

## I. Abstract

The goal of this study is to compare the causes of variation in the female-male wage ratio across states in the recession year of 2009 and the non-recession year of 2013. The female-male wage ratio is the ratio of females' wages to males' wages. I estimate the effects of education differences between the genders, unionization, and the states' minimum wage on the female-male wage ratio. I find that in both 2009 and 2013, education differences and unionization help to explain variation in the ratio.

## II. Empirical Model and Variables

$$Ratio_{it} = f(\beta_0 + \beta_{it}High + \beta_{it}Bach + \beta_{it}Mast + \beta_{it}Union + \beta_{it}Wage)$$

t= 2009,2013    i= 1...50

### Dependent Variable

Ratio<sub>it</sub>= The ratio of female to male median annual earnings in a state

### Explanatory Variables

#### *Female to Male High School Degree Ratio*

High<sub>it</sub>= is the ratio of females with a high school degree to males with a high school degree in a state converted to percentage terms

#### *Female to Male Bachelor's Degree Ratio*

Bach<sub>it</sub>= is the ratio of females with a bachelor's degree to males with a bachelor's degree in a state converted to percentage terms

#### *Female to Male Master's Degree Ratio*

Mast<sub>it</sub> = is the ratio of females with a master's degree to males with a master's degree in a state converted to percentage terms

#### *Female to Male Union Ratio*

Union<sub>it</sub>= is the ratio of females represented by unions to males represented by unions in a state

#### *Minimum Wage Variable*

Wage<sub>it</sub>= is the minimum wage for each state

### III. Theory and Hypotheses

High  $_{it}$  is hypothesized to have a positive effect on Ratio  $_{it}$  . If there is an increase in the female to male high school degree ratio, then we should see an increase in female earnings compared to males'.

Bach  $_{it}$  is hypothesized to have a positive effect on Ratio  $_{it}$  . If there is an increase in the female to male bachelor's degree ratio, then we should see an increase in female earnings compared to males'.

Mast  $_{it}$  is hypothesized to have a positive effect on Ratio  $_{it}$  . If there is an increase in the female to male master's degree ratio, then we should see an increase in female earnings compared to males'.

Union  $_{it}$  is hypothesized to have a positive effect on Ratio  $_{it}$  . If there is an increase in the female to male union ratio, then we should see an increase in female earnings compared to males'.

Wage  $_{it}$  is hypothesized to have a positive effect on Ratio  $_{it}$  . If there is an increase in the minimum wage, then we should see an increase in female earnings compared to males'.

## IV. Data

### Data Type

Cross section data sets of all 50 states from two different years (2009,2013)

### Data Sources

- *United States Census Bureau*
  - <http://factfinder.census.gov>
    - The United States Census Bureau provided high school graduation data, bachelor's degree data and master's degree data for all 50 states and for both years 2009 and 2013.
- *TruPay*
  - [http://www.trupay.com/pdf/TruPay\\_Minimum\\_Wage\\_Chart\\_2013.pdf](http://www.trupay.com/pdf/TruPay_Minimum_Wage_Chart_2013.pdf)
    - TruPay provided the minimum wages of all 50 states in the year 2013.
- *Labor Law Center*
  - <https://www.laborlawcenter.com>
    - The Labor Law Center provided the minimum wage for all 50 states in the year 2009.
- *Bureau of Labor Statistics*
  - <http://www.bls.gov/>
    - The Bureau of Labor Statistics provided the union representative data for males and females in all of the 50 states for both years 2009 and 2013.
- *Status of Women in the States*
  - <http://statusofwomendata.org/>
    - The Status of Women in the States provided the ratio of median female to male earnings in all 50 states in both years 2009 and 2016.

## V. Empirical Results

Explanatory Variable	Estimated Coefficients (2009)	Prob Value (2009)	Estimated Coefficients (2013)	Prob Value (2013)
HIGH $it$	0.048	0.0000	0.037	0.85
BACH $it$	0.055	0.422	0.20	0.020
MAST $it$	0.073	0.084	-0.077	0.35
UNION $it$	2.87	0.0000	-0.29	0.049
WAGE $it$	-0.0019	0.77	-0.015	0.18
R-Squared=	<b>0.20</b>			<b>0.21</b>

## VI. Conclusions and Implications

- The 2009 regression R-Squared is 0.20. This means the explanatory variables are only accounting for 20% of the variation in the dependant variable Ratio  $it$ . With the coefficients for HIGH  $it$  and UNION  $it$  being statistically significant with one sign reversal.
- The 2013 regression R-Squared is 0.21. This means the explanatory variables are only accounting for 21% of the variation in the dependant variable Ratio  $it$ . With the coefficients for BACH  $t$  and UNION  $t$  being statistically significant with three sign reversals.
- Comparing the results from the years 2009 and 2013, we can clearly see that there is more to the gender pay gap than is captured by my model. But what we did find is that the effects of education and unionization are statistically significant whether in a recession or not.
- The results show how females are better off in recessions than males, due to the fact that male dominant jobs during recessions are shipped overseas