



# Changing Workforce Demographics and Workplace Injury Frequency

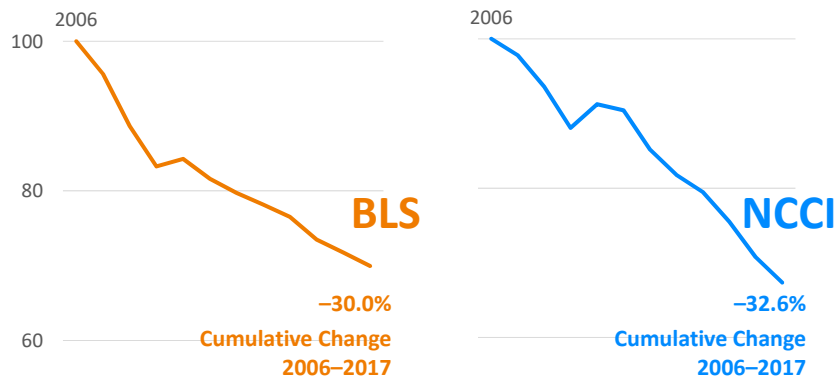
Presented by:  
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Economist

CAS RPM Seminar  
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## Workplace Injury Frequency Has Declined in Public Data and Private Data

Index 2006 = 100



Source: US Bureau of Labor Statistics; NCCI

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## Relationship of Demographics and Frequency

- How much are demographics changing?
- How different is frequency by worker characteristics?
- Do changing demographics help explain overall frequency decline?



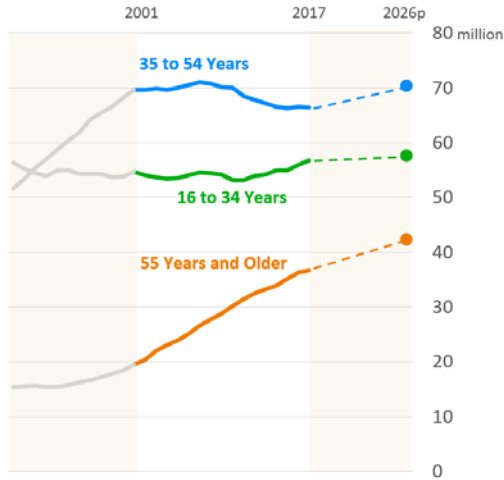
## Changing Demographics: Overview

- Workforce Aging
- Gender Distribution
- Sector Mix
  
- How much are these changing?
- How do they interact?



## The US Has Added Many Older Workers

Labor Force by Age Group, 1990–2017



2026p indicates BLS projection of the labor force for 2026  
Source: IPUMS-CPS; US Bureau of Labor Statistics

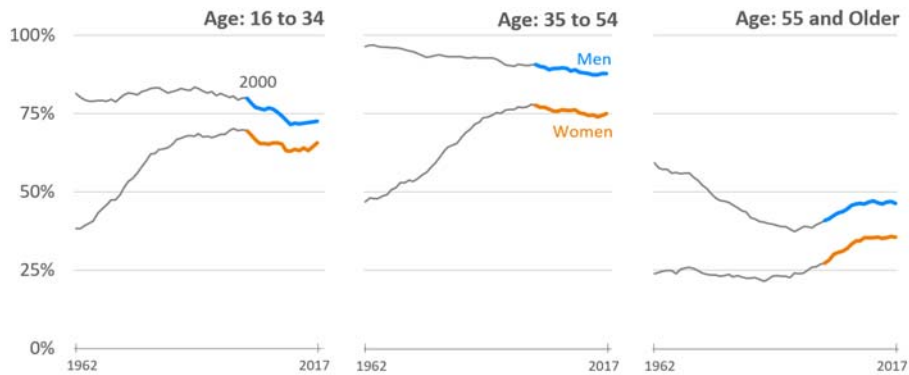
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## Labor Force Participation: Trends for Men and Women

