Graded Team Assignment: Gender Discrimination Lawsuit

Group 7

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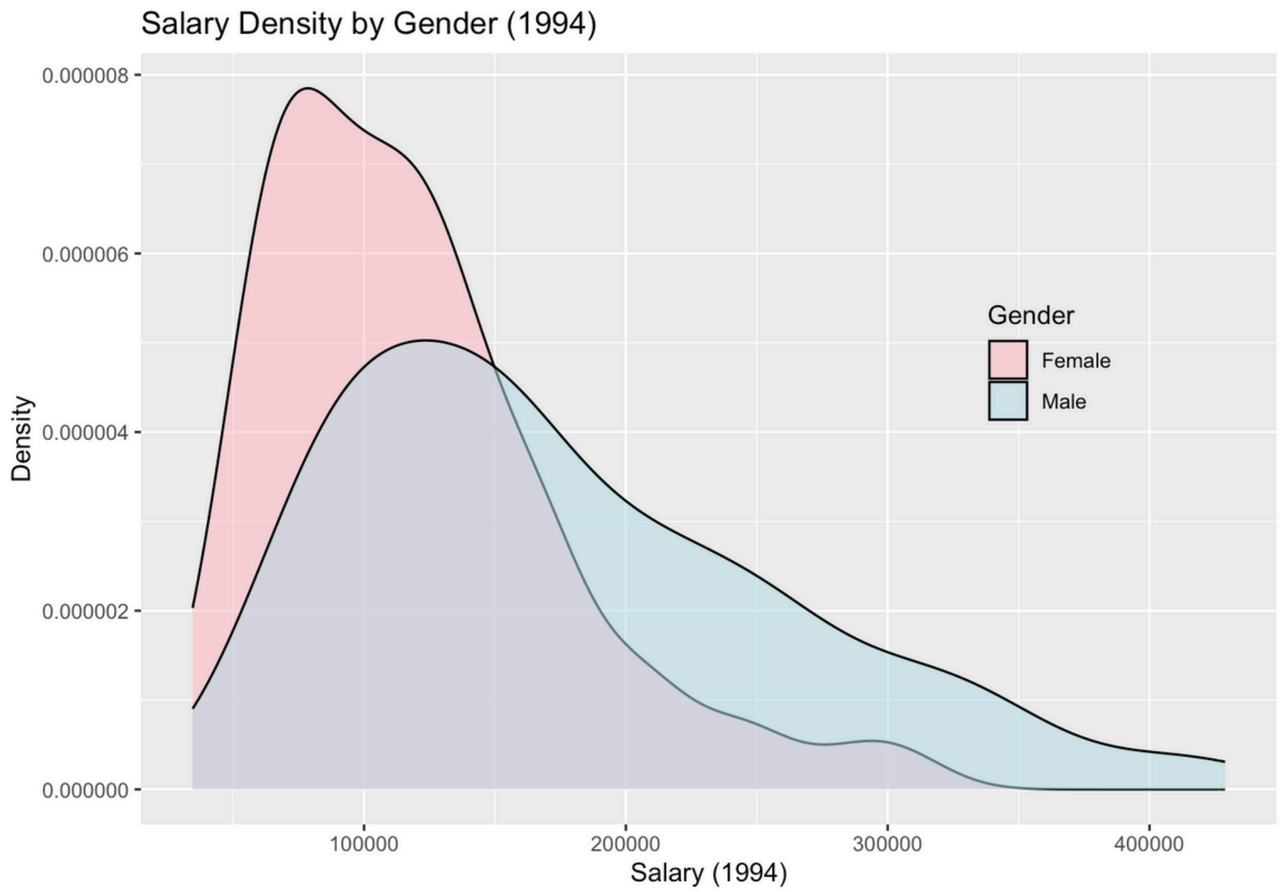
Key Claims

Claim	Salary Disparity	Promotion Gap
Argument	Females at the school earn less money than men, on average.	Female faculty at the school are less likely to be full professors, more likely to be assistant professors.
Target Data	Salary 1994, Salary 1995	Rank

