Wage Theft in California:
Minimum Wage Violations, 2014-2023

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Executive Summary

This report uses 2014-2023 data from the Census Bureau's Current Population Survey Merged Outgoing Rotation Groups (CPS-MORG) to estimate minimum wage violations across four metropolitan statistical areas (MSAs or metro areas) of interest:

Los Angeles-Long Beach-Anaheim, CA MSA	**San Jose-Sunnyvale-Santa Clara, CA MSA**	**San Diego-Carlsbad-San Marcos, CA MSA**	**San Francisco-Oakland-Fremont, CA MSA**

This research is part of a larger project intended to assess opportunities and inform strategies of local labor standards enforcement agencies within California—including those in Los Angeles (city/county), Oakland, San Diego (city/county), San Francisco, San Jose, Santa Clara (county), and Emeryville. However, due to CPS data limitations and regional commuting patterns, it not possible to reliably assess violation rates within these specific counties and municipalities. Given the structure of the CPS survey, metropolitan areas offer more reliable geographical units while encompassing most commuter sheds. We therefore focus on the four MSAs that include these jurisdictions.

Throughout this report, we provide two sets of estimates for each metro area: violation rates calculated using the lower *state minimum wage* rate and violation rates calculated using the higher *primary metro area minimum wage* rate, including the city minimum rates of Los Angeles, San Jose, San Diego, and San Francisco.[1] In addition to estimating the overall impact of minimum wage violations in each of these areas, we identify a number of individual, industrial, and job characteristics that are associated with higher levels of wage theft. We further compare the relative effects of these predictors across areas to begin to understand which issues are particularly acute in which areas.

The key findings of this report include:

- We estimate that an average of $2.3 to $4.6 billion in earned wages were lost by workers each year from 2014 to 2023 due to minimum wage violations across these four metro areas.
- The majority of lost wages were in the Los Angeles MSA, where we estimate an average of $1.6 to $2.5 billion was lost a year during the study period.

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[1] The reason we provide two estimates for each metro area is because each metro area contains counties and municipalities with higher minimum wage rates as well as jurisdictions that follow the lower state minimum wage. CPS tracks respondents' place of residence but not the location of where they work. As such, we do not know if respondents in each metro area are subject to the higher or lower minimum wage rate. The "true" violation rate for each metro area lies somewhere in between these two estimates. Estimates calculated using the lower state minimum wage are undoubtedly too low: we know that a large share of respondents in each metro area work in jurisdictions with higher than state minimum wage rates. The metro area violation rates, in turn, are undoubtedly too high—but given the high levels of employment concentrated in center cities, these estimates are likely to be closer to the truth. By reporting two sets of estimates, we aim to err on the side of caution and transparency. Readers, too, should use these estimates with caution. That said, as this report demonstrates, the CPS-MORG data provide crucial insight into the impact and incidence of wage theft within and across four major metro areas of California.

- Those that were paid below the minimum wage lost roughly 20 percent of their total paycheck on average, or nearly $4,000 in earned wages a year if working full-time.
- The most impactful violations occurred in the San Francisco area, where workers lost an average of $4,300 to $4,900 annually to minimum wage violations.
- The number of workers paid below both the state and primary metro minimum wages has more than doubled since 2014, growing particularly dramatically over the most recent year of the study (2023).
- Workers employed in private households, food services and drinking places, and personal and laundry services are particularly likely across areas to experience minimum wage violations.
- Workers without a college degree are 3-5 times more likely to experience minimum wage violations than those with a college degree.
- Part-time workers are over 3 times as likely as full-time workers to experience minimum wage violations in both the San Diego and San Francisco areas, and between 2-3 times as likely in the Los Angeles and San Jose areas.
- Both Black and Latinx workers are more likely than white workers to experience minimum wage violations across all areas.
- Women are more likely than men to be paid under the minimum wage across all areas studied.
- Noncitizens are roughly 60 to 70 percent more likely to experience a minimum wage violation than citizens in both Los Angeles and San Diego, and around 50 percent more likely to experience a violation in San Francisco (no significant different was found between these groups in San Jose).
- Older and particularly younger workers are more likely to experience minimum wage violations than mid-career workers across all areas of interest.
- The high-violation industries identified below are projected to account for over half of all employment growth by the end of the decade.

We elaborate on these findings in the following pages.

Overall Minimum Wage Violation Rates

Estimated minimum wage violation rates by metro area are shown in **Chart 1**. Over 7 percent of workers in the Los Angeles metropolitan area were paid below the California state minimum wage, compared to 3-5 percent of workers across the other three areas studied. When using the higher primary metropolitan rate for each area, nearly 14 percent of workers in the San Francisco metropolitan area were paid below the San Francisco city minimum wage, compared to roughly 12 percent of workers in Los Angeles (using the LA city/county minimum wage) and less than 10 percent in San Diego and San Jose.

Chart 1. Estimated Minimum Wage Violation Rate by MSA, 2014-2023

Chart 1 data:

Metro Area	Violation Rate using Primary Metro MW	Violation Rate using State MW
San Francisco Metro Area	13.89%	4.23%
Los Angeles Metro Area	12.16%	7.45%
San Diego Metro Area	9.60%	4.86%
San Jose Metro Area	9.46%	3.24%
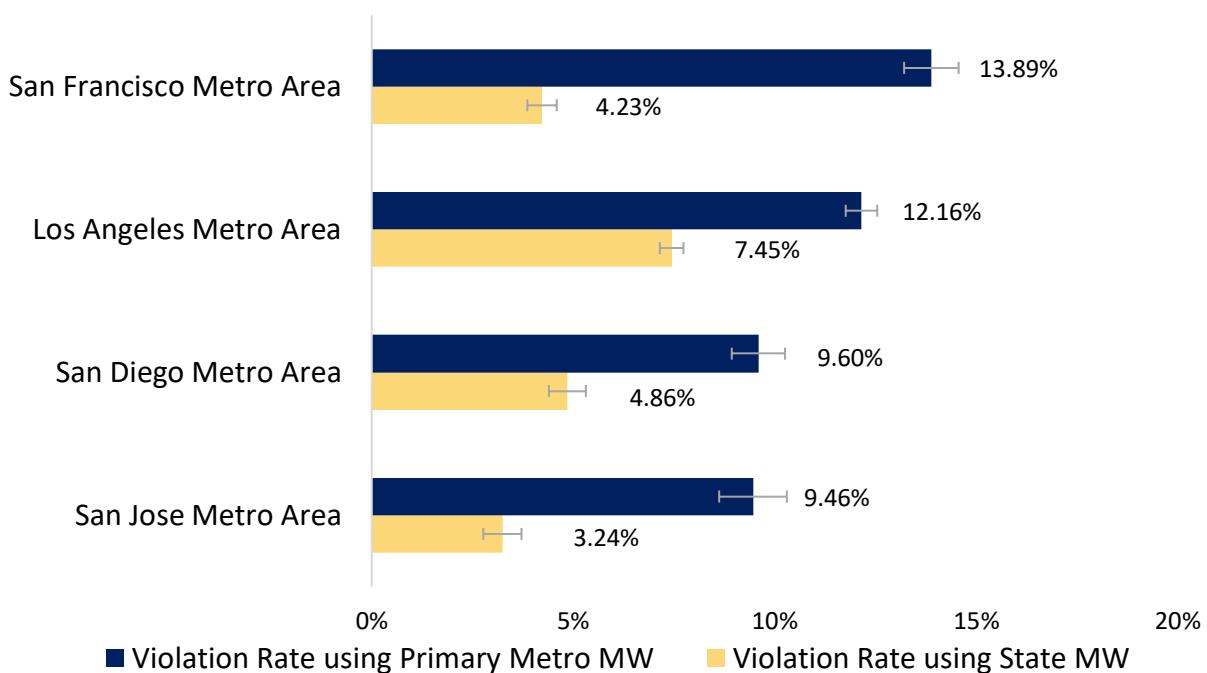
Chart 2 on the following page shows the total estimated number of minimum wage violations across the four metropolitan areas of interest each year since 2014. The number of workers paid below both the state and primary metropolitan minimum wages has more than doubled since 2014. Particularly concerning is the increase in estimated violations from 2022 to 2023. **The number of workers paid below the state minimum wage in these areas increased from roughly 616,000 in 2022 to over 960,000 in 2023**, an increase of over 56 percent. While much of this increase can likely be attributed to the rising minimum wage rates at both the state and local levels (see **Appendix II**), this alone cannot explain this most recent increase given the average growth in the wages over time.

