in the remaining cases. While the law exempted these smaller establishments, the small relative wage increases could reflect changes in the Santa Fe labor market induced by the minimum-wage law. The city minimum wage, which raised the floor of the low-wage labor market well above the federal minimum wage, may have set a reference wage that affected pay even in exempted establishments. These kinds of spillover dynamics, however, would not be consistent with the standard competitive model of the low-wage labor market.[18]

Among covered small establishments – those with 25 to 100 employees before the law went into effect – wages increased by a statistically significant three to eight percent in six of nine cases (and by two to five percent in the three other cases where the changes were not statistically significant). Employment, however, did not change by a statistically significant amount in any of the six cases where wages rose. In five of the six cases, employment increased; in the remaining case, employment fell. The corresponding policy elasticities ranged from -0.2 to 0.3.

17 The small-establishment exemption was initially intended to be permanent. At the end of 2007, the city council voted to remove the exemption for smaller establishments in 2008. During the full period analyzed here, establishments with fewer than 25 workers were exempt from the Santa Fe minimum wage.

18 If anything, in a competitive model, the minimum wage should lower average wages in exempt establishments because employees who lost positions in larger, covered establishments would increase the labor supply available to smaller, uncovered establishments, driving down the wage they have to pay to attract workers. One artefact of the way the test is constructed may also explain the wage increase. Establishment size is determined by the establishment's average number of employees in the year before the minimum wage went into effect. Establishments that were initially below the 25-employee cutoff but that subsequently grew would be covered by the law after the increase, potentially increasing their average wage.

The QCEW data by establishment size, therefore, suggest that the Santa Fe minimum wage raised wages in covered small establishments without lowering employment. The data also hint that the law may have contributed to raising wages – indirectly – in smaller, exempt establishments.

Taken together, the results for Santa Fe, like those for San Francisco, provide little support for the idea that the citywide minimum wage reduced employment opportunities in the low-wage labor market there.

Washington, DC

Washington implemented its citywide minimum wage more than a decade before the laws put in place in San Francisco and Santa Fe. On paper, the size of the increase – a one dollar increase from the previously prevailing federal minimum wage of $4.25 per hour – was about the same in percentage terms as the increase in San Francisco. In practice, however, as we've already seen, the Washington minimum wage was set at a level that potentially affected fewer workers than in San Francisco or Santa Fe, and the subsequent compliance appears to have been so weak that the share of workers earning below the new minimum wage actually increased after the law went into effect (see Table 3).

The QCEW establishment data confirm the lack of a wage impact from the Washington minimum wage. In strong contrast to the experience of San Francisco and Santa Fe, the Washington minimum wage was associated with wage increases in only one of the 36 cases examined in fast food, food services, retail, and low-wage establishments (see Table 7A). The single case where wages appeared to rise – for all low-wage establishments, in the second year after the increase, relative to the control city, Baltimore – the increase was about five percent, but only marginally significant. In three cases, the new city minimum wage was associated with statistically or marginally significant *declines* in fast food or food service wages.

In the absence of binding minimum-wage increases, the QCEW data for Washington cannot provide information on the employment impact of city minimum wages. The Washington experience, however, does suggest the importance of setting a meaningful minimum wage in the context of the local pay structure and of providing adequate enforcement of the new wage level.

