Session 8C: Impact of the Great Recession on the Well-Being of Households II
Time: Friday, August 10, 2012 PM

*Paper Prepared for the 32nd General Conference of*
*The International Association for Research in Income and Wealth*

## Boston, USA, August 5-11, 2012

# The U.S. Gender Gap through the Great Recession using an Alternative Approach to Cyclicality

Joseph Marchand and Sara Olfert

For additional information please contact:

Name: Joseph Marchand
Affiliation: University of Alberta, Canada

Email Address: joseph.marchand@ualberta.ca

# The U.S. Gender Gap through the Great Recession using an Alternative Approach to Cyclicality

JOSEPH MARCHAND *

SARA OLFERT

University of Alberta

revised April 2012

**Abstract**

Annual changes in the U.S. gender gap are analyzed before, during, and after the Great Recession using a quasi-experimental approach, with treatment and comparison groups based on the industry composition within states. During this recession, the hourly wage gap was differentially reduced by seven to ten percentage points in states with a higher concentration of employment in male-dominant and cyclical industries, while the employment gap was differentially reduced by five to seven percentage points. Neither outcome was significantly altered in the years immediately before or after the recession. The evidence supports the pro-cyclicality of the gender gap movements.

Keywords: business cycle, gender gap, Great Recession, quasi-experiment.

JEL Codes: J16, J31, E32.

*Corresponding author. Department of Economics, University of Alberta, 7-29 HM Tory, Edmonton, AB, Canada, T6G 2H4. E-mail: joseph.marchand@ualberta.ca. Phone: 780-492-9425.

# 1 Introduction

The business cycle has been shown to impact the labor outcomes between genders and across industries in predictable ways (Blank, 1989; Solon, Barsky, and Parker, 1994; Shin, 1999). First, the movements in both the real wage and employment are expected to be more pro-cyclical for men than for women. This means that the labor outcomes of males will adjust more to the business cycle than that of females, gaining more in upturns and losing more in recessions, and thereby increasing and reducing the gender gaps respectively. Second, the impact of the business cycle is predicted to differ between the real wage and employment outcomes, with a greater adjustment in the gender gap for real wages than for employment.

These predictions are based on the general consensus that males are disproportionately represented in highly cyclical industries, such as construction, whereas women are disproportionately represented in non-cyclical industries, like services.[1] The business cycle will have a greater impact upon the equilibrium labor market outcomes in those industries with more cyclical exposure. Holding labor supply constant, these aggregate shocks will move labor demand relatively more for men than for women, causing a larger outward shift in labor demand during an expansion and a larger inward shift during a contraction. Furthermore, if the short-run labor supply of women is assumed to be more elastic than that of men, a shift of labor demand along a stable short-run labor supply curve would also predict greater wage cyclicality for men but only somewhat greater employment cyclicality.[2]

[1] Park and Shin (2005) show similar pro-cyclical relationships using occupations.

[2] For more detail, please see Shin (1999).

This paper seeks to understand these gender predictions within the context of the Great Recession in the United States. If cyclicality is causing differential changes in the labor outcomes between genders, then it should be clearly visible during this relatively large downturn. It has already been suggested that male workers experienced a steeper rise in joblessness during this particular recession (Elsby, Hobijn, and Sahin, 2010). Assuming that the above predictions hold, the gender gaps in both wages and employment are expected to be reduced during the Great Recession, and the reduction in the gender wage gap should be greater than the reduction in the gender employment gap.

The recent empirical literature measuring the impact of cyclicality upon the gender gap has been mixed in its conclusions. Though a gender wage gap reduction was documented for the 1990-1994 recession in Spain supporting pro-cyclicality (Aller and Arce, 2001), other papers have suggested either no cyclicality (Datta Gupta, Oaxaca, and Smith, 2006) or even counter-cyclicality in the gender gap (Biddle and Hamermesh, 2011). Much of this previous literature has relied solely upon time variation and the correlation between the gender gap and the unemployment rate to identify its estimates, which cannot disentangle policy effects attempting to mitigate unemployment nor identify the effect for one particular cycle.