Chart 2. Total Estimated Minimum Wage Violations by Year, 2014-2023
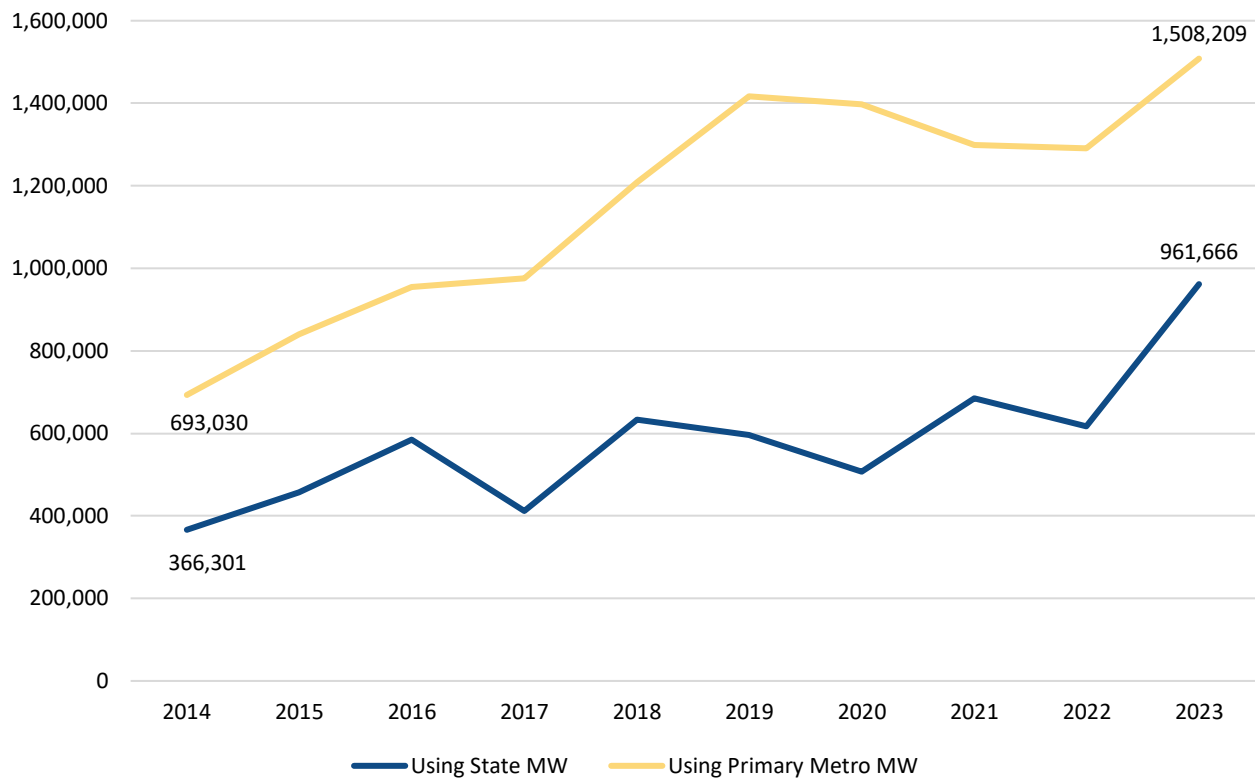
Year	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Using Primary Metro MW	693,030	840,231	955,347	975,401	1,207,731	1,416,569	1,397,601	1,298,195	1,290,467	1,508,209
Using State MW	366,301	456,524	584,180	412,168	632,431	595,927	506,791	685,056	616,301	961,666

The tables on the following page show the estimated impact of minimum wage violations in each area using both sets of minimum wage rates. **We estimate that, across these four metropolitan areas, an average of $2.3 to $4.6 billion in earned wages were lost by workers each year due to minimum wage violations.** The majority of this is in the Los Angeles area, where we estimate an average of $1.6 to $2.5 billion was lost by Los Angelenos to minimum wage theft each year. Those that were paid under the minimum wage on average lost roughly 20 percent of their total paycheck, or nearly $4,000 in earned wages a year for a full-time worker. The most impactful violations occurred in San Francisco, where workers lost an average of $4,300 to $4,900 annually to minimum wage violations.

Table 1. Summary of Minimum Wage Violation Estimates by MSA, 2014-2023

Using State MW Rate	Total number of minimum-wage-eligible workers (average per year)	Eligible workers experiencing minimum wage violations									
		Total number of workers experiencing violations under state minimum wage (average per year)	Share of eligible workers	Average weekly wages received	Average weekly wages should have received	Average weekly underpayment	Average annual wages received	Average annual wages should have received	Average annual underpayment if full year	Share of earned wages not paid	Average annual wages not paid to minimum wage theft victims, aggregate
Total	**9,728,854**	**581,735**	**6%**	**$296**	**$373**	**$77**	**$15,393**	**$19,376**	**$3,983**	**21%**	**$2,325,619,432**
Los Angeles Metro Area	5,335,000	396,803	7%	$305	$381	$77	$15,835	$19,813	$3,978	20%	$1,578,657,488
San Diego Metro Area	1,359,521	65,913	5%	$286	$358	$72	$14,883	$18,640	$3,757	20%	$247,642,365
San Francisco Metro Area	2,104,256	88,870	4%	$286	$368	$83	$14,858	$19,154	$4,295	22%	$381,732,857
San Jose Metro Area	930,078	30,148	3%	$308	$383	$75	$15,998	$19,898	$3,900	20%	$117,586,722

Using Primary Metro MW Rate (San Francisco, Los Angeles, San Diego, San Jose)	Total number of minimum-wage-eligible workers (average per year)	Eligible workers experiencing minimum wage violations									
		Total number of workers experiencing violations under primary metro area minimum wage (average per year)	Share of eligible workers	Average weekly wages received	Average weekly wages should have received	Average weekly underpayment	Average annual wages received	Average annual wages should have received	Average annual underpayment if full year	Share of earned wages not paid	Average annual wages not paid to minimum wage theft victims, aggregate
Total	**9,728,854**	**1,158,278**	**12%**	**$346**	**$421**	**$75**	**$17,982**	**$21,901**	**$3,918**	**18%**	**$4,638,415,613**
Los Angeles Metro Area	5,335,000	647,935	12%	$335	$408	$73	$17,430	$21,217	$3,788	18%	$2,454,134,151
San Diego Metro Area	1,359,521	130,270	10%	$319	$382	$63	$16,562	$19,845	$3,282	17%	$427,582,333
San Francisco Metro Area	2,104,256	292,096	14%	$372	$466	$94	$19,329	$24,227	$4,898	20%	$1,430,811,479
San Jose Metro Area	930,078	87,977	9%	$358	$429	$71	$18,609	$22,314	$3,704	17%	$325,887,650

Industry Violation Rates

Minimum wage violation rates by industry are shown for the areas of interest in **Charts 3a-3h** on the following pages. **Workers employed by private households** (e.g., nannies, housecleaners, groundskeepers, and other forms of domestic work) **are the most likely to be paid below the state minimum wage in all four areas of interest**, as well as the most likely to be paid below the primary metro minimum wage in the Los Angeles, San Jose, and San Francisco MSAs. Other high-violation sectors across all areas of interest include **food services and drinking places** and **personal and laundry services**, as well as **administrative and support services**, **retail trade**, **social assistance** and **arts, entertainment and recreation**. The vast majority of high-violation industries identified in these areas are service-based, with several key exceptions including **textile and apparel manufacturing** in Los Angeles and **food manufacturing** in both San Diego and San Francisco. While agriculture appears to have particularly high violation rates in several areas studied, the small size of the industry in these largely urban areas and correspondingly small amount of data from farmworkers results in estimates that, while statistically significant, have large confidence intervals and must be interpreted with caution.

Table 2 below provides examples of highly represented occupations in each of these industries.

Table 2. Highly Represented Occupations in High-Violation Industries

Industry (NAICS)	Occupations
Administrative and Support Services	Janitors and cleaners; Security guards; Laborers and freight, stock and material movers; Landscaping and groundskeeping workers; Customer service representatives; Office clerks; Packers and packagers
Arts, Entertainment, and Recreation	Amusement and recreation attendants; Exercise trainers and group fitness instructors; Food preparation and serving-related occupations; Building and grounds cleaning and maintenance occupations
Food Manufacturing	Meat, poultry and fish cutters and trimmers; packaging and filling machine operators and tenders; food batchmakers; laborers and material movers; bakers
Food Services and Drinking Places	Fast food and counter workers; Waiters and waitresses; Cooks; Food preparation workers; Bartenders; Dishwashers; Hosts and hostesses; Cashiers
Personal and Laundry Services	Hairdressers, Hairstylists, and Cosmetologists; Manicurists and pedicurists; Laundry and dry-cleaning workers; Animal caretakers; Parking attendants; Massage therapists; Skincare specialists; Receptionists and information clerks
Private Households	Childcare workers; Personal care aides; Maids and housekeeping cleaners
Retail Trade	Retail Salespersons; Cashiers; Stock clerks and order fillers; Laborers and material movers; Driver/sales workers and truck drivers
Social Assistance	Home health and personal care aides; Preschool teachers; Childcare workers; Social and human service assistants; Teaching assistants
Textile, Apparel and Leather Manufacturing	Sewing machine operators; Textile machine setters, operators, and tenders; Inspectors, testers, sorters, samplers, and weighers; Shoe and leather workers

Chart 3a. Minimum Wage Violation Rates by Industry, Los Angeles (State MW), 2014-2023

Industry	Rate
Private households	29.6%
Agriculture	21.1%
Personal and laundry services	16.3%
Textile, apparel, and leather manufacturing	16.3%
Food services and drinking places	14.6%
Administrative and support services	11.0%
Retail trade	10.5%
Social assistance	10.1%
Waste management and remediation…	8.3%
Membership associations and organizations	8.2%
Paper and printing	7.9%
Repair and maintenance	7.8%
Real estate	7.8%
Plastics and rubber products	7.7%
Transportation and warehousing	7.5%
Arts, entertainment, and recreation	7.3%
Furniture and fixtures manufacturing	7.3%
Accommodation	7.2%