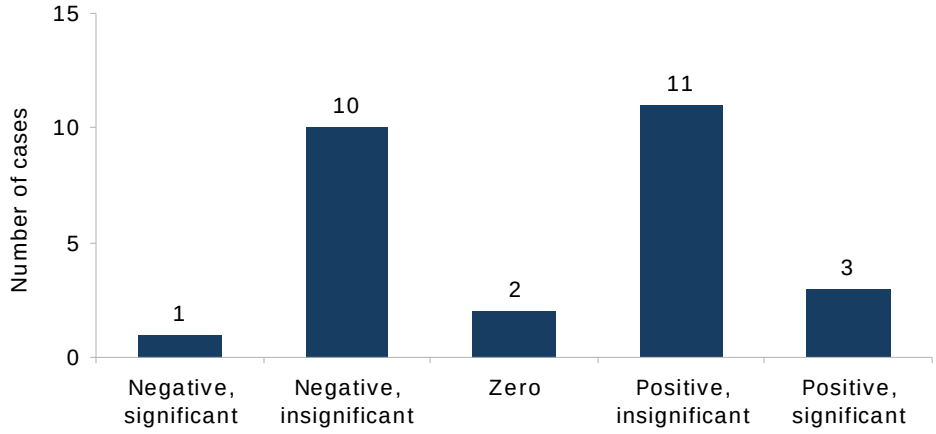
Discussion

Our analysis of city minimum wages covers multiple dimensions. We examine establishments in different industries, with different wage structures, and different initial sizes. We follow effects over periods that vary from one to three yearsand we use three different geographic control groups for each of the three cities studied. The qualitative results are remarkably consistent across all of these dimensions. The minimum wages in San Francisco and Santa Fe, the two cities where the new minimum was set sufficiently high to affect wages in the low-wage labor market, had no systematic effect on employment in affected establishments.

For San Francisco, **Figure 5** pools all the cases for fast food, food services, retail, and all low-wage establishments where the city minimum wage was associated with a statistically significant increase in the average establishment wage. The figure groups the corresponding changes in employment into

five categories: a statistically significant decline in employment; a decline in employment that was not statistically significant (at at least the 10 percent level); no change in employment;[19] an increase in employment that was not statistically significant (at at least the ten percent level); and a statistically significant increase in employment. In San Francisco, employment changes were almost evenly balanced between negative and positive changes. Overall employment increases (14) outnumbered decreases (11); statistically significant employment increases (3) also outnumbered statistically significant employment declines (1). **Figure 6** shows the corresponding results for Santa Fe. Again, employment changes were almost evenly divided between losses (11) and gains (10). Twice as many observed employment increases in Santa Fe were statistically significant at the 10 percent level or better (six) as employment declines (three).

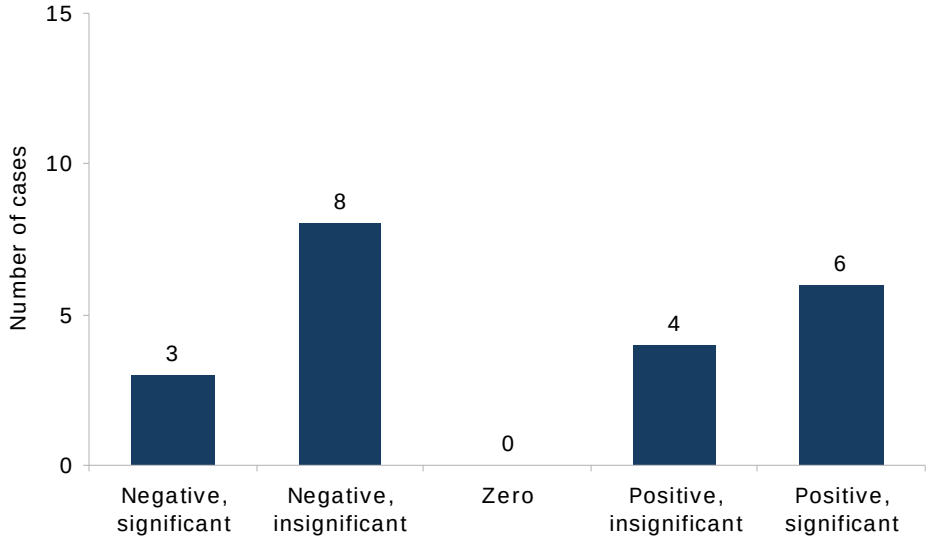
FIGURE 5
Summary of All Employment Changes, San Francisco



Source: Authors' analysis of Tables 4, 5, 6, and 7.

19 In the figure, "zero" is defined as rounding to zero at one decimal place – effectively covering policy elasticities in the range -0.044 to 0.044.