Females Earn Less and Receive Smaller Raises than Men

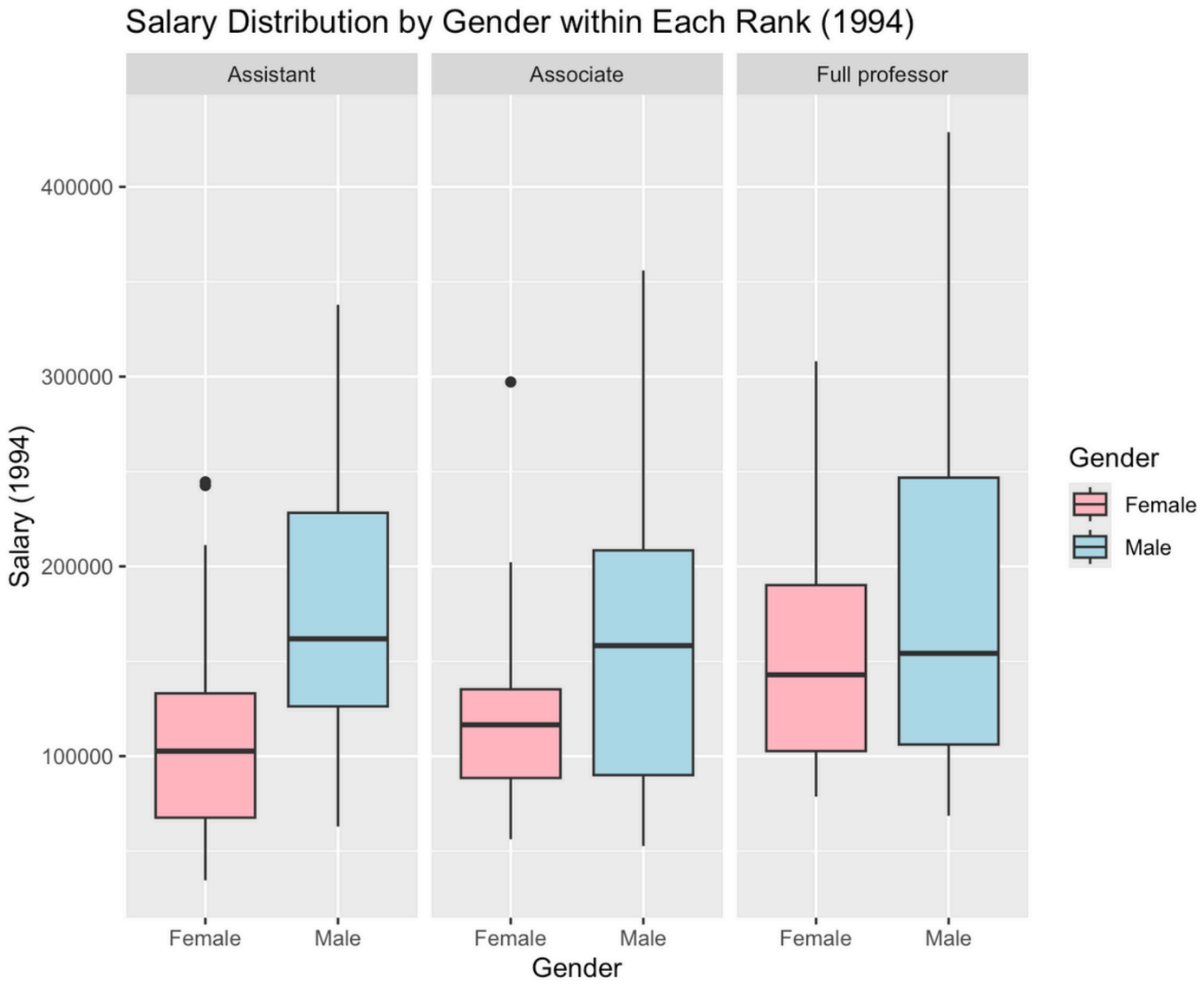


Female salaries are concentrated at lower levels, with a pronounced peak, while male salaries are more spread out and tend to be higher.

Males received higher and more variable raises compared to females, with the median male raise matching the female upper quartile.

Delwin Ramses van Strien, ZhangNing

Females Earn Less Than Males at Every Rank



Across all ranks, females earn less than males, even at the top 25%.

The gap is largest among assistant professors, where even the lowest male salaries are near the top of the female range.