Chart 3b. Minimum Wage Violation Rates by Industry, Los Angeles (LA MW), 2014-2023

Industry	Rate
Private households	37.5%
Agriculture	34.1%
Food services and drinking places	25.9%
Textile, apparel, and leather manufacturing	24.9%
Personal and laundry services	22.2%
Retail trade	18.0%
Administrative and support services	17.2%
Social assistance	17.1%
Plastics and rubber products	15.3%
Furniture and fixtures manufacturing	15.2%
Repair and maintenance	14.5%
Food manufacturing	14.1%
Accommodation	12.7%
Transportation and warehousing	12.4%
Arts, entertainment, and recreation	12.3%

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Chart 3c. Minimum Wage Violation Rates by Industry, San Diego (State MW), 2014-2023

Industry	Rate
Private households	16.7%
Personal and laundry services	12.6%
Food services and drinking places	10.9%
Administrative and support services	9.3%
Membership associations and organizations	8.6%
Arts, entertainment, and recreation	7.5%
Retail trade	7.5%
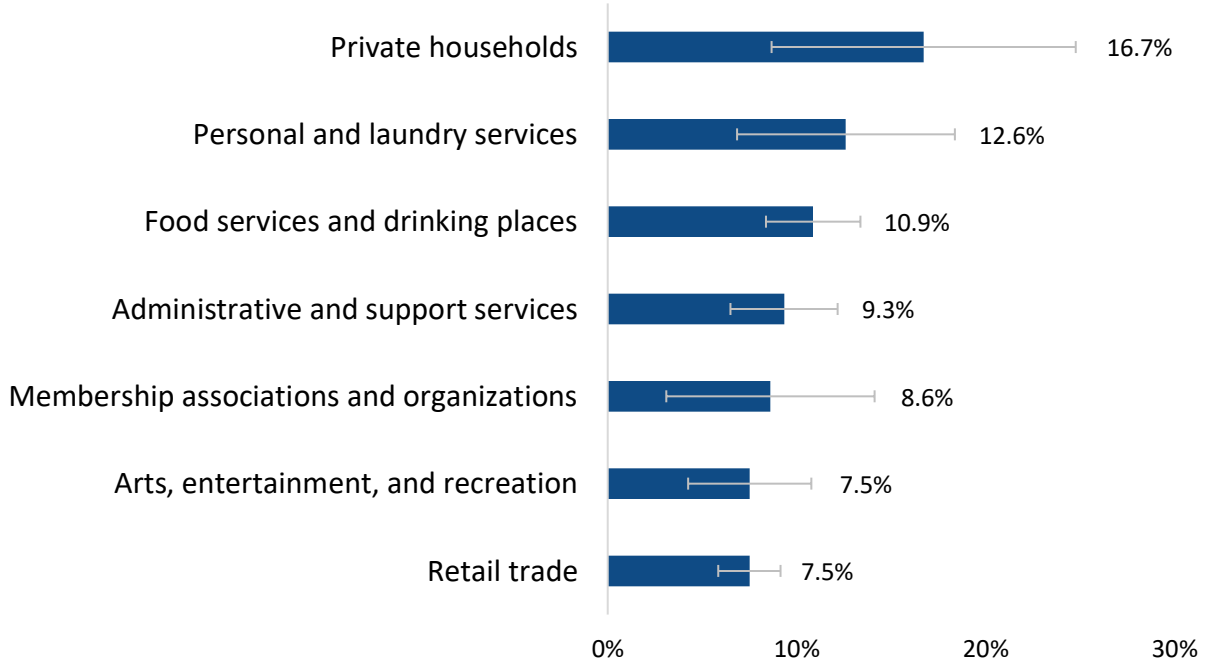
Chart 3d. Minimum Wage Violation Rates by Industry, San Diego (SD MW), 2014-2023

Industry	Rate
Agriculture	34.1%
Food manufacturing	32.0%
Private households	31.9%
Food services and drinking places	23.2%
Personal and laundry services	22.3%
Retail trade	17.7%
Administrative and support services	17.1%
Membership associations and organizations	15.8%
Social assistance	12.1%
Arts, entertainment, and recreation	11.5%
Repair and maintenance	11.1%
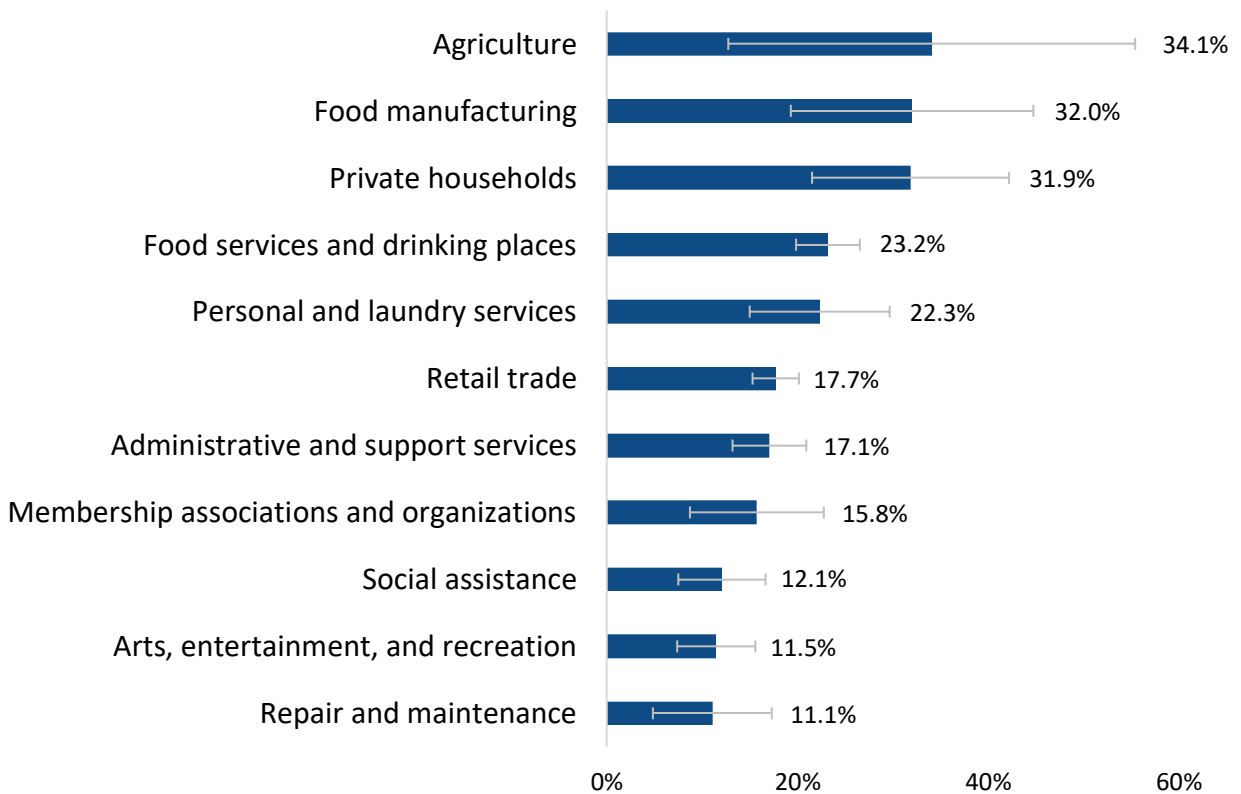
Chart 3e. Minimum Wage Violation Rates by Industry, San Francisco (State MW), 2014-2023