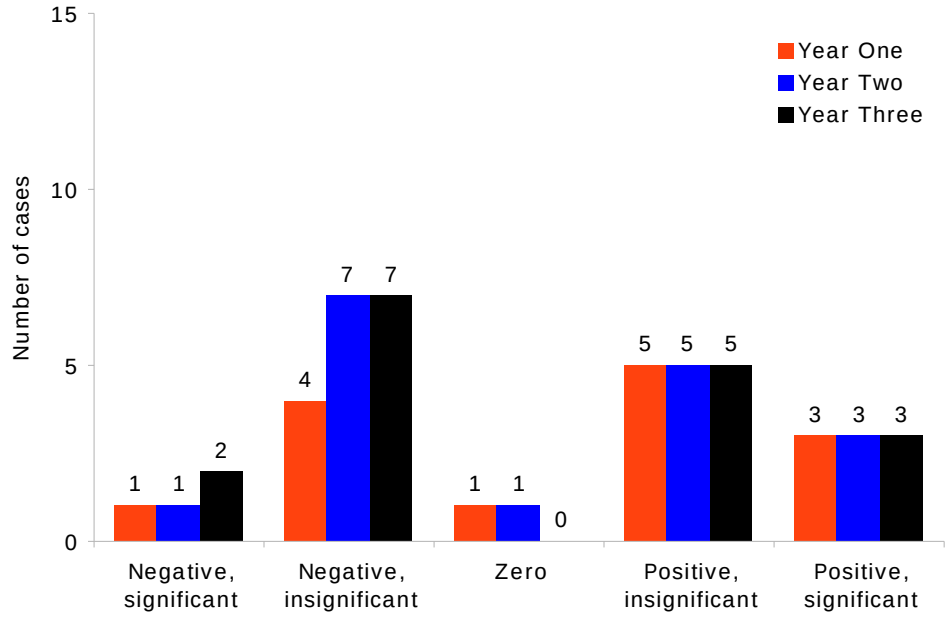
FIGURE 6
Summary of All Employment Changes, Santa Fe



Source: Authors' analysis of Tables 4, 5, 6, and 7

The qualitative results in Figures 5 and 6 do not vary over time. **Figure 7** combines the observed outcomes in both San Francisco and Santa Fe and separates out the estimates by the first, second, and third year after implementation. For all three periods, the employment responses were about evenly distributed between negative and positive values. Year one shows five declines (one statistically significant) and eight increases (three statistically significant); year two, eight declines (one significant) and eight increases (three significant); and year three, nine declines (two significant) and eight increases (three significant).

FIGURE 7
Summary of Employment Changes, San Francisco & Santa Fe

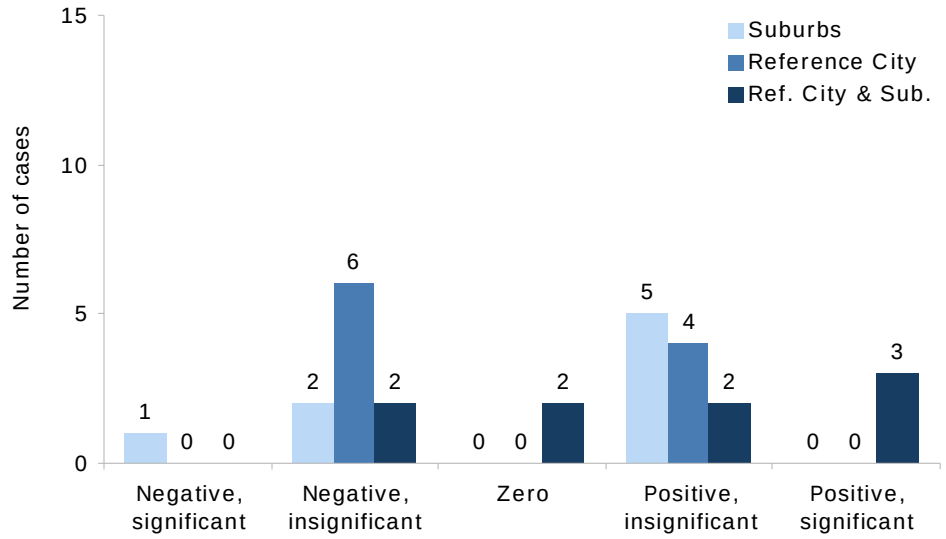


Source: Authors' analysis of Tables 4, 5, 6, and 7.