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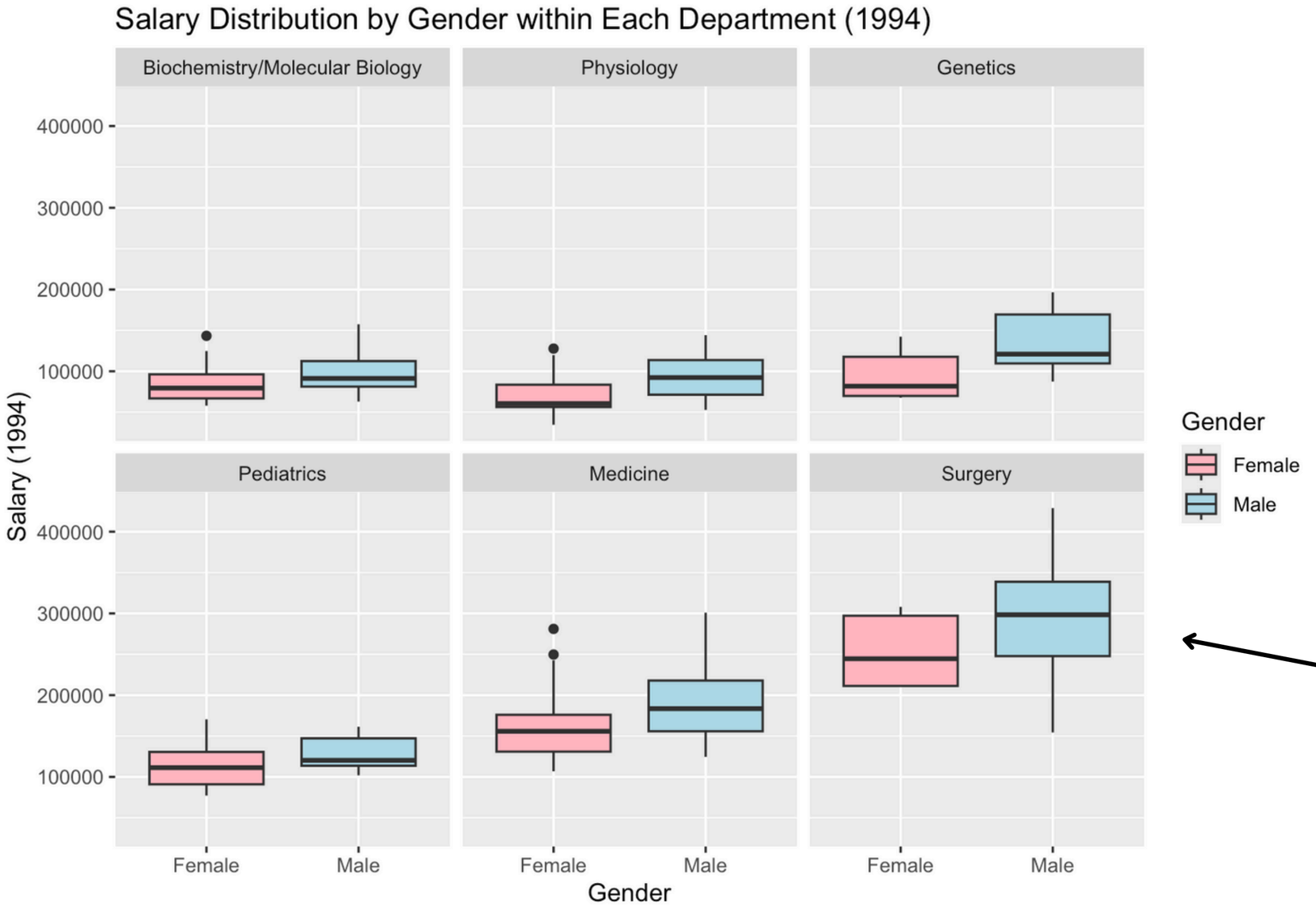
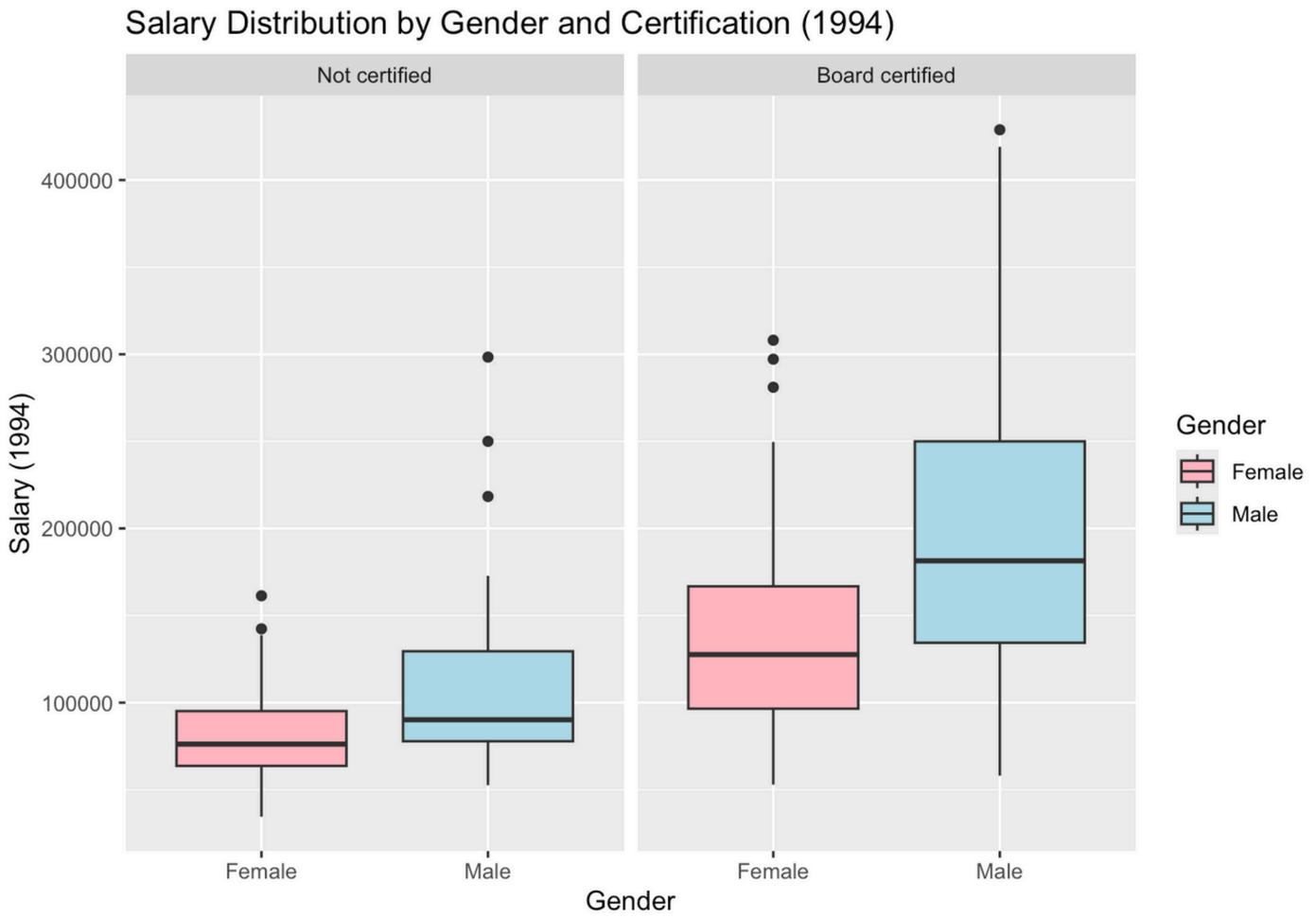
Females Consistently Earn Less Than Males Across All Departments