Industry	Rate
Private households	25.6%
Food services and drinking places	10.4%
Personal and laundry services	9.8%
Social assistance	9.3%
Administrative and support services	8.6%
Retail trade	7.2%
Food manufacturing	6.4%
Arts, entertainment, and recreation	6.0%
Real estate	6.0%
Membership associations and organizations	5.7%
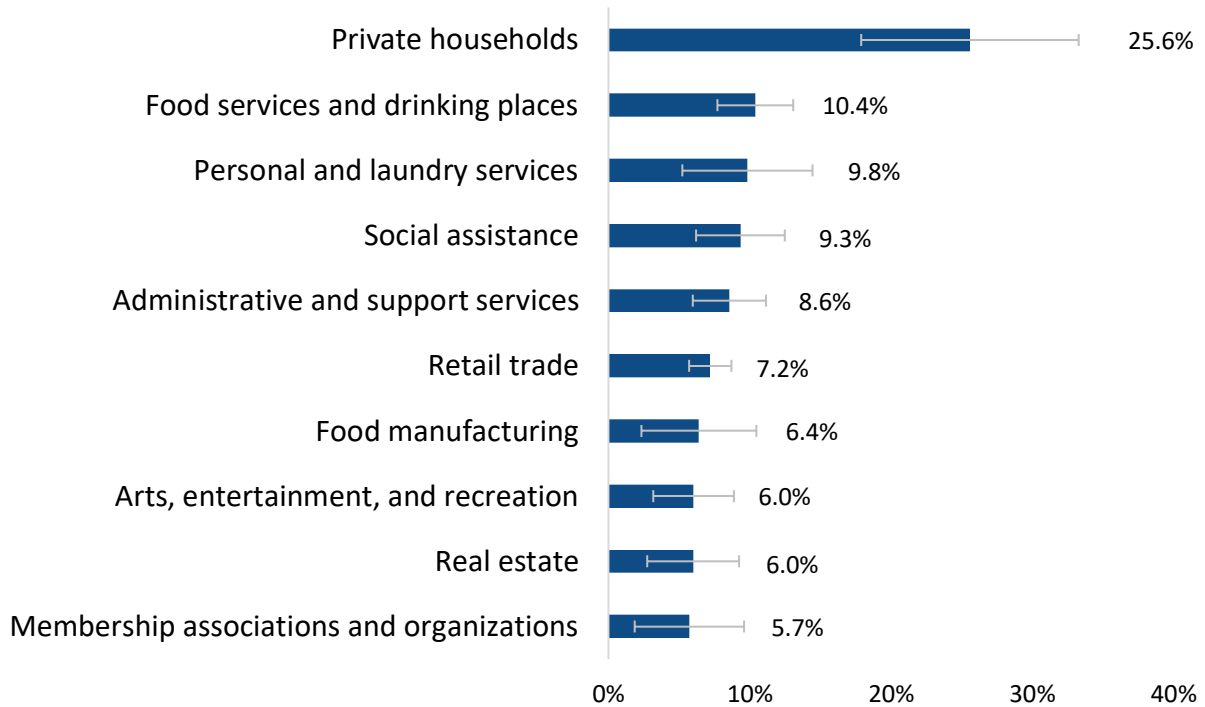
Chart 3f. Minimum Wage Violation Rates by Industry, San Francisco (SF MW), 2014-2023

Industry	Rate
Private households	56.9%
Food services and drinking places	38.8%
Personal and laundry services	31.6%
Retail trade	28.8%
Agriculture	27.6%
Administrative and support services	26.2%
Food manufacturing	23.5%
Arts, entertainment, and recreation	22.4%
Social assistance	21.6%
Textile, apparel, and leather manufacturing	19.6%
Paper and printing	18.7%
Accommodation	18.0%
Transportation and warehousing	17.6%

Chart 3g. Minimum Wage Violation Rates by Industry, San Jose (State MW), 2014-2023

Private households	28.1%
Personal and laundry services	15.6%
Administrative and support services	7.7%
Food services and drinking places	7.2%
Transportation and warehousing	6.7%

0% 5% 10% 15% 20% 25% 30% 35% 40% 45% 50%

Chart 3h. Minimum Wage Violation Rates by Industry, San Jose (SJ MW), 2014-2023

Private households	54.6%
Agriculture	39.1%
Personal and laundry services	29.6%
Food services and drinking places	27.1%
Accommodation	24.3%
Administrative and support services	18.1%
Retail trade	18.1%
Arts, entertainment, and recreation	16.5%

0% 20% 40% 60% 80%
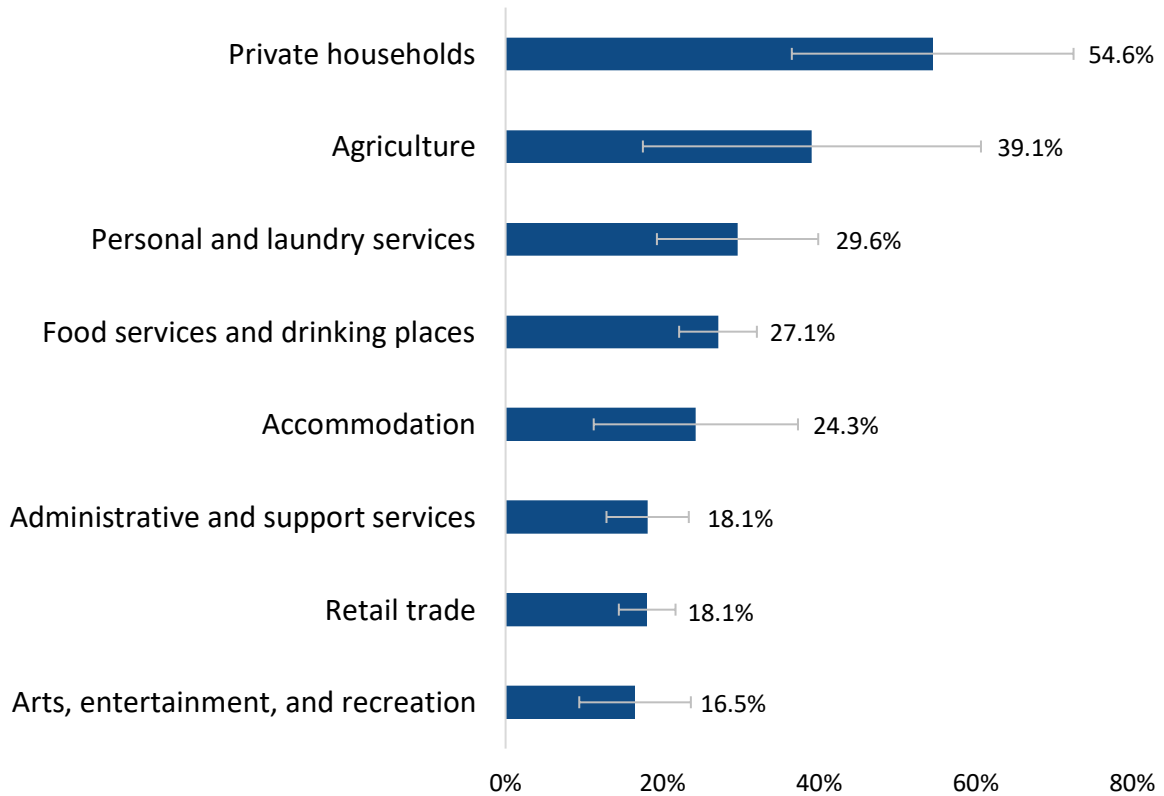
Individual and Job Characteristics

These data do not tell us *why* some industries and occupations have more or fewer violations. Still, it is worth noting that the industries with the highest estimated violation rates tend to employ many women, people of color, and immigrant workers, while industries with lower violation rates often employ more men and/or historically have been more unionized; these patterns point to discrimination and occupational segregation as potential explanations. To assess the likelihood that any given worker would suffer a minimum wage violation, we generate and compare predicted probabilities across demographic groups (see **Charts 4a-4d** on the following pages). For people of color, the reference group is white workers; for women, it's men; for noncitizens, the reference group is citizens, and so on.

The greatest disparities in minimum wage violation rates across the factors studied is education status. **Workers without a college degree** are **4-5 times more likely** in the **San Jose** and **San Francisco** areas—and **3-4 times more likely** in the **Los Angeles** and **San Diego areas—**to experience minimum wage violations.

Part-time workers are over **3 times as likely as full-time workers** to experience minimum wage violations in both the **San Diego** and **San Francisco** areas, and **between 2-3 times as likely** in the **Los Angeles** and **San Jose** areas.

Hourly workers in both the **San Jose** and **San Francisco** areas are **4 times as likely** to be paid underneath the applicable metro area minimum wage rate than non-hourly workers.

Both **Black and Latinx workers are more likely than white workers to experience minimum wage violations across all areas**. Latinx workers are nearly three times as likely as white workers to experience minimum wage violations in the San Jose area. Black workers in the San Jose area are paid under the San Jose minimum wage at around 2.3 times the rate of white workers, yet are paid underneath the state minimum wage at nearly 4 times the rate of white workers, suggesting that violations of black workers on average are of greater depth than those of white workers.[2]

Women are more likely than men to be paid under the minimum wage across all areas studied. Women are 30 percent more likely than men in Los Angeles, 40 percent more likely in San Diego, 50 percent more likely in San Francisco, and roughly 70-80 percent more likely in San Jose to experience a minimum wage violation.

Noncitizens are roughly **60 to 70 percent more likely** to experience a minimum wage violation than citizens in both **Los Angeles** and **San Diego**, and around **50 percent more likely** to experience a violation in **San Francisco** (no significant different was found between these groups in San Jose).

For a comparison of these individual characteristics across metro areas, see **Appendix III**.

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[2] The only statistically significant difference found between Asian workers and white workers was in Los Angeles, where Asian workers are around 20 percent more likely to be paid under the Los Angeles minimum wage rate than white workers.

