

## RESEARCH BRIEF

# Motherhood and the Gender Productivity Gap

Based on BFI Working Paper No. 2018-41, "[Motherhood and the Gender Gap](#)," by Yana Gallen, UChicago assistant professor of economics at the Harris School of Public Policy

### KEY TAKEAWAYS

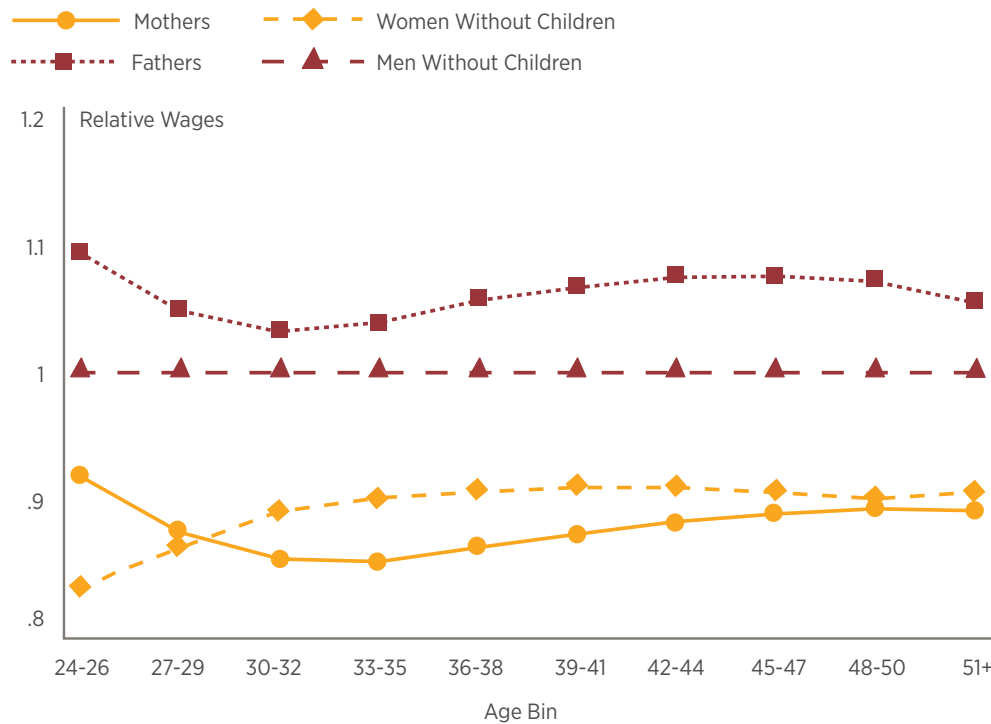
- ✓ Motherhood is the primary cause of the gender pay gap
- ✓ This gap in pay reflects a gap in productivity between men and women with children
- ✓ This productivity gap explains about two-thirds of the wage gap between men and women
- ✓ However, women with no children, especially younger women, outperform men yet still earn lower wages

Researchers have long studied the gender pay gap, attributing this divergence to such factors as educational and career choices by women, psychological differences between men and women regarding risk and reward, demand for work flexibility, and, of course, discrimination, among other issues.

However, new research by UChicago assistant professor of economics Yana Gallen reveals that two-thirds of the pay gap can be explained by a productivity gap between men and women that is driven by motherhood. In "[Motherhood and the Gender Gap](#)," the first paper to link parenthood by gender to productivity measures, Gallen finds that about 8 percentage points of the 12 percent residual pay gap between men and women can be explained by lower workplace productivity of mothers.

Prior to motherhood, women are actually more productive than men and their productivity climbs again as their children age to equal that of men. However, for women who choose to have children, the fall-off in workplace production is enough to impact their pay and, possibly, the earnings of younger women whom employers assume will have children.

Figure 1



This figure shows the relative wages of women without children compared to men without children of the same age, as well as mothers and fathers compared to men without children of the same age. Relative wages are measured using a wage regression with 2 digit industry fixed effects, 3 education fixed effects, a quadratic in experience, and year fixed effects. For each age category, I normalize the wages relative to those of men without children of the same age.

Gallen’s findings, based on extensive Danish private-sector data, do not mean that the factors cited above are not important when explaining wage gaps—indeed, she stresses the need for more research on all of them—but her results do suggest that productivity declines in motherhood explain a solid majority of the gender wage gap.

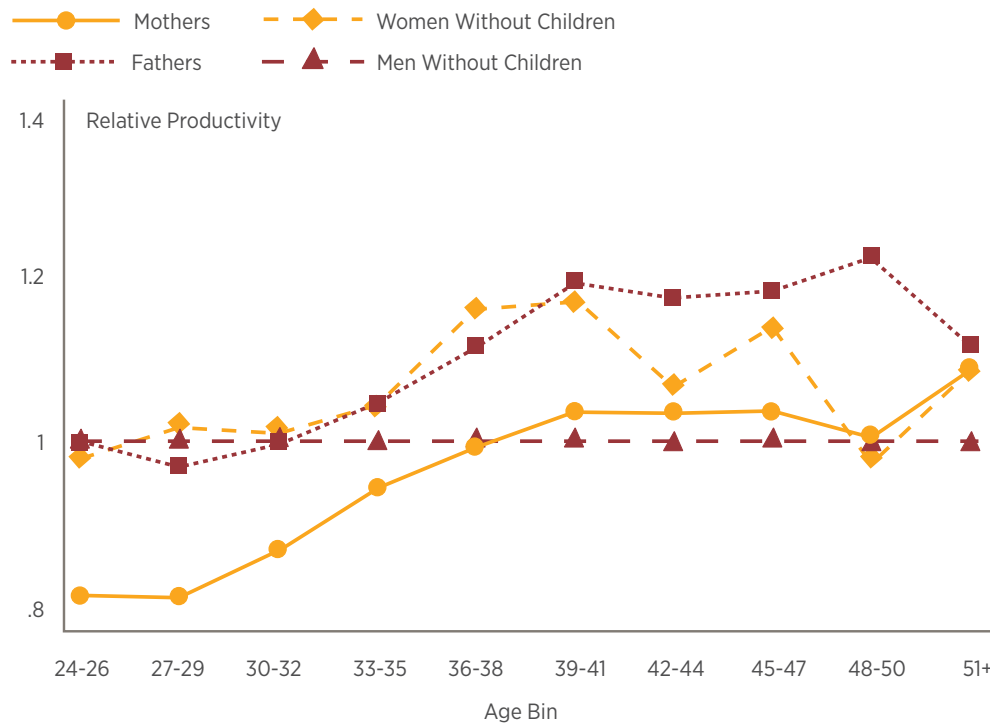
### More productivity means more pay ... if you’re a man