Nor do the qualitative results vary across the three geographic control groups.[20] The availability of three possible geographic controls allows us to observe the empirical variation across three plausible control groups, and to test the sensitivity of our quantitative and qualitative results to the choice of control.

Figure 8 presents the full set of results for San Francisco (from Figure 5) according to the three geographic controls: suburbs; nearby reference city; and the nearby reference city and its suburbs. Regardless of geographic control group, the qualitative employment effects are roughly evenly distributed around zero. When the San Francisco suburbs were used as the reference group, there were three negative employment outcomes (one statistically significant), and five positive employment outcomes (all statistically insignificant). Relative to San Francisco's reference city (Oakland), employment fell six times (none statistically significant) and rose four times (none significant). Finally, comparing San Francisco's performance relative to its suburbs with Oakland's performance relative to its suburbs, employment fell twice (neither significant), was unchanged twice, and rose five times (three significant).

FIGURE 8
Summary of Employment Changes, San Francisco



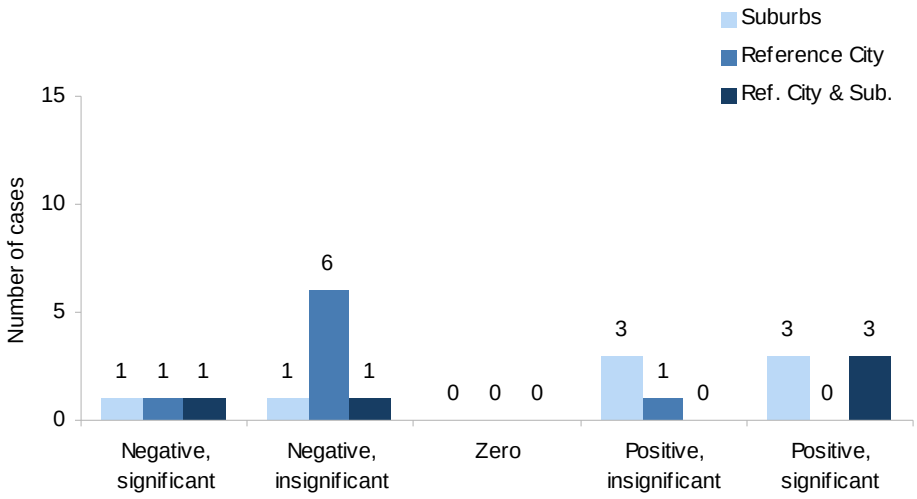
Source: Authors' analysis of Tables 4, 5, 6, and 7

Figure 9 displays the same data for Santa Fe. The qualitative results for Santa Fe appear to be somewhat more sensitive to the choice of geographic controls than was the case for San Francisco. The employment outcomes using the Santa Fe suburbs and nearby reference city (Albuquerque) relative to its suburbs produce results that suggest, if anything, the Santa Fe minimum wage raised employment in the city. Relative to the Santa Fe suburbs, employment fell in two cases (one statistically significant), but rose in six cases (three statistically significant). Using Albuquerque and

20 As Meyer (1995), Blundell, Costa Dias, Meghir, and Van Reenen (2004) and Draca, Machin, and Van Reenen (2011) and others have emphasized, the validity of the control group in difference-in-difference estimators depends on both common trends and stable composition across the treatment and control groups.

its suburbs as a control, employment fell in two cases (one statistically significant) and increased in three cases (all significant). Employment elasticities based on comparisons to Albuquerque alone, however, were more negative, with seven estimated declines (though only one was statistically significant), with no estimates that were zero or positive.

FIGURE 9
Summary of Employment Changes, Santa Fe



Source: Authors' analysis of Tables 4, 5, 6, and 7.

The policy elasticities in Tables 4 through 7 show substantial quantitative variation across geographic controls, even within the same city, industry, and time period. The qualitative results summarized in Figures 8 and 9, however, suggest that the broad conclusions about the lack of employment impacts of the minimum wage do not depend on the choice of any of the three geographic controls.