Chart 4a. Minimum Wage Violation Rate by Individual Characteristic (vs. Reference Group), Los Angeles MSA, 2014-2023
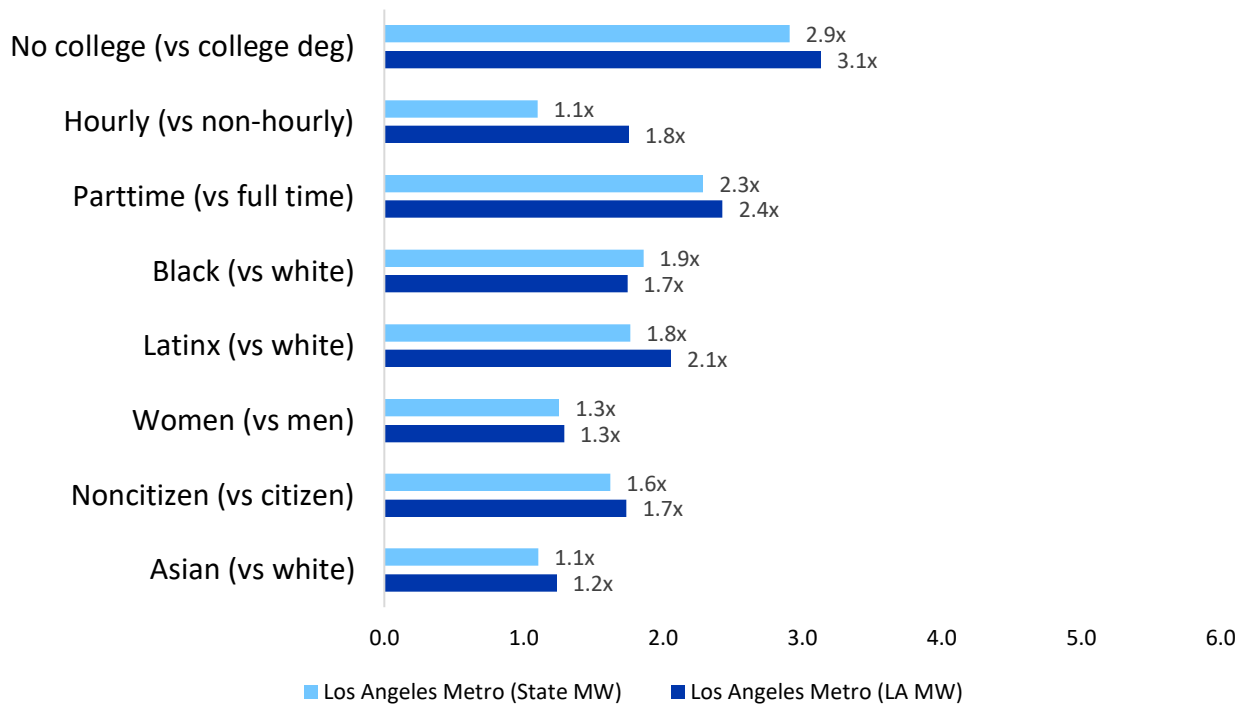
Characteristic	Los Angeles Metro (State MW)	Los Angeles Metro (LA MW)
No college (vs college deg)	2.9x	3.1x
Hourly (vs non-hourly)	1.1x	1.8x
Parttime (vs full time)	2.3x	2.4x
Black (vs white)	1.9x	1.7x
Latinx (vs white)	1.8x	2.1x
Women (vs men)	1.3x	1.3x
Noncitizen (vs citizen)	1.6x	1.7x
Asian (vs white)	1.1x	1.2x

■ Los Angeles Metro (State MW) ■ Los Angeles Metro (LA MW)

Chart 4b. Minimum Wage Violation Rate by Individual Characteristic (vs. Reference Group), San Diego MSA, 2014-2023
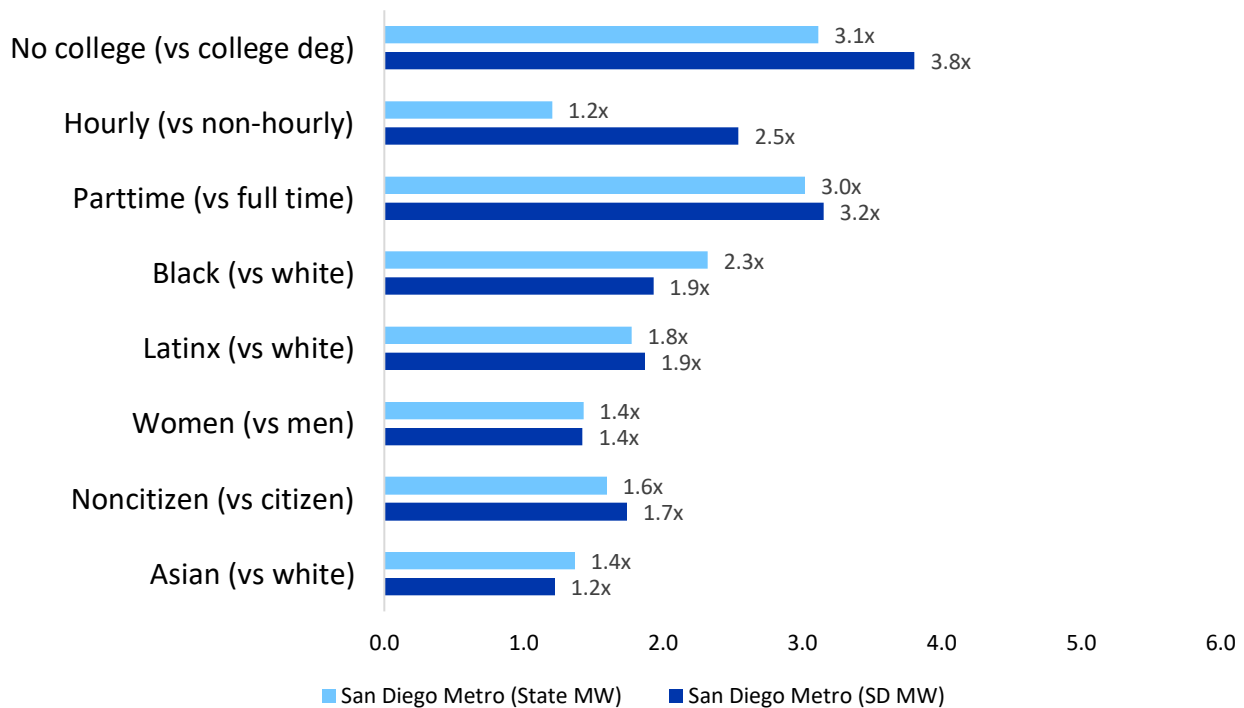
Characteristic	San Diego Metro (State MW)	San Diego Metro (SD MW)
No college (vs college deg)	3.1x	3.8x
Hourly (vs non-hourly)	1.2x	2.5x
Parttime (vs full time)	3.0x	3.2x
Black (vs white)	2.3x	1.9x
Latinx (vs white)	1.8x	1.9x
Women (vs men)	1.4x	1.4x
Noncitizen (vs citizen)	1.6x	1.7x
Asian (vs white)	1.4x	1.2x

■ San Diego Metro (State MW) ■ San Diego Metro (SD MW)