Even in Surgery, the highest-paying department, females earn less than males, showing a consistent gender gap across departments.

Nguyen Ngoc Thien Huong, Jo Bum Joon

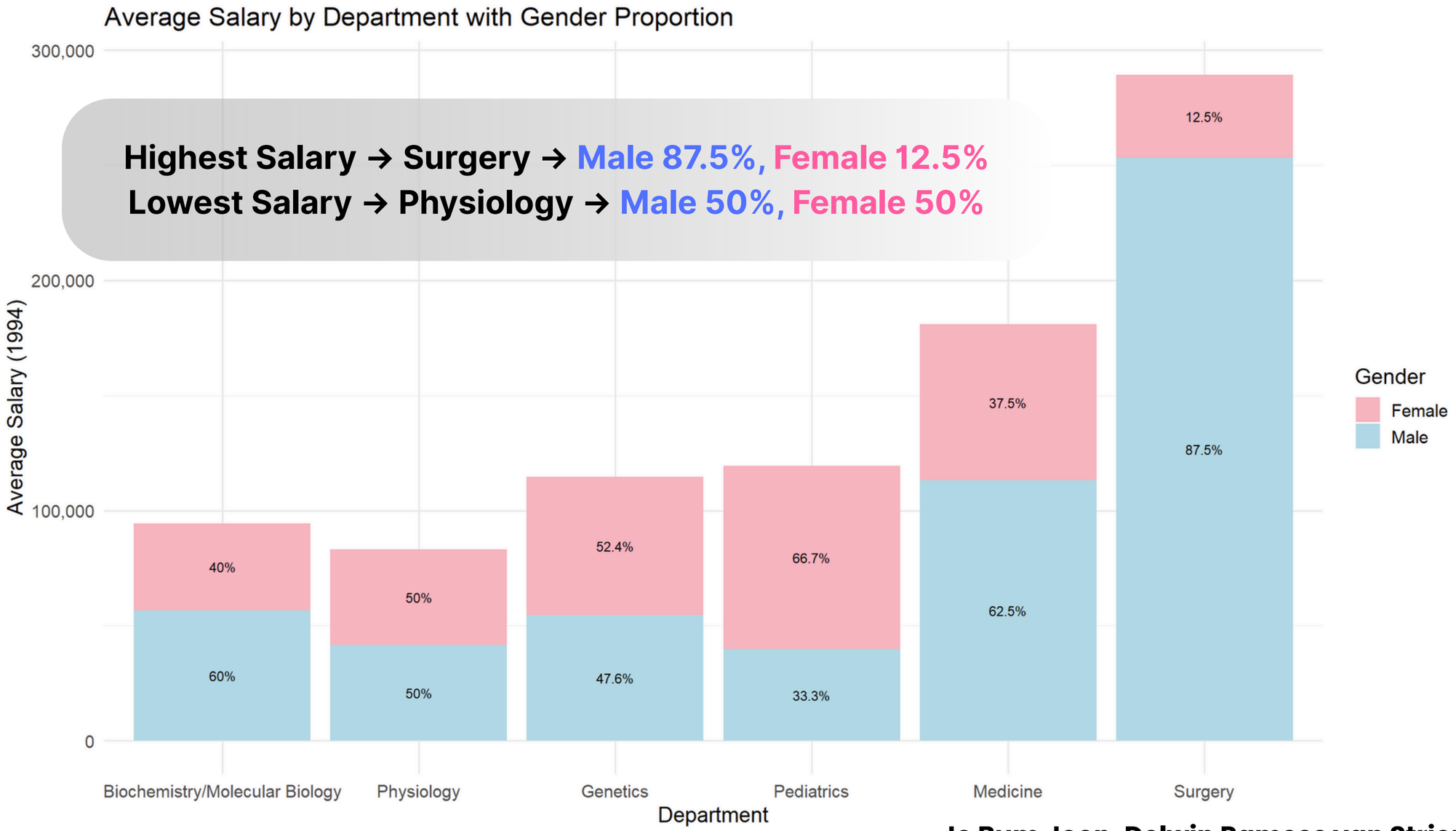
Females Are Paid Less Than Males With the Same Certification



The salary gap widens substantially for board-certified employees, with males earning much more than females.

