The Gender Earnings Gap in the Gig Economy

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Gender earnings gap

- Women earn about 20-30% less then men
- 2016 American Community Survey
  - Annual 1% random sample of the population
  - Largest re-occurring survey in the US
  - Ask about work/earnings in the previous year
  - Full-time/full-year workers (30+ hours/week, 50+ weeks/year)
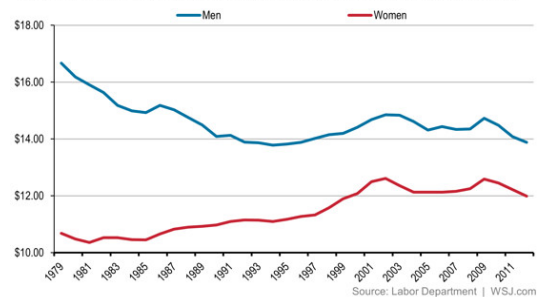 - Ages 18-50

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Results

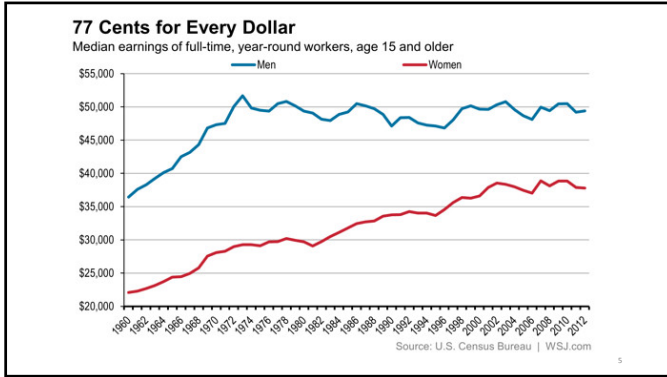|	Men	Women	Ratio: W/M
Observations	345,612	262,695	
Mean annual earnings	$63,844	$49,971	0.78
Median annual earnings	$44,000	$35,000	0.76
Mean of hourly wage	$26.88	$21.97	0.82
Median of hourly wage	$19.61	$17.16	0.88

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86 Cents for Every Dollar
Median hourly earnings of wage and salary workers paid hourly rates, inflation adjusted

Source: Labor Department | WSJ.com

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77 Cents for Every Dollar
Median earnings of full-time, year-round workers, age 15 and older

Source: U.S. Census Bureau | WSJ.com

Questions to consider

- Do wages = productivity?
- Why might this be the case?
- What is discrimination?
- How can we hold all else constant?

Top 10 Industries for Men and Women

| Men			Women		
Industry	% of workers	Avg. annual earnings	Industry	% of workers	Avg. annual earnings
Computer system designs	3.3%	$110,605	Hospitals	9.5%	$60,226
Hospitals	2.6%	$90,885	Insurance carriers	3.0%	$59,738
Arch., eng. and rel. services	1.6%	$83,719	Offices of Physicians	2.2%	$59,174
Justice, order, safety activities	3.5%	$67,456	Banking and related services	2.3%	$56,681
Colleges/universities	1.9%	$64,901	Colleges/universities	3.0%	$55,623
Motor vehicle manufacturing	1.5%	$60,445	Justice, order, safety activities	1.9%	$53,101
Elem/Secondary schools	2.8%	$55,697	Outpatierent care centers	2.2%	$50,333
Construction	10.0%	$53,455	Elem/Secondary schools	9.8%	$47,854
Truck transportation	1.7%	$52,123	Nursing care facilities	2.2%	$37,620
Restaurants/food service	3.9%	$35,143	Restaurants/food service	4.2%	$28,438

Top 10 Occupations for Men and Women

Men			Women		
Occupation	% of workers	Avg. annual earnings	Occupation	% of workers	Avg. annual earnings
Software developer	1.7%	$114,935	Manager	2.5%	$81,227
Manager	3.5%	$104,540	Accountants/auditors	2.0%	$67,775
Sales rep	1.3%	$90,124	Registered nurse	4.3%	$63,757
Supervisor -- retail	2.4%	$58,395	Elem/Middle school teacher	4.3%	$49,636
Retail sales	1.9%	$51,455	Supervisor -- retail	2.3%	$41,979
Driver	3.5%	$47,187	Secretary/admin assistant	3.9%	$37,913
Construction laborer	1.9%	$39,123	Customer service rep	2.5%	$36,870
Laborer (moving, stock, freight)	2.1%	$35,318	Home health aid	2.3%	$27,558
Janitor	1.6%	$34,760	Waiter/waitress	2.0%	$24,444
Cooks	1.6%	$25,642	Cashier	2.7%	$23,821