This paper uses an alternative empirical approach. Building upon this previous literature, a quasi-experimental identification strategy is developed based on the industry composition of states which favor men and have more exposure to the business cycle relative to other states. By using the strict timing of the 2008 recession provided by NBER, the paper shows that the gender gaps in the U.S. are pro-cyclical

with respect to both wages and employment, as there are significant reductions found in the gaps of both outcomes during this time, with a larger reduction in the wage gap than in the employment gap.

# 2 Data and Methodology

The primary data source for this analysis is the March 2008-2011 Current Population Survey (CPS).[3] The sample is restricted to full-time (35 hours or more per week), full-year (48 weeks or more per year), working age (15-64 years old) individuals in non-farm, private wage and salary employment (ex. Altonji and Blank, 1999). These individual observations are aggregated to the state level, with the forty-eight contiguous states plus the District of Columbia serving as the independent observations.

The industry composition within states is used to define its gender dominance and cyclicality, using the industry in which an individual was employed for the longest interval in the base year of 2007. Any aggregate industry where men hold more than two-thirds of the employment is defined as "male-dominant"; these industries include construction (90.05% male), mining (85.36%), and manufacturing (69.49%), which a general consensus would confirm as highly cyclical industries as well.[4] Any aggregate industry where women hold a simple majority of the overall employment is defined as "female-dominant"; these industries include services (62.63% female), finance, insurance, and real estate (56.37%), and retail trade (50.12%), which are also considered as non-cyclical industries.

[3]The particular data used are from the IPUMS-CPS Version 3.0.

[4]The utilities industry, while also being highly male (73.60%), was excluded due to it being a non-cyclical industry.

The "most male-dominant" set of treatment and comparison groups is formed using a descending ranking of states based on the percentage of total employment within the male-dominant and cyclical industries. The "least female-dominant" set is then constructed using an ascending ranking of states based on the percentage of total employment within the female-dominant and non-cyclical industries. Each set of treatment and comparison groups based on the CPS definition contain the top twenty and bottom twenty states in each ranking, respectively, leaving a natural separation of nine buffer states between the two groups. A secondary data source from the Regional Economic Accounts (REA) is then used to form two stricter classifications of states, based on the overlap of the treatment and comparison groups between the CPS and REA definitions.[5] Altogether, these four classifications of states, which are presented in Figure 1, are used to perform multiple quasi-experiments in order to show the robustness of the results within the next section.

The NBER Business Cycle Dating Committee defined the Great Recession of the U.S. as lasting between December 2007 and June 2009. Based on this definition, the four years of March CPS data are used to calculate the annual changes in the gender gaps to fit three spans of time: the before period (March 2007 to 2008), during the Great Recession (March 2008 to 2009), and the after period (March 2009 to 2010).[6] The quasi-experiments are performed separately for each of these periods, in order to determine whether the gender gaps were significantly altered prior to the 2008 recession or whether any trend found during the recession continued, halted, or reversed after the recession.

[5]The REA data do not contain any gender information.

[6]Each survey year of the CPS provides responses regarding the previous year.

# 3 Estimation and Results

In order to estimate the differential effects in the gender gap, difference-in-difference regressions of the following form are run separately across each of the four experiments, over each of the three periods, for two labor outcomes:

$$ln(w_m)_{st} - ln(w_f)_{st} = \alpha + \beta \cdot Treat_s + \gamma \cdot Post_t + \delta \cdot Treat_s * Post_t + \varepsilon_{st}$$

where $ln(w)_{st}$ is the logged value of the labor outcome used to calculate the gender gap between males and females in state $s$ and year $t$, $Treat_s$ is a treatment group binary indicator using the most male-dominant or least female-dominant ranking under the CPS or CPS-REA definition, $Post_t$ is a post-year binary indicator in the before, during, or after period, and $Treat_s * Post_t$ is the interaction of these two binary indicators. The hourly wage rate (annual earnings divided by the product of weeks worked and usual hours worked per week) and the total employment level (count of individuals who are employed) serve as the two labor outcomes of interest in this study (ex. Fields and Wolff, 1995; Blau and Kahn, 1997).