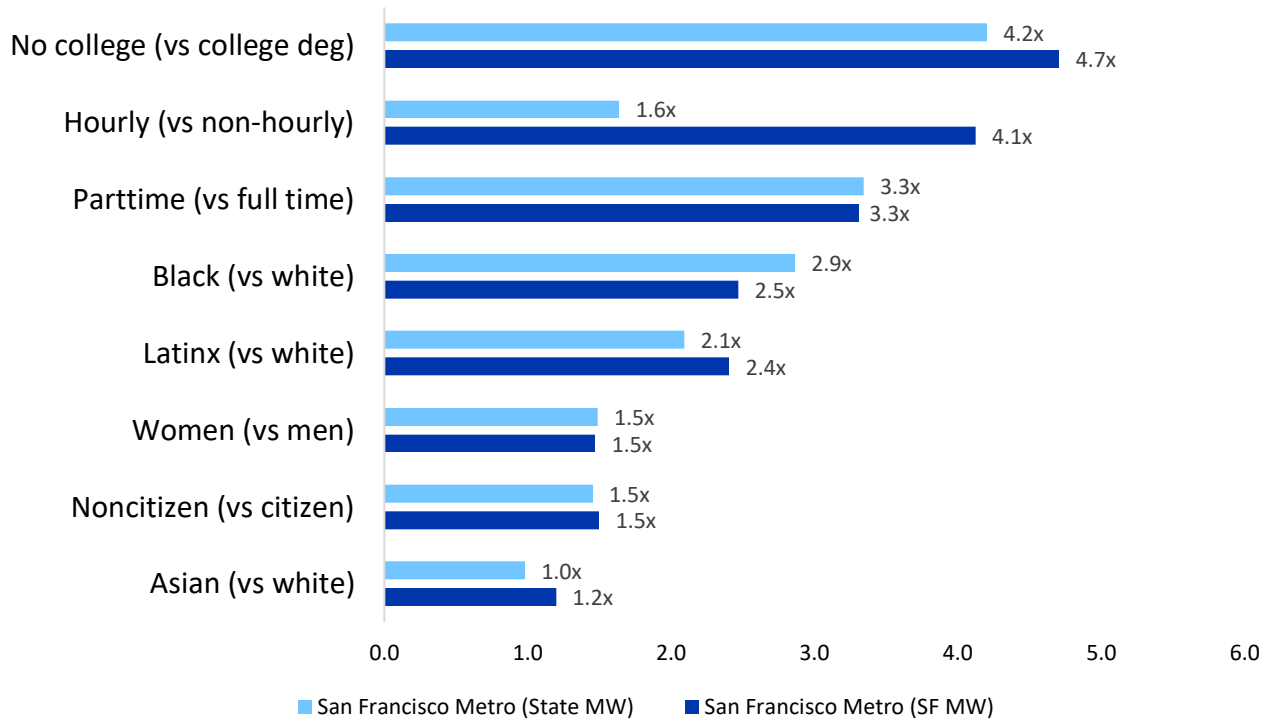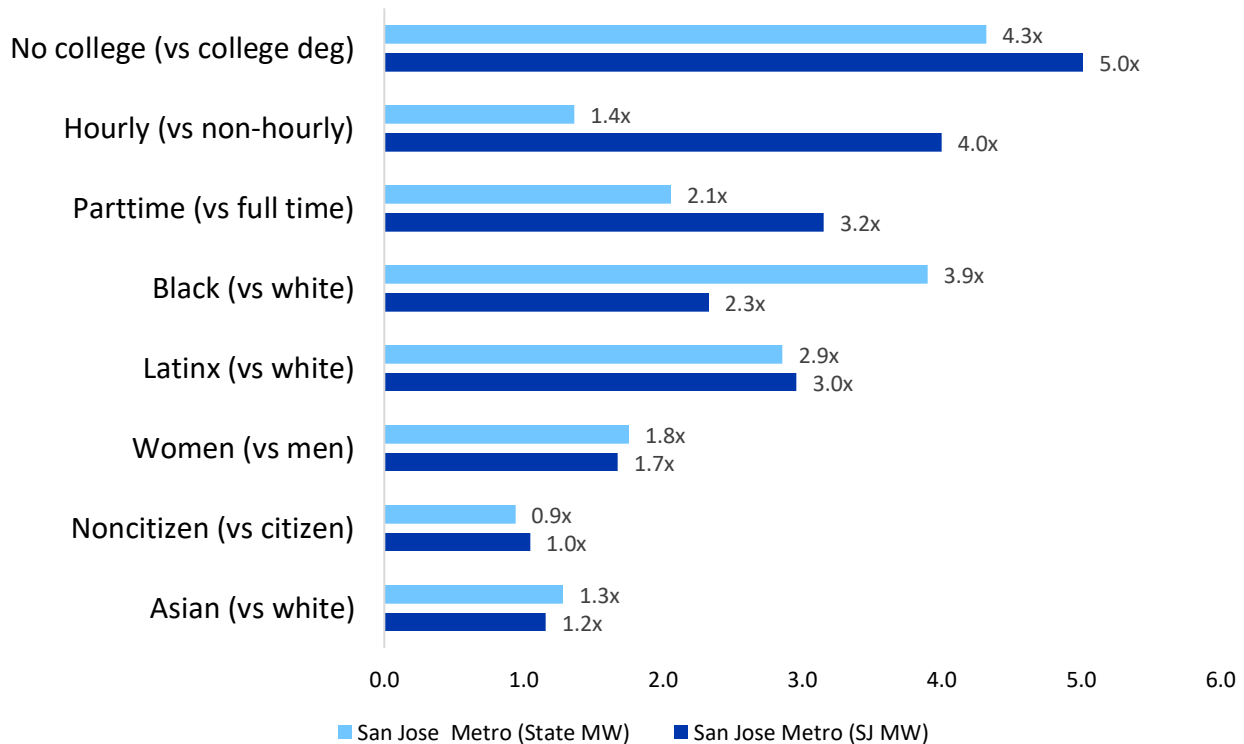**Chart 4c. Minimum Wage Violation Rate by Individual Characteristic (vs. Reference Group), San Francisco MSA, 2014-2023**

No college (vs college deg): 4.2x / 4.7x
Hourly (vs non-hourly): 1.6x / 4.1x
Parttime (vs full time): 3.3x / 3.3x
Black (vs white): 2.9x / 2.5x
Latinx (vs white): 2.1x / 2.4x
Women (vs men): 1.5x / 1.5x
Noncitizen (vs citizen): 1.5x / 1.5x
Asian (vs white): 1.0x / 1.2x

■ San Francisco Metro (State MW)   ■ San Francisco Metro (SF MW)

Chart 4d. Minimum Wage Violation Rate by Individual Characteristic (vs. Reference Group), San Jose MSA, 2014-2023

No college (vs college deg): 4.3x / 5.0x
Hourly (vs non-hourly): 1.4x / 4.0x
Parttime (vs full time): 2.1x / 3.2x
Black (vs white): 3.9x / 2.3x
Latinx (vs white): 2.9x / 3.0x
Women (vs men): 1.8x / 1.7x
Noncitizen (vs citizen): 0.9x / 1.0x
Asian (vs white): 1.3x / 1.2x

■ San Jose Metro (State MW)   ■ San Jose Metro (SJ MW)

Older and particularly younger workers are more likely to be paid below the applicable minimum rate compared to mid-career workers across all areas studied, regardless of minimum rate applied (see **Chart 5** below). More than a quarter of workers under the age of 24 are paid under the applicable metro rate in Los Angeles, San Diego and San Jose, while over 40% of young workers are paid below the San Francisco minimum wage in the San Francisco metro area (between 8 and 14 percent of these workers are paid below the lower state minimum wage, depending on the area). Anywhere from 12% to 18% of workers over 65 are estimated to be paid below the applicable metro areas, while anywhere from 4 to 9 percent of these workers are paid below the state minimum.

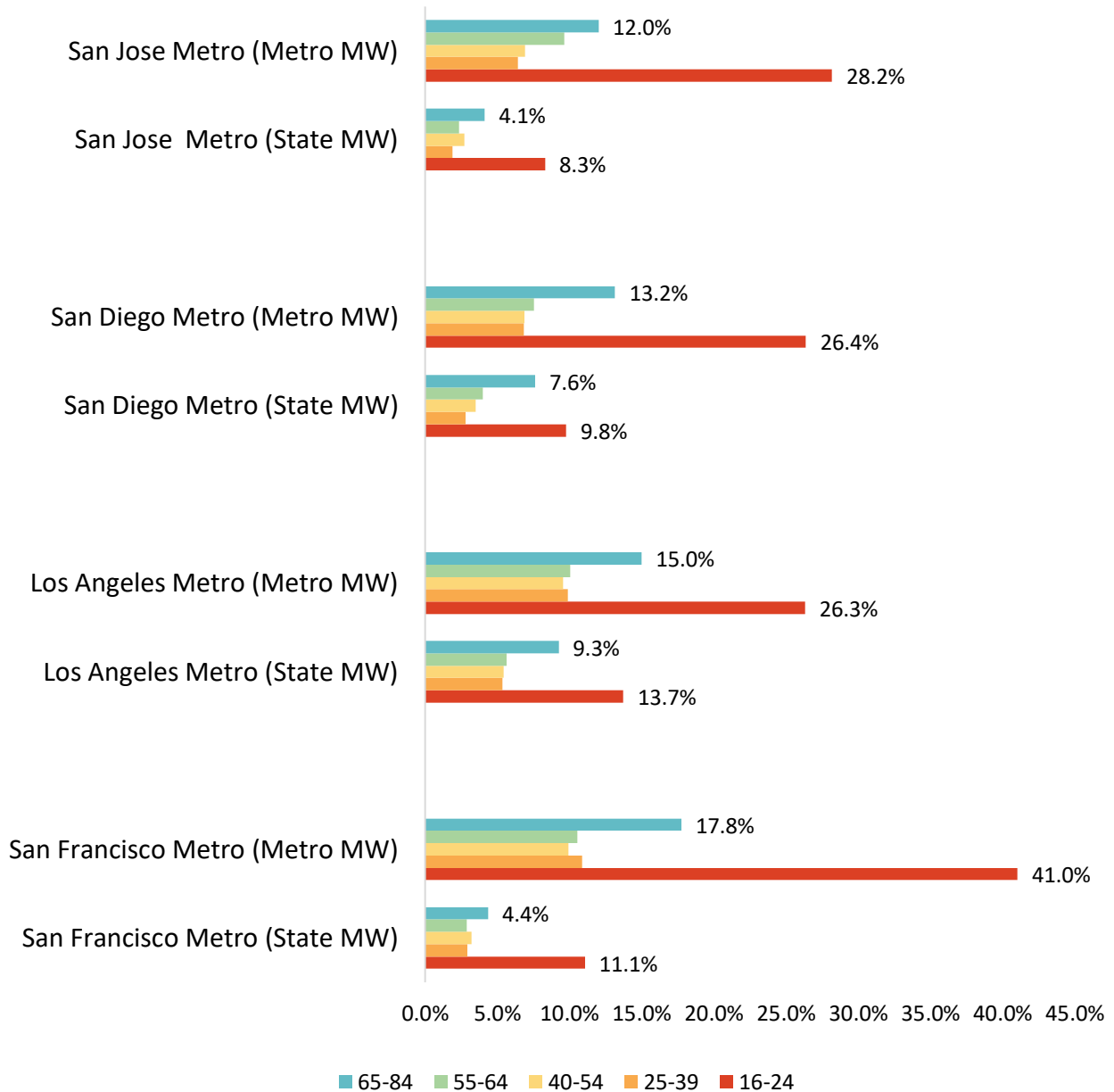**Chart 5. Minimum Wage Violation Rate by Age Group, 2014-2023**