Jo Bum Joon, Zhang Ning, Delwin Ramses van Strien

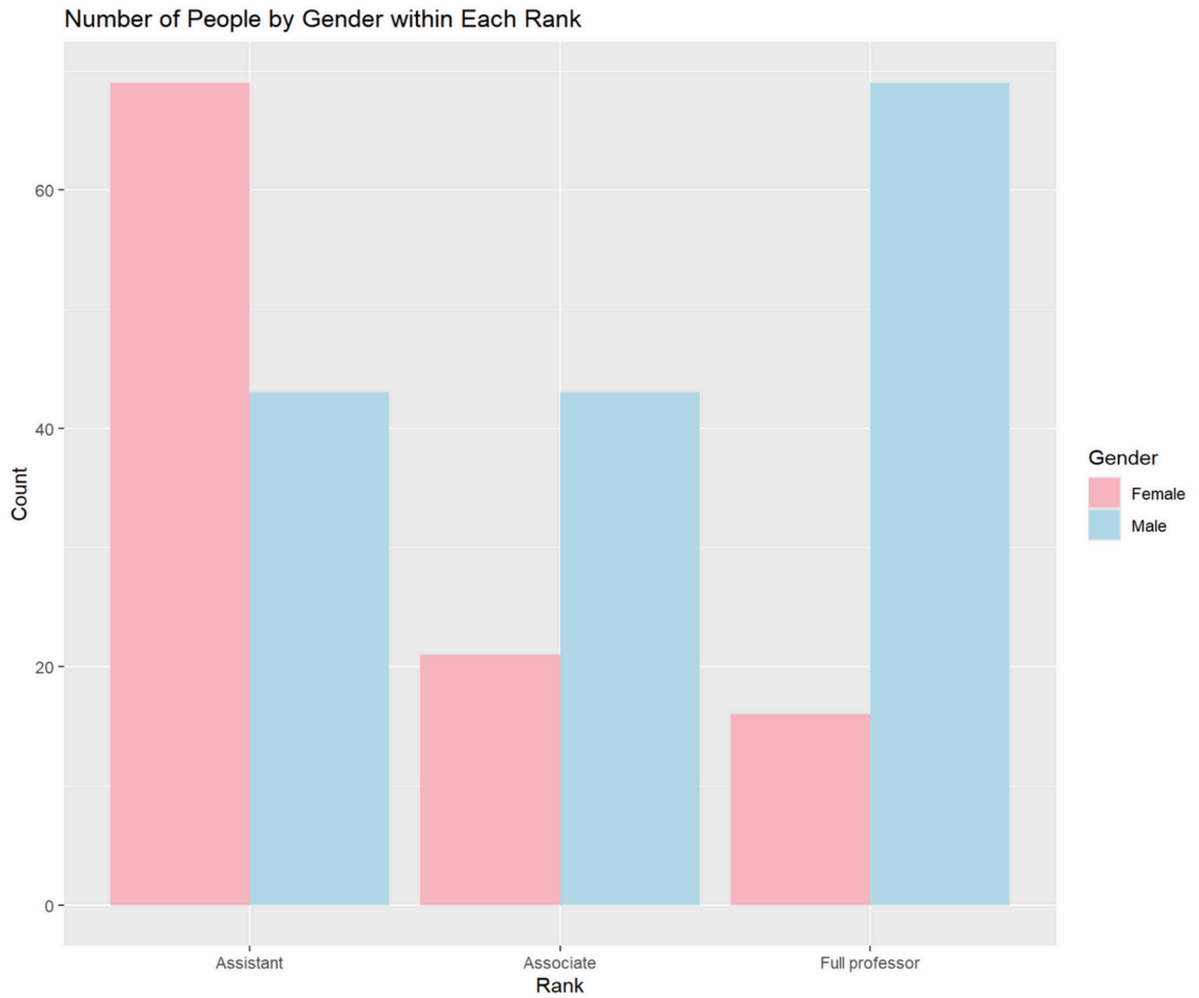
Surgery is the Highest-paying Department but has the Lowest Proportion of Females