The coefficient on the interaction, $\delta$, serves as the difference-in-difference estimator. For the recession period, a negative coefficient on this term would support procyclicality in the gender gap, a positive coefficient would support counter-cyclicality, and an insignificant coefficient would support neutrality. For the periods immediately before or after the official recession, insignificant coefficients on the interaction would allow the differential changes found during the recession to be attributed to

cyclicality rather than some other underlying trend which is unrelated to the business cycle. The magnitude of any significant change during the recession implies the extent to which cyclicality can alter the gender gap, at least for this particular cycle.

The evidence presented in Table 1 suggests that the gender gap in hourly wages was differentially reduced during the recession period in states with an industry concentration favoring highly cyclical male-dominant industries relative to other states. More specifically, the differential reductions in the hourly wage gaps were as large as 10.16 percentage points and as little as 7.19 percentage points during the Great Recession, with the statistical significance of these estimates ranging from the one to five percent level.[7] This wage gap reduction is larger in magnitude than what was found for Spain's recession over the early 1990s by Aller and Arce (2001), and it occurred over a much shorter period of time. The estimates which are based on the stricter CPS-REA overlap definition are higher in magnitude relative to those under the CPS definition for the most male-dominant ranking, but not for the least female-dominant ranking. Further, there was no significant differential effect on the interaction term before or after the recession under any of the definitions, implying that this effect was specific to the economic downturn and was not the result of a competing trend in the gender gap.

According to Table 2, the gender employment gap was also differentially reduced in the treatment states relative to the comparison states during the 2008 recession. However, the magnitude of this reduction in the employment gap was lower than that of hourly wages under all definitions, as the effect is estimated to be between a

[7]Estimates in this paper are in log point changes and are approximated as percentage changes.

5.32 and 7.38 percentage point reduction, with all estimates statistically significant at the five percent level. This implies that the prediction of Shin (1999) is correct in assuming that females had a larger short-run labor supply elasticity relative to that of males. Similar to the results for hourly wages, the magnitudes of the employment effects were higher under the stricter CPS-REA overlap definition of states and, for this labor outcome, it was true under both sets of rankings. Finally, the differential effects for the periods before and after the recession were found to be insignificant (with one exception), further supporting the significant effects found during the recession.

# 4 Conclusion

This study uses the industry composition within states to analyze the movements of the gender gaps in wages and employment during the Great Recession. The impacts to these gender gaps are important outcomes of the 2008 recession which have not yet been reported in the literature. The results suggest that the gender gaps in both wages and employment were differentially reduced in states with a higher concentration in male-dominated cyclical industries and less of a concentration in female-dominated non-cyclical industries, implying that the downward shifts in the labor demand for men were more pronounced in those states during the recession period. In addition, the reduction in the hourly wage gap was shown to be greater than that of the employment gap. Overall, these significant reductions across the quasi-experiments support the idea of pro-cyclicality in the gender gaps.

# References


Aller, R., Arce, M., 2001. Explaining the reduction in the gender wage gap during the 1990-94 economic recession in Spain. Atlantic Economic Journal 29 (1), 63-74.

Altonji, J., Blank, R., 1999. Race and gender in the labor market. In O. Ashenfelter and D. Card (eds.), Handbook of Labor Economics 3 (48), 3143-3259.

Biddle, J., Hamermesh, D., 2011. Cycles of wage discrimination. NBER Working Paper 17326, 37 pages.

Blank, R., 1989. Dissaggregating the effect of the business cycle on the distribution of income. Economica 56 (222), 141-163.

Blau, F., Kahn, L., 1997. Swimming upstream: Trends in the gender wage differentials in the 1980s. Journal of Labor Economics 15 (1), 1-42.

Datta Gupta, N., Oaxaca, R., and Smith, N., 2006. Analysing trends in US and Danish gender wage gaps in the 1980s and 1990s. Applied Economics Letters 13 (10), 643-647.

Elsby, M., Hobijn, B., Sahin, A., 2010. The labor market in the Great Recession. Brookings Papers on Economic Activity 41 (1), 1-48.

Fields, J., Wolff, E., 1995. Interindustry wage differentials and the gender wage gap. Industrial and Labor Relations Review 49 (1), 105-120.

Park, S., Shin, D., 2005. Explaining procyclical male-female wage gaps. Economics Letters 88 (2), 231-235.