Hold things constant

- Work 50+ weeks
- Work 30+ hours/week
- Work in the same occupation and industry
  - Cashier/retail stores
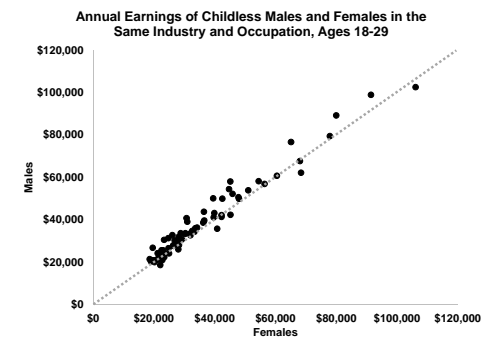 - Laborer/construction
  - Nurse/hospital

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Average Annual Earnings in 2015 by Sex, Full-Time/Full-Year Workers in the Same Occupation and Industry
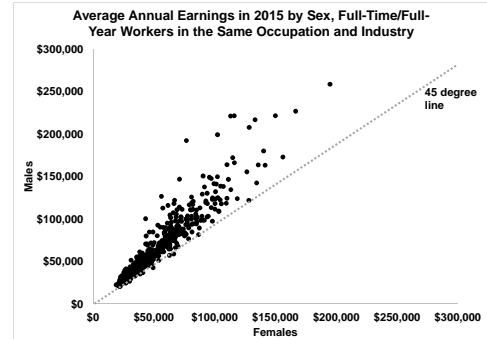
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Ln(annual earnings) regression, 18-45

Independent variable	Males (R²=0.565)	Females (R²= 0.577)
Age	0.051 (39.0)	0.060 (42.0)
Age²	-0.00047 (-24.3)	-0.00062 (-29.7)
1 child	0.034 (11.5)	-0.020 (-7.41)
2 children	0.082 (28.2)	-0.007 (-2.62)
3 children	0.073 (19.6)	-0.039 (-10.1)
4 children	0.059 (11.5)	-0.055 (-9.2)
HS grad	0.141 (34.1)	0.084 (14.0)
Some college	0.211 (47.8)	0.135 (22.1)
BA/BS	0.395 (82.9)	0.347(55.1)
Grad degree	0.555 (100.7)	0.531 (78.8)
Married	0.102 (42.0)	0.058 (26.9)

(t-tests in parentheses)

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Annual Earnings of Childless Males and Females in the Same Industry and Occupation, Ages 18-29

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Gig economy

- Characteristics
  - Divide work into small pieces
  - Independent workers
  - Real-time markets
  - Low barriers to entry
- Size
  - 15% do primarily independent work
  - 30% do some independent work
- Very flexible work arrangements

Uber pay

- Chicago
  - $1.70/trip
  - $0.20/mile
  - $0.95/mile
- Some extras
  - Surge pricing
  - Bonus payments for reaching # trip threshold
  - Only 9% of earnings
- Key point: Earnings are productivity in this case

Hourly pay

$$p(\cdot) = 60 * \left(\frac{SM \left(r_b + d_1 r_d + 60 * \frac{d_1 r_t}{s} \right) + I}{w + 60 * \frac{d_0 + d_1}{s}} \right)$$

- r_b r_d r_t are base fare, per-mile and per-minute rates
- SM = surge multiplier
- d_0 = distance between accepts and pickup
- d_1 = distance on trip
- s = speed
- w = wait time
- I = per trip incentive

Data

- Weekly earnings for all drivers, January 2015 – March 2017
- UberX and UberPOOL
- Size
  - 741 million trips
  - 24.9 million driver weeks
  - 196 cities
  - 1.877 million drivers
  - 27.3% females
- For each week
  - Total earnings
  - Hours worked (total time APP is on)

Table 1: Basic summary statistics, all US drivers

	All	Men	Women
Weekly earnings	$376.38	$397.68	$268.18
Hourly earnings	$21.07	$21.28	$20.04
Hours per week	17.06	17.98	12.82
Trips per week	29.83	31.52	21.83
6 month attrition rate	68.1%	65.0%	76.5%
Number of drivers	1,873,474	1,361,289	512,185
Number driver/weeks	24,832,168	20,210,399	4,621,760
Number of Uber trips	740,627,707	646,965,269	93,662,438

33% lower earnings and 6% lower wages for females

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Figure 1: Average hourly earnings, US

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$$\ln(Earnings_{dt}) = \beta_0 + \beta_1 isMale_d + \rho X_{dt} + \epsilon_d$$

Table 2: National gender pay gap

	(1) log(weekly earnings)	(2) log(weekly earnings)	(3) log(hourly earnings)	(4) log(hourly earnings)
isMale	0.4142	0.4092	0.0702	0.0653
	(0.002)	(0.002)	(0.001)	(0.001)
Intercept	4.9737	4.9208	2.9280	2.8849
	(0.002)	(0.002)	(0.001)	(0.001)
City	X	X	X	X
Week		X		X
N	24,877,588	24,877,588	24,877,588	24,877,588
Drivers	1,877,252	1,877,252	1,877,252	1,877,252
R^2	0.125	0.136	0.199	0.239

Note: This table documents the gender pay gap for all US cities from January 2015 to March 2017. Data are at the driver-week level; weekly earnings is the entire pay for a given week, while hourly earnings is the pay divided by hours worked in the week. Standard errors (clustered at the driver-level) in parentheses.