Standard competitive models of the labor market cannot easily explain our results. Competitive models unambiguously predict that a binding minimum-wage will reduce employment. But, we find this outcome in fewer than half the cases examined here, and in the large majority of those cases, the observed employment declines were not statistically significant. One possible explanation is that employers adjusted to higher wage costs by reducing hours, not employment. Over the ranges seen here, from the employees' point of view, hours adjustments yield an unambiguous welfare improvement because average quarterly earnings are higher. If all the adjustment took place through hours reductions, this implies that average hours fell while the average hourly wage rose by a larger proportion, leaving employees working fewer hours for higher quarterly earnings.[21] Other possible ways to reconcile our results with the competitive model include assuming that: labor costs are passed on in higher prices (under the assumption that product demand is inelastic);[22] minimum-wage

21 This result holds as long as the labor-demand elasticity is between 0 and -1.
22 See Aaronson (2001), Fouger, Gautier, and le Bihan (2008), and Lemos (2008).

increases reduce non-wage compensation or training;[23] and minimum wages reduce firm profits (but not enough to drive firms out of affected industries).[24]

We could also reconcile our results with the standard competitive model if we assume that the minimum wage does lower employment but these disemployment effects are small. The random distribution of negative and positive employment changes around a small, negative employment effect would be difficult to distinguish from the random distribution of negative and positive employment changes around an effect that is truly zero. From a policy point of view, the difference between zero and small negative employment effects is not likely to be important, especially in a context where the wage benefits are large.

In general, our results are more consistent with non-competitive "recruitment-retention" models of the labor market.[25] These models differ from the competitive model in that they assume that firms face costs for recruiting and retaining workers. In this context, an increase in the minimum wage can actually make it easier for firms to recruit and retain workers, offsetting some or all of the increased labor costs. As a result, the "recruitment-retention" model suggests that over some range, minimum-wage increases might result in no change or even an increase in employment.

Conclusion

The results for fast food, food services, retail, and low-wage establishments in San Francisco and Santa Fe support the view that a citywide minimum wages can raise the earnings of low-wage workers, without a discernible impact on their employment. Moreover, the lack of an employment response held for three full years after the implementation of the measures, allaying concerns that the shorter time periods examined in some of the earlier research on the minimum wage was not long enough to capture the true disemployment effects.

Our estimated policy elasticities generally cluster near zero, and are more likely to be positive than negative. Few of our point estimates are precise enough to rule out either positive or negative employment effects, but statistically significant positive policy elasticities outnumber statistically significant negative elasticities. In general, our findings are consistent with earlier research by Card and Krueger (1994, 1995, 2000), Dube, Lester, and Reich (forthcoming), and others who have found, at the federal and state level, that policy makers tend to set levels of the minimum wage that raise wages of low-wage workers without significant negative effects on employment. Our findings are also consistent with earlier studies of the citywide minimum wages in San Francisco (Dube, Naidu, and Reich, 2006) and Santa Fe (Potter, 2006).

23 Neumark and Wascher (2001) find evidence that minimum wages reduce training; Grossberg and Sicilian (1999), Acemoglu and Pischke (2003), and Arulampalam, Booth, and Bryan (2004) do not.

24 See Draca, Machin, and Van Reenen (2011).

25 These are often referred to as "dynamic monopsony" models. Small firms operating in competitive product markets face upward sloping, rather than completely flat, labor supply curves. In these models, firms' labor demand curves still slope downward, but the interaction of supply, demand, and the minimum wage can produce outcomes where employment increases, rather than decreases, after a minimum-wage increase. For a complete discussion, see Manning (2003).

We also find that the minimum-wage increase implemented in Washington in 1993 was too small to raise wages in fast food, food services, retail, and other low-wage establishments. CPS data for Washington suggest that a relatively low share of the city's hourly workers were in the wage range affected by the new city minimum and suggest that the measure was not enforced (more workers earned below the new city minimum after it was enacted than before). The citywide minimum wage in Washington therefore does not constitute a meaningful policy experiment, and does not allow us to draw conclusions about the employment effects of binding citywide minimum wages.