Labor Force Participation Rates by Age Group and Gender, 1962–2017



Source: IPUMS-CPS

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## Sector Employment by Gender

Economic Sector	millions		
	Employment 2016	Proj. Growth 2016–2026	Female Share 2016
Education and Health Services	22.6	+4.5	76.4%
Financial Activities	8.3	+0.5	53.2%
Other Services	6.4	+0.4	52.1%
Leisure and Hospitality	15.6	+1.3	51.3%
Professional and Business Services	20.1	+2.2	41.6%
Trade, Transportation and Utilities	27.2	+0.9	39.0%
Information	2.8	+0.1	38.9%
Manufacturing	12.3	-0.7	28.8%
Mining	0.6	+0.1	13.6%
Construction	6.7	+0.9	9.7%
All Sectors	122.8	+10.0	46.1%

Source: US Bureau of Labor Statistics, SOII

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## Sector Trends

	2006	2016	2026
<b>Goods</b>	<b>19.5%</b>	<b>16.0%</b>	<b>15.0%</b>
Manufacturing	12.3%	10.1%	8.7%
Construction	6.7%	5.5%	5.7%
Mining	0.5%	0.5%	0.5%
<b>Services</b>	<b>80.5%</b>	<b>84.0%</b>	<b>85.0%</b>
Trade, Transportation and Utilities	22.8%	22.2%	21.2%
Education and Health Services	15.8%	18.4%	20.4%
Professional and Business Services	15.2%	16.4%	16.8%
Leisure and Hospitality	11.4%	12.7%	12.8%
Financial Activities	7.3%	6.7%	6.6%
Other Services	5.4%	5.2%	5.1%
Information	2.6%	2.3%	2.1%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>

Source: US Bureau of Labor Statistics, SOII

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## How Demographics and Frequency Interact

- Incidence Rates (=BLS DAFW cases per 10K workers) vary by demographics
  - Younger workers now have lower rates than older workers
  - Men have higher rates than women, mostly because of contact injuries
  - Incidence rates vary widely by sector



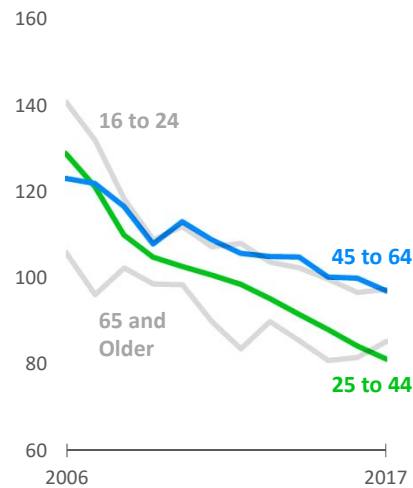
## How Demographics and Frequency Interact

- Even so, frequency decline is driven primarily by changes within each group
  - Demographic change is slower than frequency decline
  - Demographic change is not uniformly increasing the proportion of low-frequency groups



## Injury Frequency by Age

Cases/10k FTEs



Source: US Bureau of Labor Statistics, SOII

- Incidence rates are now lower for younger prime-age workers (25-44) than older (45-64), and the gap has widened in the last ten years
- Until 2008, younger workers had higher incidence rates
  - The crossing is a continuation of a longer-term trend
- The youngest (oldest) workers still tend to have high (low) incidence rates

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## Age and Type of Work

- Do these changes reflect different types of jobs done by younger and older workers?
- At a high level, not much evidence of this:
  - Sector mix adjustments result in very similar differentials
  - Younger and older workers have different injury mix, but younger workers' injury rates are falling faster for each type of injury

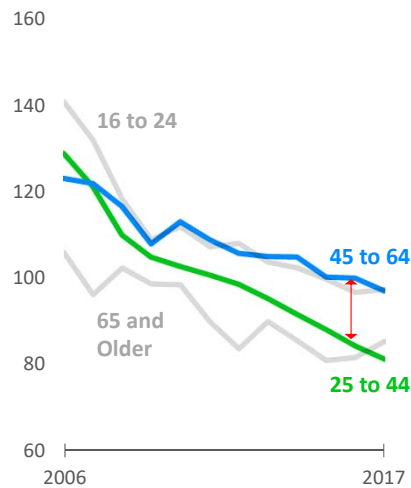
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## Injury Frequency by Age