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Data for Chicago

- Hold city and prices constant
- 33 million driver hours
- 120K drivers, 30% are female
- Place driver in a 3 mile x 3 mile geohash where they pick up a passenger
  - Holds location constant
 - Men may work in different geographies than females

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Table 4: Parameter averages

|	Men	Women	Difference
w – Wait time (min)	8.223 (0.008)	8.218 (0.019)	-0.005
d_0 – Accepts-to-pickup distance (mi)	0.485 (0.000)	0.500 (0.001)	0.015
d_1 – Trip distance (mi)	5.035 (0.003)	4.875 (0.006)	0.160
s – Speed (mph)	19.532 (0.006)	18.760 (0.012)	0.772
SM – Surge multiplier	1.051 (0.000)	1.046 (0.000)	0.005
I – Incentive payout ($)	0.903 (0.001)	0.818 (0.002)	0.085
Total per-trip payout ($)	10.142 (0.004)	9.841 (0.008)	0.301

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Figure 2: Distribution of driver tenure, January 2017
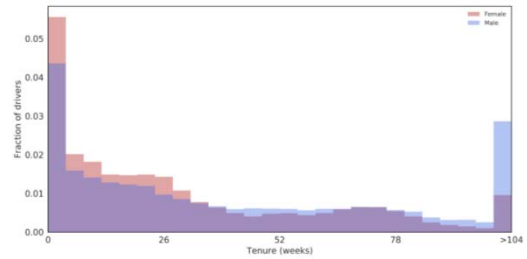
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Figure 4: Returns to experience
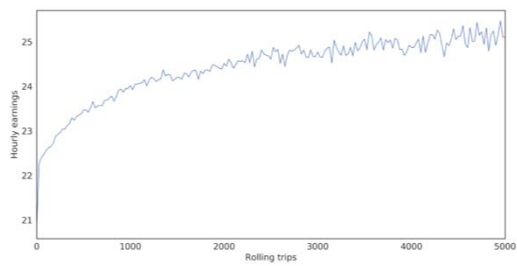
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Table 5: Baseline gender pay gap

Focus on This specification

	(1)	(2)	(3)
isMale	0.0356 (0.003)	0.0302 (0.003)	0.0261 (0.002)
riderCancellations			
driverCancellations			
Intercept	3.0862 (0.003)	3.0912 (0.003)	3.0946 (0.003)
Week	X	X	X
Hour of week		X	
Geohash			X
Geohash*hour of week			
N	11,572,163	11,572,163	11,572,163
R^2	0.039	0.099	0.092

T-statistic is 13

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Table 8: Returns to speed

	(1)	(2)	(3)	(4)	(5)	(6)
IsMale	0.0256	0.0106	0.0101	0.0016	−0.0018	−0.0019
	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
logSpeed	0.2677	0.4552	0.4623	0.2715	0.4544	0.4616
	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Trips completed: 100-500				0.0563	0.0318	0.0321
				(0.001)	(0.001)	(0.001)
Trips completed: 500-1000				0.0819	0.0460	0.0460
				(0.002)	(0.001)	(0.001)
Trips completed: 1000-2500				0.1075	0.0599	0.0594
				(0.003)	(0.002)	(0.002)
Trips completed: >2500				0.1519	0.0831	0.0810
				(0.004)	(0.0003)	(0.003)
Intercept	2.3084	1.7704	1.7502	2.2293	1.7346	1.7083
	(0.003)	(0.004)	(0.006)	(0.005)	(0.004)	(0.004)
Week	X	X	X	X	X	X
Hour of week		X	X		X	X
Geohash		X	X		X	X
Geohash*hour of week			X			X
N	11,572,163	11,572,163	11,572,163	11,572,163	11,572,163	11,572,163
R^2	0.101	0.263	0.282	0.111	0.266	0.284

Note: The table expands on earlier regressions by adding log speed as an explanatory variable. Speed is based on total trip distance and duration in a given driver-hour. The outcome variable is log of hourly earnings. Standard errors (clustered at the driver-level) in parentheses.

T-statistic is -0.9 with 11.6 million obsevations

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