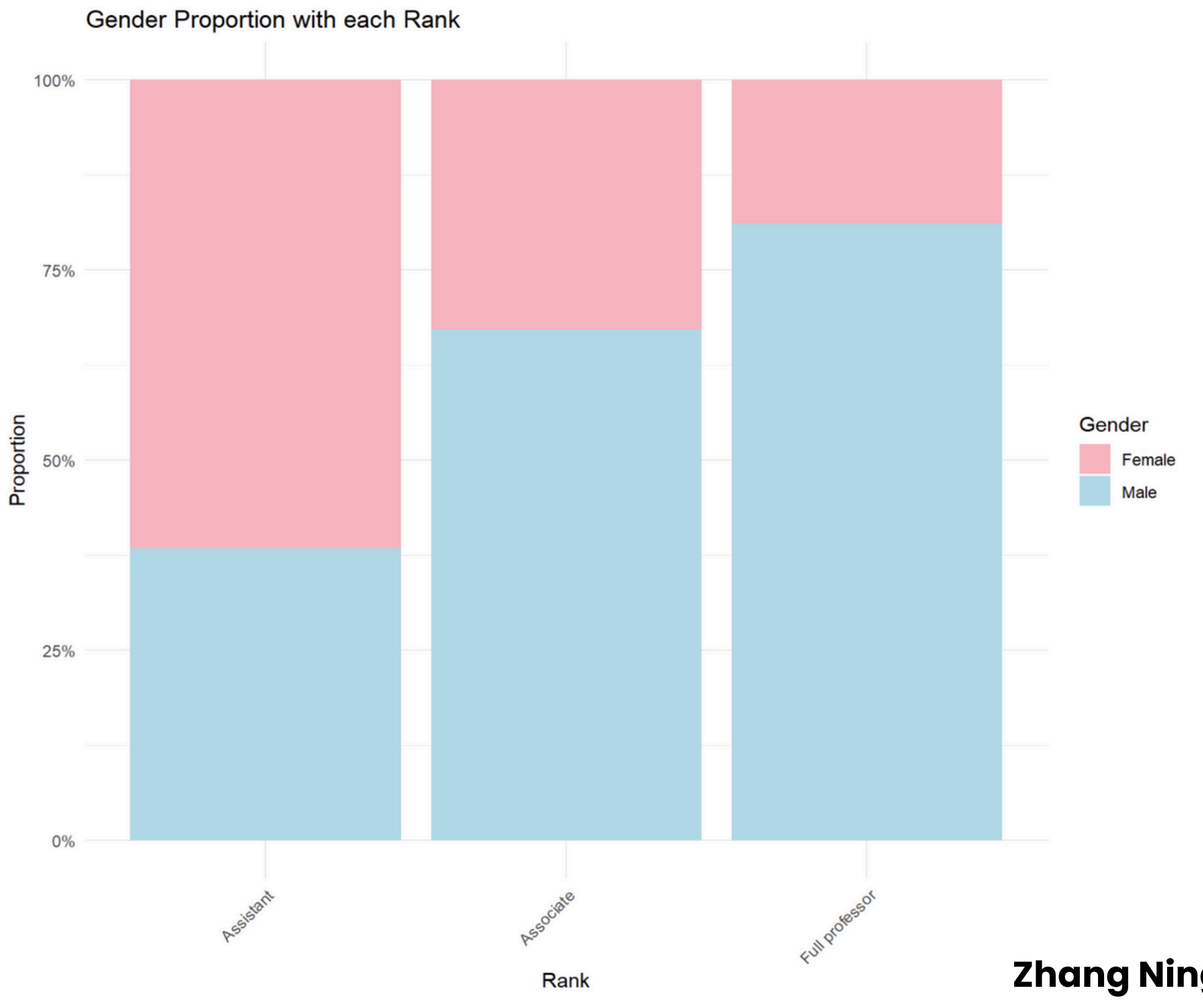
Jo Bum Joon, Delwin Ramses van Strien, Zhang Ning

Males are More Likely to be Full Professors, resulting in Higher Average Salaries

There are far more female assistant professors than female full professors, while for males the opposite is true.