Gallen takes a somewhat novel approach when investigating the gender wage gap—she avoids using wages in her analysis. Instead, she estimates the relative revenue of a firm that hires a man compared to a woman with the same background. Doing so allows Gallen to take labor, material goods, and capital as inputs and treats male and female labor units as perfect substitutes (in economic parlance, she estimates a production function). The gender productivity gap is the efficiency units lost if a worker is female, holding other explanatory factors such as age, education, experience, and hours worked constant.

Gallen’s research incorporates comprehensive data from the Danish private sector (from 2000-2011) that matches worker characteristics with a firm’s accounting information to estimate the gender productivity gap. Doing so allows her to provide an updated view on gender productivity, including the discussion of motherhood, and also accounts for such factors as job sorting, or the types of jobs that women select over men. The paper also notes this slice of Denmark (the private sector) has many characteristics in common with the US labor market, especially in terms of the size of the gender pay gap. This suggests that the results may not be limited to the Danish setting.

All told, it is that deeper analysis of motherhood and productivity that is the main contribution of Gallen’s paper. She finds that the wage gap of mothers is approximately equal to the productivity gap, suggesting that there is little or no wage discrimination against mothers (in the form of uncompensated output). This finding is consistent with the hypothesis that the wage gap occurs only for women with children who work

**Figure 2**



This figure shows the relative productivity of women without children compared to men without children of the same age, as well as mothers and fathers compared to men without children of the same age. Relative productivity is measured using the baseline translog production function with industry specific shares and fixed effects, and the baseline specification for efficiency units but omitting age from the efficiency units. I model efficiency units of the interaction of 12 age bins and 4 gender/parenthood categories as perfect substitutes.

fewer and more flexible hours than their male counterparts. The general pattern that women without children are as productive as men, while mothers are substantially less productive, holds across industries and occupations.

But this does not mean that there is no wage discrimination for all female workers. Women without children may, by extension, be penalized. The wage gap for non-mothers is smaller than that of mothers, but it is also true that non-mothers are more productive than men, meaning that non-mothers are undercompensated for their work. In addition, Gallen finds that the disparity between wages and productivity for non-mothers happens especially during their prime child-bearing ages, suggesting that firms expect women of child-bearing age to have children and, thus, they undercompensate them accordingly. After age 40, there are no meaningful differences in the relative productivity of mothers and non-mothers. Discrimination, then, is largest in the group with a smaller residual pay gap: young non-mothers.

About 8 percentage points of the 12 percent residual pay gap between men and women can be explained by the decrease in productivity by mothers.

Further, Gallen does not find a larger gap between pay and productivity for married or cohabiting women compared to single women without children. To the extent that marriage and cohabitation increase an employer’s expectations about, and an employee’s probability of, childbirth, this suggests that statistical discrimination is unlikely to be the main driver of the wedge between pay and productivity for prime-age non-mothers. Gallen takes account of the types of firms where women decide to work and finds no evidence that women work in lower wage firms within her data set.

## Conclusion

Researchers have come to call the decrease in wages for mothers a “child penalty.” The contribution of Gallen’s paper is to determine how much of that penalty is explained by productivity differences in the workplace. Using Danish data she reveals how firm output varies with the gender and motherhood status of employees to find that about 8 percentage points of the 12 percent residual pay gap can be explained by productivity differences between men and women. And motherhood drives this difference.

### CLOSING TAKEAWAY

The wage gap for non-mothers is smaller than that of mothers, but it is also true that non-mothers are more productive than men, meaning that non-mothers are undercompensated for their work.

This productivity difference may arise from differences in the effort, extra (undocumented) hours worked, or effectiveness of men relative to women. While on average, the pay gap is quite close to the productivity gap, this is not true over all of the lifecycle. In particular, women without children are estimated to be as productive—if not more productive—than men without children, but they are still paid less than these men. Mothers, on the other hand, are substantially less productive than fathers and are paid commensurate with this productivity gap.

Finally, while Gallen does not offer policy prescriptions based on her findings, she does reinforce the need for further research on the factors driving the gap between the pay and productivity of women without children, and whether these differences reflect work preferences or occupation sorting, for example, or discrimination.

### READ THE WORKING PAPER

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#### **Motherhood and the Gender Productivity Gap**

[bfi.uchicago.edu/Gallen-WP-201841](http://bfi.uchicago.edu/Gallen-WP-201841)

### MORE ABOUT



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