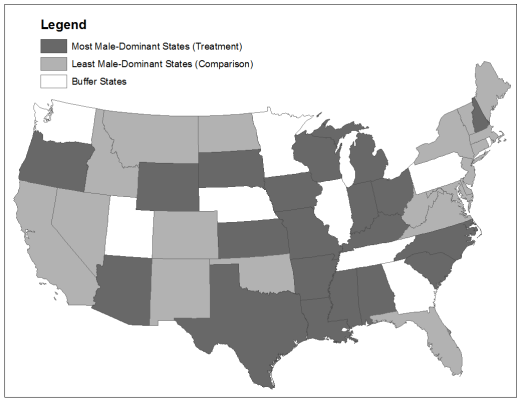
Shin, D., 1999. An equilibrium theory of wage and employment cyclicality by gender and by industry. Southern Economic Journal 65 (3), 451-471.

Solon, G., Barsky, R., and Parker, J., 1994. Measuring the cyclicality of real wages: How important is composition bias? Quarterly Journal of Economics 109 (1), 1-25.

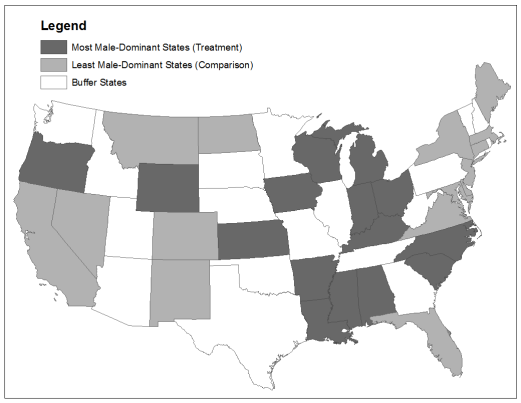
Figure 1: Classification of States

Most Male-Dominant States

CPS Definition

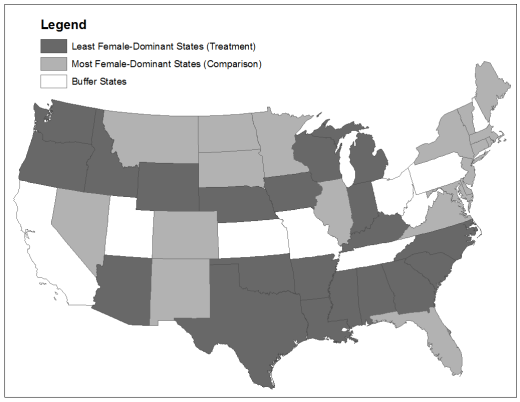



CPS-REA Overlap

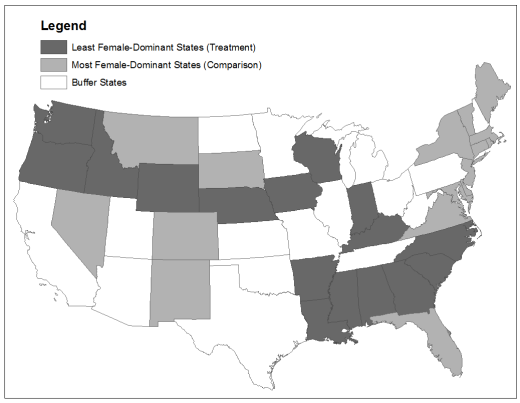



Least Female-Dominant States

CPS Definition




CPS-REA Overlap




*Notes*: Authors' calculations of March 2008 CPS and 2007 REA data.