Table 3. Employment Projections by Industry & Area, 2020-2030

NAICS	Industry	Statewide		Los Angeles-Long Beach-Glendale MD (Los Angeles County)		San Diego-Carlsbad-San Marcos MSA (San Diego County)		San Francisco-Redwood City-S. San Francisco MD (San Francisco County)		Oakland-Hayward-Berkeley MD (Alameda/Contra Costa Counties)		San Jose-Sunnyvale-Santa Clara MSA (San Benito/Santa Clara Counties)	
		Numeric Change 2020-2030	% Change	Numeric Change 2020-2030	% Change	Numeric Change 2020-2030	% Change	Numeric Change 2020-2030	% Change	Numeric Change 2020-2030	% Change	Numeric Change 2020-2030	% Change
	Total, All Industries	2,843,700	16.0%	701700	15.7%	269500	18.0%	228500	19.4%	187000	16.0%	210800	18.0%
722	Food Services and Drinking Places	475,500	42.4%	136,100	45.8%	52,000	49.1%	41,400	68.3%	33,100	49.3%	26,400	45.8%
561	Administrative and Support Services	239,100	23.9%	46,600	19.7%	21,700	27.8%	11,800	21.9%	8,800	15.9%	11,700	21.0%
624	Social Assistance	222,200	26.4%	89,400	33.2%	10,200	19.1%	15,600	31.0%	15,200	26.5%	9,100	21.7%
71	Arts, Entertainment, and Recreation	133,600	64.3%	38,800	59.8%	11,800	61.8%	7,300	52.1%	7,300	62.4%	n/a	n/a
44-45	Retail Trade	93,100	6.1%	44,700	11.8%	16,700	12.5%	6,100	8.9%	10,700	10.6%	8,500	11.6%
812	Personal and Laundry Services	66,300	50.3%	20,500	50.6%	6,700	45.3%	6,600	68.8%	4,700	57.3%	n/a	n/a
814	Private Households	500	1.5%	-200	-1.6%	200	8.0%	200	4.3%	100	4.5%	200	10.0%

MD = Metropolitan Division. MSA = Metropolitan Statistical Area. Source: CA Employment Development Department.

Conclusion

Worker justice advocates have established some of the most forward-thinking labor standards policies in the country. State and local enforcement agencies are further engaged in some of the most forward-thinking enforcement practices in the country. And yet, as this report shows, wage theft remains an urgent problem across California's major metro areas. These findings support the importance of local agencies that can tailor enforcement practices to particular sectors and geographic areas—including building relationships with the organizations that are most connected to these workforces—with the goal of maximizing impact on compliance. These concerning levels of wage theft are likely to persist without active intervention. As shown in **Table 3**, the seven high-violation industries discussed above are projected to account for over 1.2 million new jobs from 2020 to 2030.

About the Authors

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About WJL@RU

The workplace justice lab@RU exists to address economic inequality through supporting and strengthening grassroots organizing and democratic governance. We do this through building dynamic communities of learning and practice, carrying out cutting edge research, and offering specialized training and in-depth one-on-one consultations.

At the lab, we go beyond talking about what government should do, to focusing on how government should do it. Through our strengthening labor standards enforcement program, we work to reimagine the public enforcement of workers' rights laws. By proactively targeting the sectors with the worst problems and involving those directly impacted in enforcement, we help agencies realize the intended impact of innovative labor standards legislation.

Appendix I. Data & Methodology

Measuring the scope and depth of "wage theft" is difficult. No single data source systematically and reliably tracks the incidence of wage theft and records the precise amounts of money that are not being paid. Early studies of minimum wage compliance used data provided voluntarily by employers to the Bureau of Labor Statistics (e.g., Zucker 1973), but employer-reported data is not reliable, as employers who violate the law cannot be trusted to report that information to government agencies.

Workers can report wage theft by filing lawsuits and/or lodging complaints with federal, state, and local enforcement agencies. But lawsuits are often too expensive for minimum-wage workers and the costs of litigation frequently exceed the amounts of back pay owed. Complaints are also problematic measures because the workers who are more likely to be exploited are also more likely to be unaware of their right to complain (whether due to language barriers, lack of information and knowledge, or fear of retaliation, termination, or deportation). Lawsuits and the complaints government agencies receive thus provide inaccurate and unreliable portraits of the actual number of violations. We must therefore turn to alternative methods to more accurately detect and measure violations. Survey data on hours and earnings are invaluable in this regard, as they enable us to estimate the true underlying incidence wage violations indirectly.

Most useful is the Current Population Survey's Merged Outgoing Rotation Groups (CPS-MORG) data, which the U.S. Department of Labor's Wage and Hour Division uses to identify "priority industries" for investigations and which remains the top choice of every social scientist who has sought to develop national or industry-specific estimates of FLSA noncompliance since the 1970s.[3]

The CPS-MORG data has many advantages: it is gathered via extensive interviews with around 60,000 households per month; it is representative at the state and national levels (unlike other survey data, such as the Survey of Income and Program Participation [SIPP]); and its individual-level responses permit us to estimate earnings and minimum wage violations relatively easily. The biggest downside is measurement error, as with any survey.

The methodological approach employed here is consistent with previous research.[4] A few key points to keep in mind:

Wage variable
For hourly wages, we use variables that include wages earned from overtime, tips, and commissions (OTC) for both hourly and nonhourly workers.[5] Wage estimates are therefore conservative over-estimates that effectively downward-bias the estimated minimum wage violation rates. This is preferable to the alternative, however, which excludes OTC for hourly workers while including it for nonhourly workers (for whom different sources of wages are not distinguished). Efforts to estimate and subtract OTC from nonhourly workers adds unknown quantities of additional measurement error to this key variable, and is not recommended.[6]

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[3] Ashenfelter and Smith 1979; Ehrenberg and Schumann 1982; Sellekaerts and Welch 1984; Trejo 1991, 1993; Fry and Lowell 1997; Weil and Pyles 2005; U.S. Department of Labor 2014; ERG 2014; Galvin 2016; Cooper and Kroeger 2017.
[4] In particular, Galvin 2016; U.S. Department of Labor 2014; Cooper and Kroeger 2017.
[5] http://ceprdata.org/cps-uniform-data-extracts/cps-outgoing-rotation-group/.
See also Cooper and Kroeger's 2017 preference for this method of estimating wages.
[6] U.S. Department of Labor 2014.

To ensure our estimates of wage violations are conservative underestimates, we follow Cooper and Kroeger (2017) in taking the higher of the reported wage (hourly wage or weekly pay divided by hours worked) for hourly workers who reported both hourly and weekly earnings.

Calculating minimum wage violations
Minimum wage violations are dichotomous measures of whether an individual's estimated hourly wage was lower than the applicable legal minimum. We use the applicable statutory minimum wage rate for each respondent as of the date (month) effective. For each jurisdiction, we use the lowest applicable minimum wage (e.g., for small businesses with fewer than 25 employees rather than large businesses), as CPS data does not identify firm size. As discussed in the introduction, we estimate violations using both the (lower) state minimum wage rate and the (higher) primary metro area minimum wage rate (the cities of Los Angeles, San Francisco, San Jose, and San Diego).

"Amount lost" is calculated based on the applicable minimum wage as of the date (month) effective.

Exemptions
We implement (and exclude from the analysis) all respondents who we can identify as exempt from state and local minimum wages. In California, identifiable exemptions constitute a miniscule fraction of the estimated total workforce (.04%). Identifiable exemptions include only "outside salespeople." We are unable to identify immediate family members, apprentices, "learners" in their first 160 hours of employment in a new field, and mentally or physically disabled employees.

Sample size restrictions
Small sample sizes in some jurisdictions limited the inclusion of certain industries, as there were not sufficient observations to generate reliable estimates. Industries were only included if their point estimates were statistically distinguishable from zero.

Survey weights and standard errors
All analyses, including population estimates, use the survey weights suggested by Davern et. al (2007), which are necessary given the sampling method of the CPS.

Measurement error
There is reason to believe that measurement error in the CPS may downward-bias the estimates of minimum wage violations.[7] First, despite going to great lengths to reach them, both Hispanics (Latinx) and undocumented immigrants are underrepresented in the CPS.[8] Because workers in these groups are at higher risk of experiencing minimum wage violations, the estimates of violations reported here should be considered conservative estimates.[9] Second, in Bollinger's study of measurement error in the CPS, he finds a "high over reporting of income for low-income men" driven by "about 10% of the reporters who grossly over report their income," thus potentially

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[7] For an excellent discussion of the advantages and limitations of using the CPS data to estimate minimum wage violations given the existence of measurement error and other issues, see U.S. Department of Labor 2014, Appendix B.

[8] McKay 1992. As Bernhardt et al. 2009 write: "standard surveying techniques—phone interviews or census-style door-to-door interviews—rarely are able to fully capture the population that we are most interested in: low- wage workers who may be hard to identify from official databases, who may be vulnerable because of their immigration status, or who are reluctant to take part in a survey because they fear retaliation from their employers. Trust is also an issue when asking for the details about a worker's job, the wages they receive, whether they are paid off the books or not, and their personal background" (56).