The experience of smaller establishments in San Francisco and Santa Fe – whether below or just above the sizes exempted by the new laws – suggests that small establishments do not respond to minimum wages differently than larger firms. Small establishments below the size cutoffs in those cities did not experience systematic changes in employment. The same was true for small establishments just above the size cutoffs in these cities.

Overall, the evidence is consistent with the view that minimum wages set at "modest changes in the minimum wage have little systematic effect on employment" (Card and Krueger, 2000, p. 1398).

References

Acemoglu, Daron, and Jorn-Steffen Pischke. 2003. "Minimum Wages and On-the-Job Training." *Research in Labor Economics*, vol. 20, pp. 159-202.

Arulampalam, Wiji, Alison L. Booth, and Mark L. Bryan. 2004. "Training and the New Minimum Wage." *The Economic Journal*, vol. 114 (March), pp. C87–C94.

Bertrand, Marianne, Esther Duflo and Sendhil Mullainathan. 2004. *Quarterly Journal of Economics*, vol. 119, no. 1, pp. 249-75.

Brown. Charles. 1999. "Minimum Wages, Employment, and the Distribution of Income," in Orley Ashenfelter and David Card (eds.), *Handbook of Labor Economics, Vol. III*, New York: Elsevier.

Brown, Charles, Curtis Gilroy, and Andrew Kohen. 1982. "The effect of the minimum wage on employment and unemployment." *Journal of Economic Literature*, vol. 20, no. 2, pp. 487-528.

Card, David and Alan Krueger. 1994. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania." *American Economic Review*, vol. 84, no. 5, pp. 772-93.

Card, David and Alan Krueger. 1995. *Myth and Measurement: The New Economics of the Minimum Wage*. Princeton, New Jersey: Princeton University Press.

Card, David and Alan Krueger. 2000. "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania: Reply." *American Economic Review*, vol. 90, no. 5, pp. 1397-1420.

Dube, Arindrajit, T. William Lester, and Michael Reich. Forthcoming. "Minimum Wage Effects Across State Borders: Estimates Using Contiguous Counties." *Review of Economics and Statistics*.

Dube, Arindrajit, Ethan Kaplan, Michael Reich, and Felxi Su. 2006. "Do Businesses Flee Citywide Minimum Wages? Evidence from San Francisco and Santa Fe." Institute of Industrial Relations Policy Brief, University of California, Berkeley.

Dube, Arindrajit, Suresh Naidu, and Michael Reich. 2006. "The Economic Effects of a Citywide Minimum Wage." *Industrial and Labor Relations Review*, vol. 60, no. 4, pp. 522-543.

Flinn, Christopher J. 2011. *The Minimum Wage and Labor Market Outcomes*. Cambridge, Massachusetts: The MIT Press.

Grossberg, Adam J., and Paul Sicilian. 1999. "Minimum Wages, On-the-Job Training, and Wage Growth." *Southern Economic Journal*, vol. 65, no. 3, pp. 539-56.

Hashimoto, Masanori. 1982. "Minimum Wage Effects on Training on the Job." *American Economic Review*, Vol. 72, No. 5, December, pp. 1070-87.

Manning, Alan. 2003. *Monopsony in Motion: Imperfect Competition in Labor Markets*. Princeton, New Jersey: Princeton University Press.

Meyer, Bruce D. 1995. "Natural and Quasi-Experiments in Economics." *Journal of Business & Economic Statistics*, vol. 13, no. 2, pp. 151-161.

Neumark, David and William Wascher. 2000. "Minimum Wage and Employment: A Case Study of Fast-Food Industry in New Jersey and Pennsylvania: Comment." *American Economic Review*, vol. 90, no. 5, pp. 1362-96.

Neumark, David, and William Wascher. 2001. "Minimum Wages and Training Revisited." *Journal of Labor Economics*, vol. 19, no. 2, pp. 563-95.

Neumark, David and William Wascher. 2006. "Minimum Wages and Employment: A Review of Evidence from the New Minimum Wage Research." manuscript.

Potter, Nicholas. 2006. "Measuring the Employment Impacts of the Living Wage Ordnance in Santa Fe, New Mexico." Bureau of Business and Economic Research, University of New Mexico.