Table 1: Gender Gap Estimates for Log Hourly Wages

| | Most Male-Dominant States | | | Least Female-Dominant States | | |
|---|---|---|---|---|---|---|
| | CPS Definition | | | CPS Definition | | |
| | Before 2007-08 | During 2008-09 | After 2009-10 | Before 2007-08 | During 2008-09 | After 2009-10 |
| Treat | 0.0328 | 0.0767* | -0.0049 | 0.0641 | 0.0970** | 0.0196 |
| | (0.0399) | (0.0420) | (0.0424) | (0.0406) | (0.0402) | (0.0418) |
| Post | -0.0045 | -0.0330 | -0.0027 | -0.0076 | -0.0420** | -0.0083 |
| | (0.0215) | (0.0204) | (0.0252) | (0.0199) | (0.0175) | (0.0218) |
| Treat*Post | 0.0439 | -0.0815** | 0.0130 | 0.0328 | -0.0773** | 0.0277 |
| | (0.0309) | (0.0305) | (0.0329) | (0.0323) | (0.0289) | (0.0338) |
| | [0.164] | [0.011] | [0.694] | [0.316] | [0.011] | [0.418] |
| Observations | 80 | 80 | 80 | 80 | 80 | 80 |
| | CPS-REA Overlap | | | CPS-REA Overlap | | |
| | Before 2007-08 | During 2008-09 | After 2009-10 | Before 2007-08 | During 2008-09 | After 2009-10 |
| Treat | 0.0624 | 0.1040** | 0.0023 | 0.0659 | 0.1142** | 0.0423 |
| | (0.0445) | (0.0505) | (0.0484) | (0.0473) | (0.0469) | (0.0488) |
| Post | 0.0081 | -0.0278 | -0.0074 | -0.0120 | -0.0386* | -0.0108 |
| | (0.0235) | (0.0203) | (0.0251) | (0.0178) | (0.0206) | (0.0245) |
| Treat*Post | 0.0416 | -0.1016*** | 0.0127 | 0.0483 | -0.0719** | 0.0079 |
| | (0.0363) | (0.0330) | (0.0376) | (0.0340) | (0.0345) | (0.0363) |
| | [0.261] | [0.004] | [0.737] | [0.165] | [0.045] | [0.829] |
| Observations | 62 | 62 | 62 | 66 | 66 | 66 |

*Notes*: Authors' estimations of individually-weighted March 2008-2011 CPS data. Stars denote statistical significance at the ten (*), five (**), and one (***) percent levels. State-clustered standard errors are in parentheses. P-values are in brackets.

Table 2: Gender Gap Estimates for Log Total Employment

| | Most Male-Dominant States | | | Least Female-Dominant States | | |
|---|---|---|---|---|---|---|
| | CPS Definition | | | CPS Definition | | |
| | Before 2007-08 | During 2008-09 | After 2009-10 | Before 2007-08 | During 2008-09 | After 2009-10 |
| Treat | 0.0016 | 0.0262 | -0.0272 | 0.0272 | 0.0572* | 0.0030 |
| | (0.0291) | (0.0322) | (0.0282) | (0.0280) | (0.0293) | (0.0280) |
| Post | -0.0101 | -0.0282* | 0.0153 | -0.0180 | -0.0259 | 0.0149* |
| | (0.0133) | (0.0164) | (0.0131) | (0.0138) | (0.0161) | (0.0080) |
| Treat*Post | 0.0246 | -0.0534** | 0.0030 | 0.0299 | -0.0542** | 0.0092 |
| | (0.0229) | (0.0262) | (0.0190) | (0.0233) | (0.0251) | (0.0185) |
| | [0.289] | [0.048] | [0.874] | [0.207] | [0.037] | [0.622] |
| Observations | 80 | 80 | 80 | 80 | 80 | 80 |
| | CPS-REA Overlap | | | CPS-REA Overlap | | |
| | Before 2007-08 | During 2008-09 | After 2009-10 | Before 2007-08 | During 2008-09 | After 2009-10 |
| Treat | 0.0087 | 0.0481 | -0.0257 | 0.0176 | 0.0677* | 0.0044 |
| | (0.0329) | (0.0378) | (0.0321) | (0.0304) | (0.0340) | (0.0330) |
| Post | -0.0097 | -0.0252 | 0.0129 | -0.0224* | -0.0254 | 0.0143 |
| | (0.0164) | (0.0201) | (0.0096) | (0.0127) | (0.0189) | (0.0094) |
| Treat*Post | 0.0394 | -0.0738** | 0.0045 | 0.0501** | -0.0632** | -0.0031 |
| | (0.0277) | (0.0323) | (0.0205) | (0.0233) | (0.0298) | (0.0188) |
| | [0.165] | [0.030] | [0.826] | [0.039] | [0.042] | [0.871] |
| Observations | 62 | 62 | 62 | 66 | 66 | 66 |

*Notes*: Authors' estimations of individually-weighted March 2008-2011 CPS data. Stars denote statistical significance at the ten (*), five (**), and one (***) percent levels. State-clustered standard errors are in parentheses. P-values are in brackets.