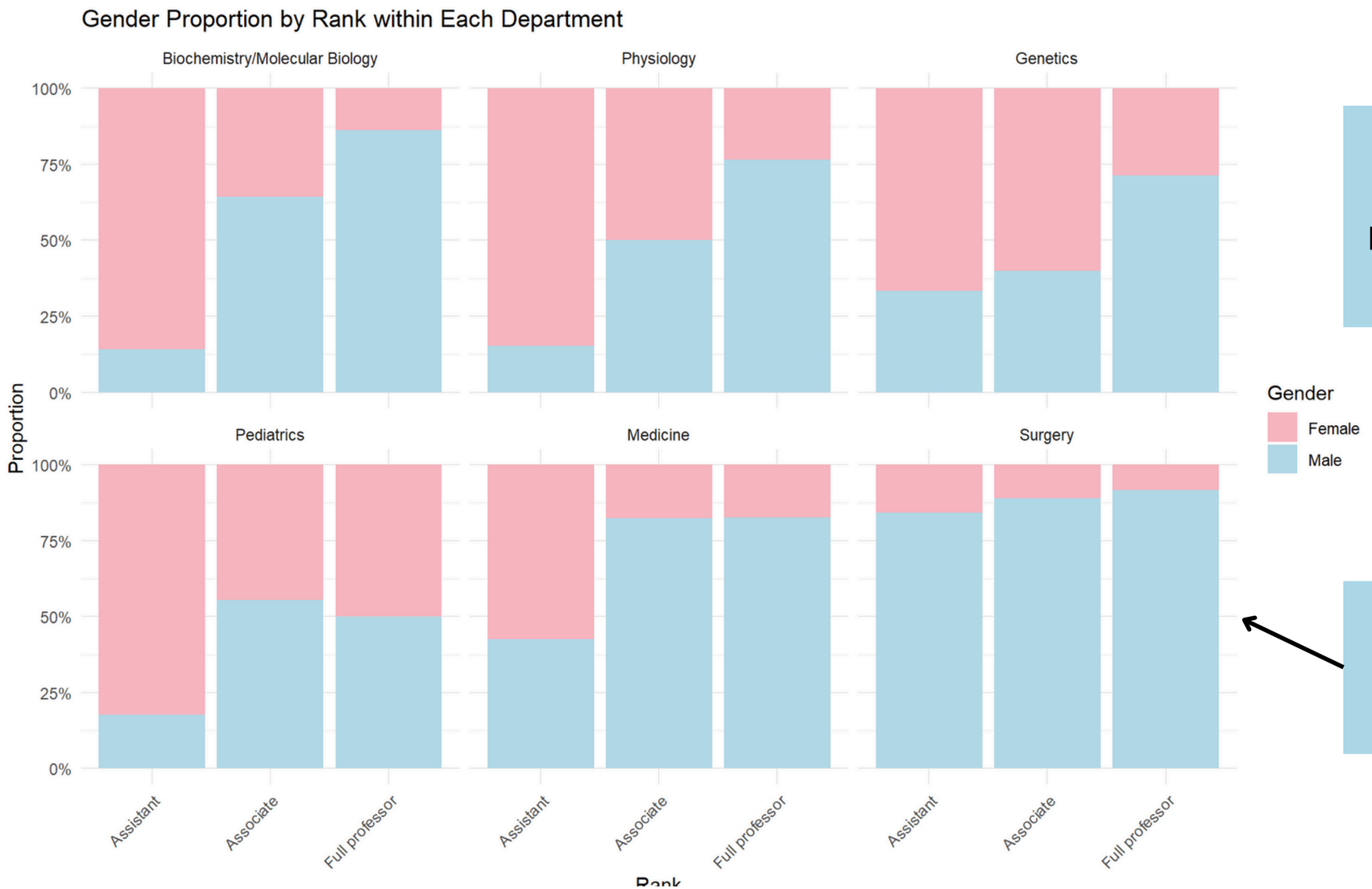


The proportion of males is greatest at the full professor level, whereas females are more likely to be assistant professors.