[9] McKay 1992; Bernhardt et al. 2009; U.S. Department of Labor 2014.

biasing estimates downward even further.[10] Third, CPS data have a shortage of low-wage workers and an excess of high-wage workers relative to comparable survey data like SIPP; one effect of this imbalance could be to underestimate minimum wage violations.[11] Roemer does find that the CPS reaches more "underground" workers than other large-scale surveys and is less biased than alternatives.[12] But given the high rates of violation discovered in the Bernhardt et al. 2009 innovative survey of hard-to-reach workers in the "informal" labor market—higher than the estimates presented here—there is reason to suspect that these findings underestimate the prevalence of minimum wage violations across the board.[13] These considerations notwithstanding, the fact that measurement error surely exists recommends using caution when working with the point estimates reported.

To address measurement error and conduct sensitivity tests, following ERG (2014), Galvin (2016), and Cooper and Kroeger (2017):
- Exclude unemployed and self-employed workers
- Exclude all observations of workers not specifying hourly/nonhourly status
- Exclude observations of nonhourly workers with weekly earnings less than $10
- Exclude observations of workers with hourly wages less than $1
- Exclude respondents with imputed hours
- Exclude proxy respondents (sensitivity test)
- Violation only if less than applicable minimum wage minus $0.25 (sensitivity test)

The relative violation rates remain extremely similar in all sensitivity tests.

Race variable
Racial and ethnic categories are mutually exclusive. We follow CEPR and EPI in the construction of the race variable. "Black" includes those who identify as Black-white; Black-American Indian; Black-Asian; Black-Hawaiian/Pacific Islander; white-Black-American Indian; white-Black-Asian; white-Black-Hawaiian/Pacific Islander; Black-American Indian-Asian; and white-Black-American Indian-Asian. "Asian" includes those who identify as Asian & Hawaiian/Pacific Islander; white-Asian; white-Hawaiian/Pacific Islander; American Indian-Asian; American Indian-Hawaiian/Pacific Islander; Asian-Hawaiian/Pacific Islander; white-American Indian-Asian; white-American Indian-Hawaiian/Pacific Islander; white-Asian-Hawaiian/Pacific Islander; white-American Indian-Asian-Hawaiian/Pacific Islander. "Other" includes American Indian (only); white-American Indian; other 3 races; other 4 and 5 races. "Hispanic" includes those who identify as Mexican, Mexican-American, Mexicano/Mexicana, Chicano/Chicana, Mexican (Mexicano), Mexicano/Chicano, Puerto Rican, Cuban, Dominican, Salvadoran, Other Hispanic, Central/South American, Central American, (excluding Salvadoran), South American, and any of these categories *and* white, Black, Asian, or Other. See: https://microdata.epi.org/variables/demographics/wbhao/

According to the CPS, "noncitizen" includes any person born outside the U.S. who is not a naturalized U.S. citizen (e.g., refugee, asylee, undocumented immigrant legal permanent resident), not born in Puerto Rico, and does not have parents who are U.S. citizens.

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[10] Bollinger 1998.

[11] Roemer 2002; U.S. Department of Labor 2014.

[12] Roemer 2002.

[13] Bernhardt et al. 2009.

Data
We use the IPUMS CPS-MORG abstracts generated by Flood et al. 2020.

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Appendix II. Minimum Wage Rates used in Study
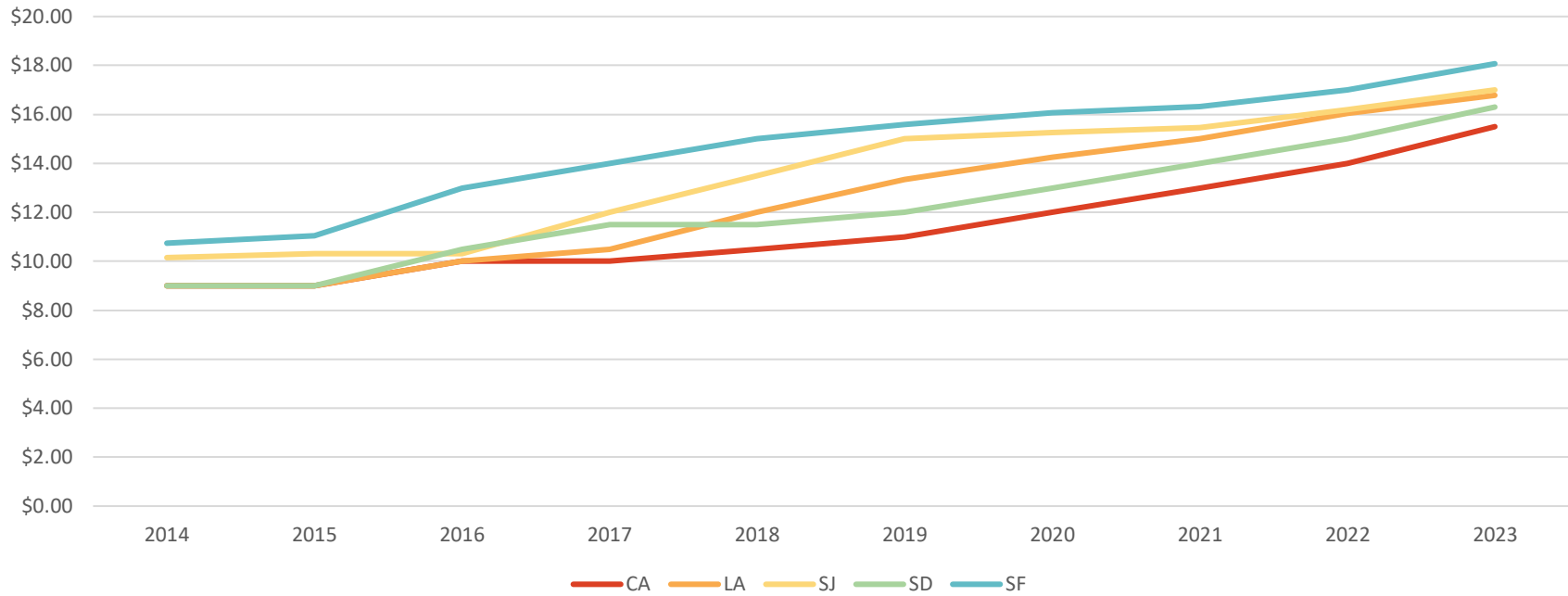
Year	CA	LA	SJ	SD	SF	Average	Average growth
2014	$9.00	$9.00	$10.15	$9.00	$10.74	$9.58	
2015	$9.00	$9.00	$10.30	$9.00	$11.05	$9.67	0.96%
2016	$10.00	$10.00	$10.30	$10.50	$13.00	$10.76	11.27%
2017	$10.00	$10.50	$12.00	$11.50	$14.00	$11.60	7.81%
2018	$10.50	$12.00	$13.50	$11.50	$15.00	$12.50	7.76%
2019	$11.00	$13.35	$15.00	$12.00	$15.59	$13.39	7.10%
2020	$12.00	$14.25	$15.25	$13.00	$16.07	$14.11	5.42%
2021	$13.00	$15.00	$15.45	$14.00	$16.32	$14.75	4.53%
2022	$14.00	$16.04	$16.20	$15.00	$16.99	$15.65	6.05%
2023	$15.50	$16.78	$17.00	$16.30	$18.07	$16.73	6.93%

Appendix III. Relative Violation Rates by Individual Characteristic

No college (vs college deg)
- 5.0x
- 4.3x
- 3.8x
- 3.1x
- 3.1x
- 2.9x
- 4.7x
- 4.2x

Hourly (vs non-hourly)
- 4.0x
- 1.4x*
- 2.5x
- 1.2x*
- 1.8x
- 1.1x*
- 4.1x
- 1.6x

Parttime (vs full time)
- 3.2x
- 2.1x
- 3.2x
- 3.0x
- 2.4x
- 2.3x
- 3.3x
- 3.3x

Black (vs white)
- 2.3x
- 3.9x
- 1.9x
- 2.3x
- 1.7x
- 1.9x
- 2.5x
- 2.9x

Latinx (vs white)
- 3.0x
- 2.9x
- 1.9x
- 1.8x
- 2.1x
- 1.8x
- 2.4x
- 2.1x

Women (vs men)
- 1.7x
- 1.8x
- 1.4x
- 1.4x
- 1.3x
- 1.3x
- 1.5x
- 1.5x

Noncitizen (vs citizen)
- 1.0x*
- 0.9x*
- 1.7x
- 1.6x
- 1.7x
- 1.6x
- 1.5x
- 1.5x

Asian (vs white)
- 1.2x*
- 1.3x*
- 1.2x*
- 1.4x*
- 1.2x
- 1.1x*
- 1.2x*
- 1.0x*

Legend:
- San Jose Metro (Metro MW)
- San Jose Metro (State MW)
- San Diego Metro (Metro MW)
- San Diego Metro (State MW)
- Los Angeles Metro (Metro MW)
- Los Angeles Metro (State MW)
- San Francisco Metro (Metro MW)
- San Francisco Metro (State MW)

*not statistically significant

X-axis: 0.0 1.0 2.0 3.0 4.0 5.0 6.0