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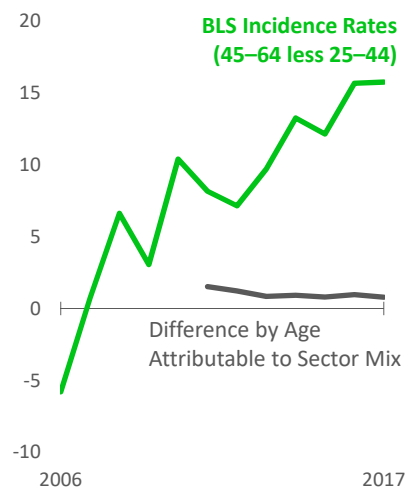
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## Injury Frequency by Age

Cases/10k FTEs



Source: US Bureau of Labor Statistics, SOII

- Younger workers are slightly more likely to work in Prof. & Bus. Services; Leisure & Hosp.
- Older workers are slightly more likely to work in Mfg.; Ed. & Health; Trade, Trans. & Util.
- Sector mix does not explain frequency differences between younger and older workers

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## Cause of Injury by Age - Distribution

The Relative Share of Injuries by Cause Varies by Age

	Age Ranges						
	16-19	20-24	25-34	35-44	45-54	55-64	65+
Fall/slip/trips	20%	17%	19%	21%	25%	33%	44%
Contact	42%	39%	32%	27%	24%	21%	22%
Overexertion	23%	30%	35%	40%	39%	35%	24%
Other	15%	14%	14%	13%	12%	11%	10%
Total	100%	100%	100%	100%	100%	100%	100%

Source: US Bureau of Labor Statistics, SOII

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## Cause of Injury by Age – Change over Time

Frequency Percentage Decline From 2006 to 2017 by Age Range and Cause

	Age Ranges				
	20-24	25-34	35-44	45-54	55-64
Fall/slip/trips	33%	37%	30%	17%	13%
Contact	37%	39%	40%	28%	24%
Overexertion	43%	41%	42%	27%	18%

20 to 44 Years | 45 to 64 Years

Younger Workers Experienced  
Larger Frequency Declines  
for Each Cause of Injury

Source: US Bureau of Labor Statistics, SOII

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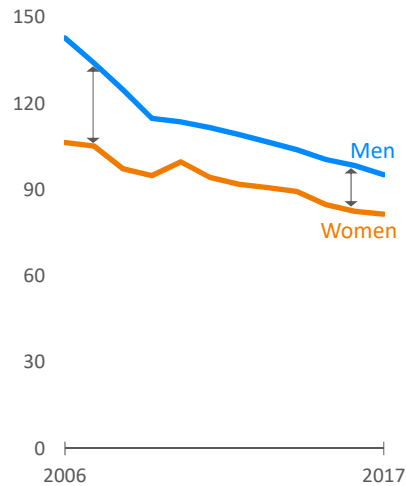
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## Injury Frequency by Gender

Cases/10k FTEs



Source: US Bureau of Labor Statistics, SOI

- Men have higher incidence rates, but the difference has been cut approximately in half
- Different sector mixes for men and women explain part of the gap, but not the majority
- By cause of injury, the largest difference is men's higher rates of contact injuries

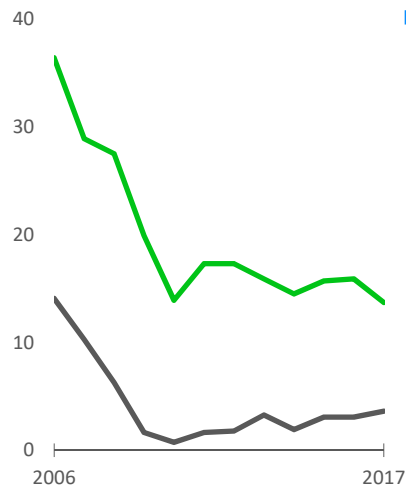
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## How Much Does Sector Mix Explain?

Cases/10k FTEs



Source: US Bureau of Labor Statistics, SOI

- Sector mix partly explains the gender gap in frequency from 2006–2009 (esp. Construction) but is a small factor thereafter

BLS Incidence Rates:  
(Men less Women)

Difference by Gender  
Attributable to Sector Mix

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## Frequency by Gender and Cause

Year	Overall Rate		Percent Men Vary from Women by Injury Type			
	Men	Women	Overall	Contact	Overexertion	Fall/slip/trips
2006	142.8	106.4	34%	134%	20%	-9%
2007	134.1	105.2	27%	117%	18%	-9%
2008	124.8	97.3	28%	126%	18%	-17%
2009	114.8	94.9	21%	95%	16%	-16%
2010	113.6	99.7	14%	85%	9%	-20%
2011	111.6	94.3	18%	112%	9%	-17%
2012	109.2	91.9	19%	96%	20%	-20%
2013	106.6	90.7	18%	101%	16%	-18%
2014	103.9	89.4	16%	94%	13%	-17%
2015	100.5	84.8	19%	98%	19%	-14%
2016	98.4	82.5	19%	95%	20%	-16%
2017	95.2	81.5	17%	80%	18%	-16%

Source: US Bureau of Labor Statistics, SOII

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## Frequency by Sector

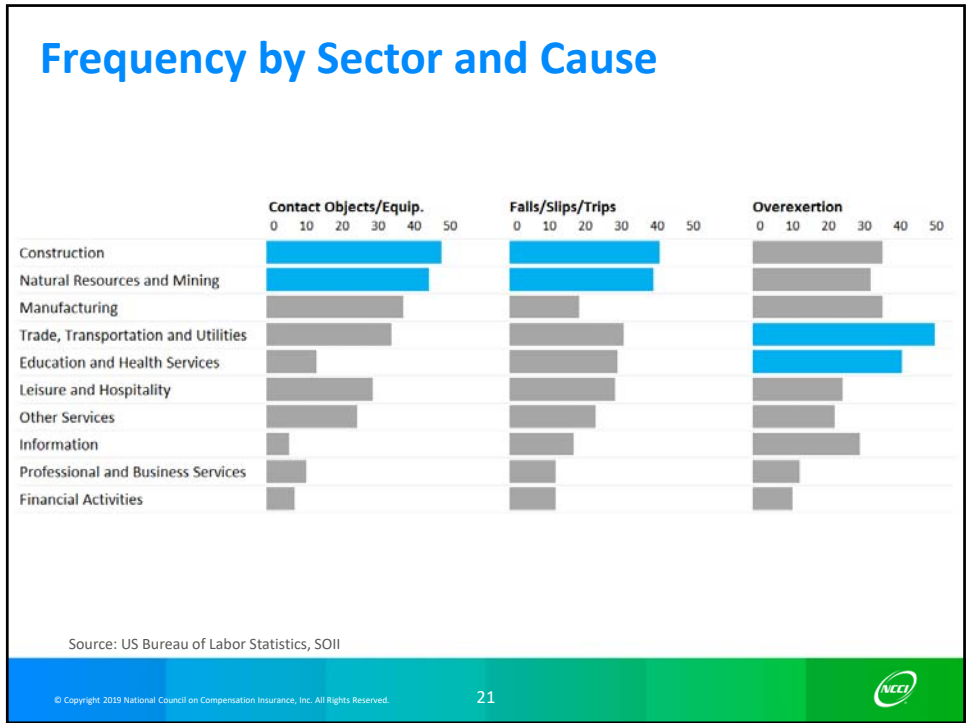
NAICS Supersector	Average Frequency			Annualized Decrease 2006-2017
	2006-2009	2010-2013	2014-2017	
Construction	185.5	149.7	131.1	4.2%
Natural Resources and Mining	156.7	143.1	129.8	2.3%
Trade, Transportation and Utilities	149.6	132.0	123.7	2.3%
Education and Health Services	133.5	123.3	106.2	2.8%
Manufacturing	124.6	107.4	97.5	3.0%
Leisure and Hospitality	104.3	103.8	94.4	1.2%
Other Services	97.3	89.7	79.3	2.5%
Information	67.9	65.5	57.5	2.0%
Professional and Business Services	63.7	53.8	46.9	3.8%
Financial Services	45.3	40.2	37.1	2.5%
Overall	117.4	103.5	93.2	2.8%

Source: US Bureau of Labor Statistics, SOII

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- ## Summary of Demographics/Frequency
- Younger prime-age workers have lower injury frequency than older workers, a reversal from 10 years ago
  - Men have higher injury frequency than women, but the gap shrunk considerably between 2006 and 2010
  - Goods-producing sectors, such as Construction and Manufacturing, have higher injury frequency than most service sectors
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## Do Demographics Drive Frequency Decline?

- No! Frequency decline is mainly the result of lower incidence rates for all workers, not the result of changing workforce demographics
- Frequency has dropped at an annualized rate of 1%–4% for workers in each category by age, gender, or sector
- The aging workforce has had almost no net effect on frequency decline
- Increased proportions of female and service sector workers push frequency downward a little bit



## What If Demographics Were Fixed?

- We can calculate counterfactual frequencies holding worker characteristics fixed at 2006 levels
- Workforce aging has mixed effects, as older workers are no longer monotonically lower-frequency than younger workers
- Increasing the proportion of women and service workers pushes frequency down, but not much.



## Counterfactual Frequency by Year

BLS Incidence Rates with Constant 2006 Distributions

	Actual
2006	127.8
2007	122.2
2008	113.3
2009	106.4
2010	107.7
2011	104.3
2012	101.9
2013	99.9
2014	97.8
2015	93.9
2016	91.7
2017	89.4

**Age:** the aging workforce does not explain frequency decline

**Gender:** changing gender mix does not explain frequency decline

**Sector:** changing sector mix does not explain frequency decline either

Source: US Bureau of Labor Statistics, SOI



## Summary

- Work injury frequency has declined by almost one-third between 2006 and 2017
- Incidence rates and causes of injury vary meaningfully by worker characteristics: age, gender and sector
- Changing patterns of frequency by age and gender are not primarily driven by differences in sector mix
- Changing demographics do not explain frequency decline in recent years



## Injury Frequency by 10-Year Age Range

Year	Age Ranges						
	16-19	20-24	25-34	35-44	45-54	55-64	65+
2006	134.2	142.9	126.1	131.5	123.6	122.1	106.0
2007	124.0	134.4	118.4	123.9	123.0	119.9	96.2
2008	115.9	119.1	109.0	111.0	116.6	116.7	102.4
2009	100.8	111.1	100.6	109.1	108.6	106.8	98.7
2010	114.4	111.4	100.1	105.4	115.6	108.9	98.5
2011	105.2	107.8	97.3	104.4	110.5	106.4	90.0
2012	108.9	107.9	98.2	99.1	107.6	103.0	83.7
2013	109.6	102.4	94.2	96.5	105.8	103.9	90.0
2014	104.8	101.9	90.3	93.2	104.0	106.3	85.6
2015	109.2	97.5	85.2	91.4	99.6	101.3	81.0
2016	100.5	95.8	83.8	85.0	97.2	103.9	81.7
2017	111.7	93.8	80.1	82.7	94.7	100.2	85.4
2006-2017	-17%	-34%	-36%	-37%	-23%	-18%	-19%

Source: US Bureau of Labor Statistics, SOII