Zhang Ning

Gender Gap in Professorship Across Departments

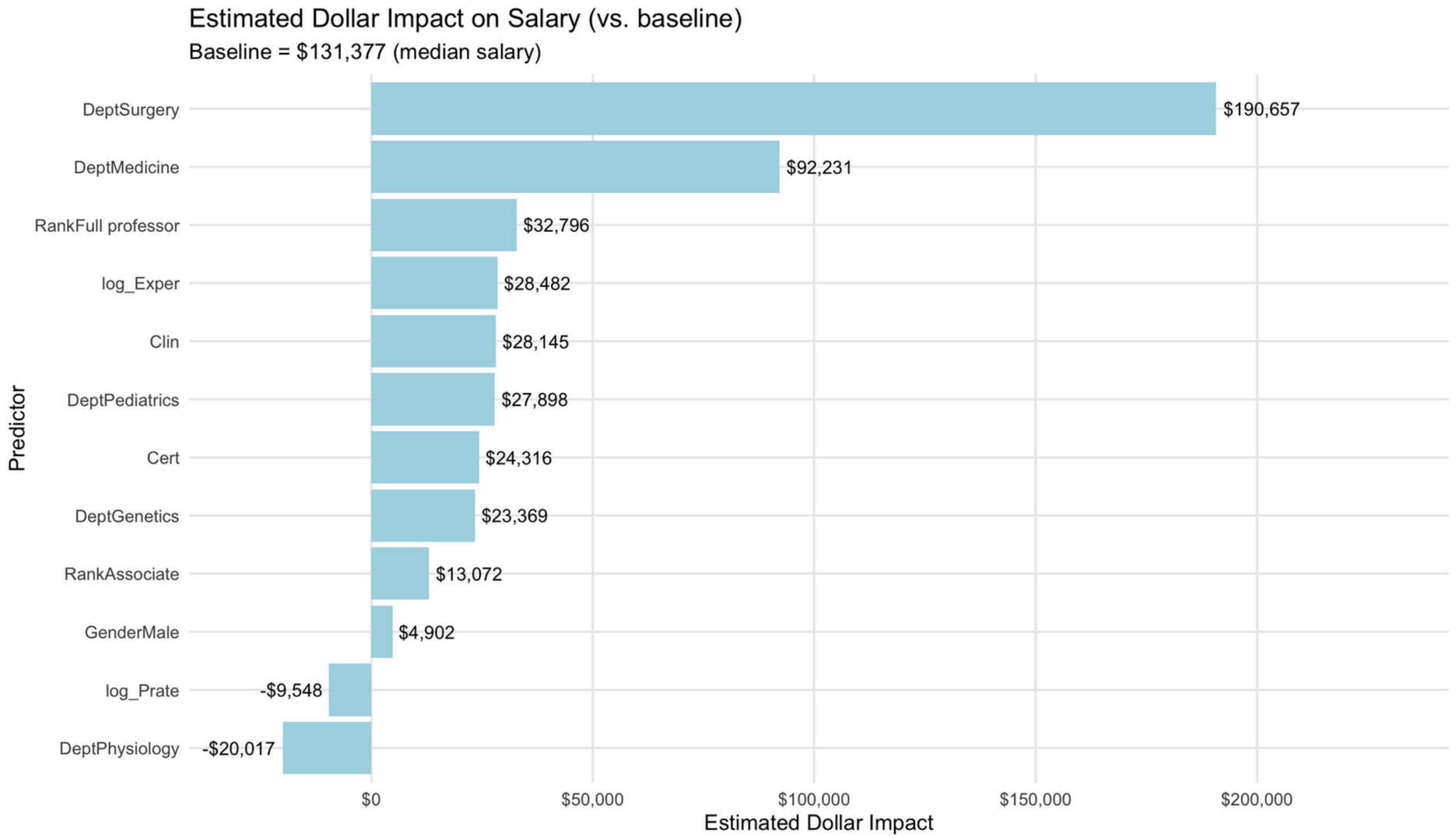


In all departments, males make up a larger share of higher ranks. Only in Pediatrics is full professorship equally split between genders.

Surgery has the highest proportion of male full professors and is male-dominated across all ranks.

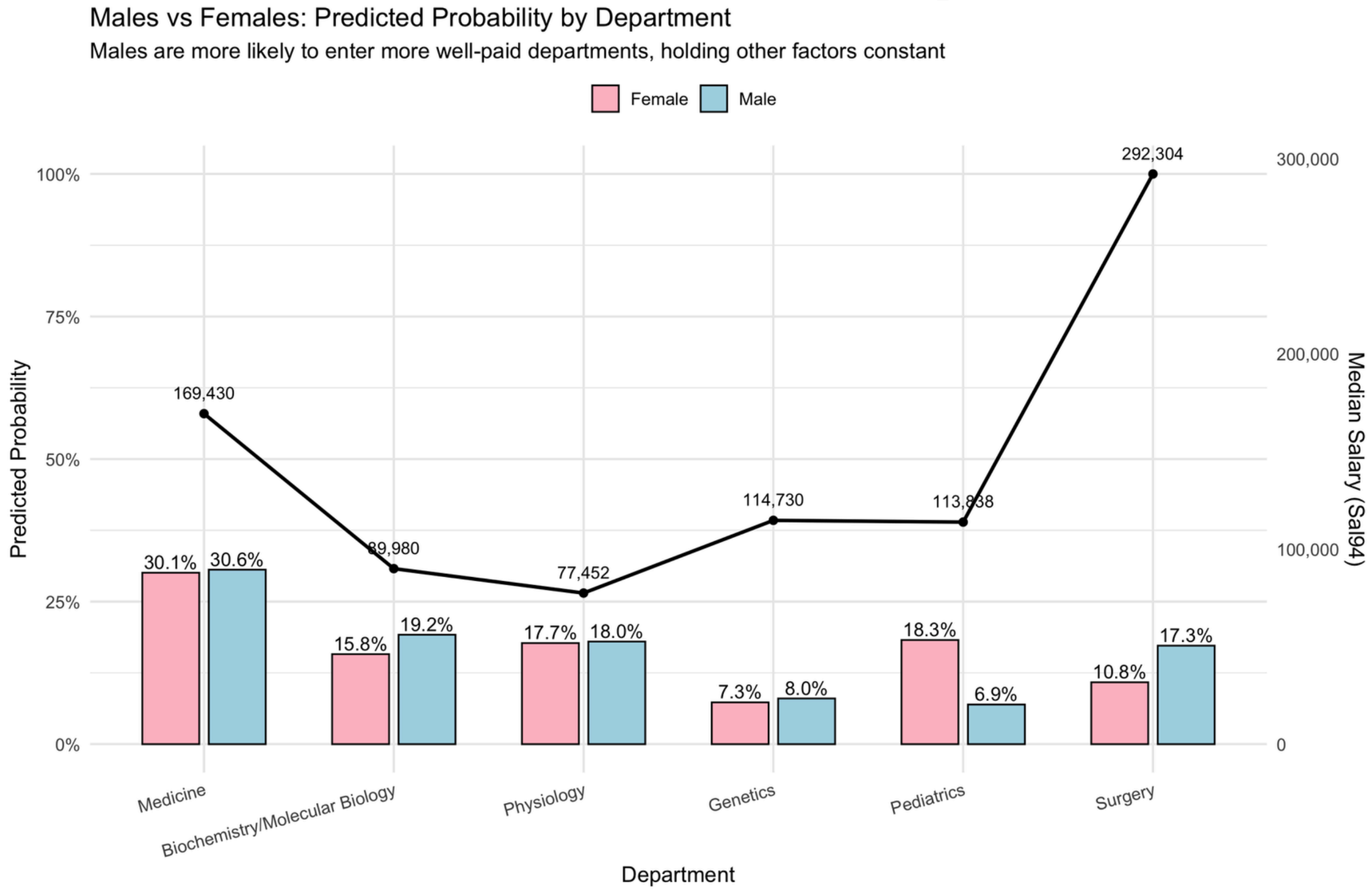
Zhao Hengjie, Nguyen Ngoc Thien Huong, Zhang Ning

No Direct Gender Impact on Salary, but Investigation on Department is Needed



Zhang Jianyu, Nguyen Ngoc Thien Huong

Males Have Higher Chances of Entering Departments with Lucrative Expected Salaries

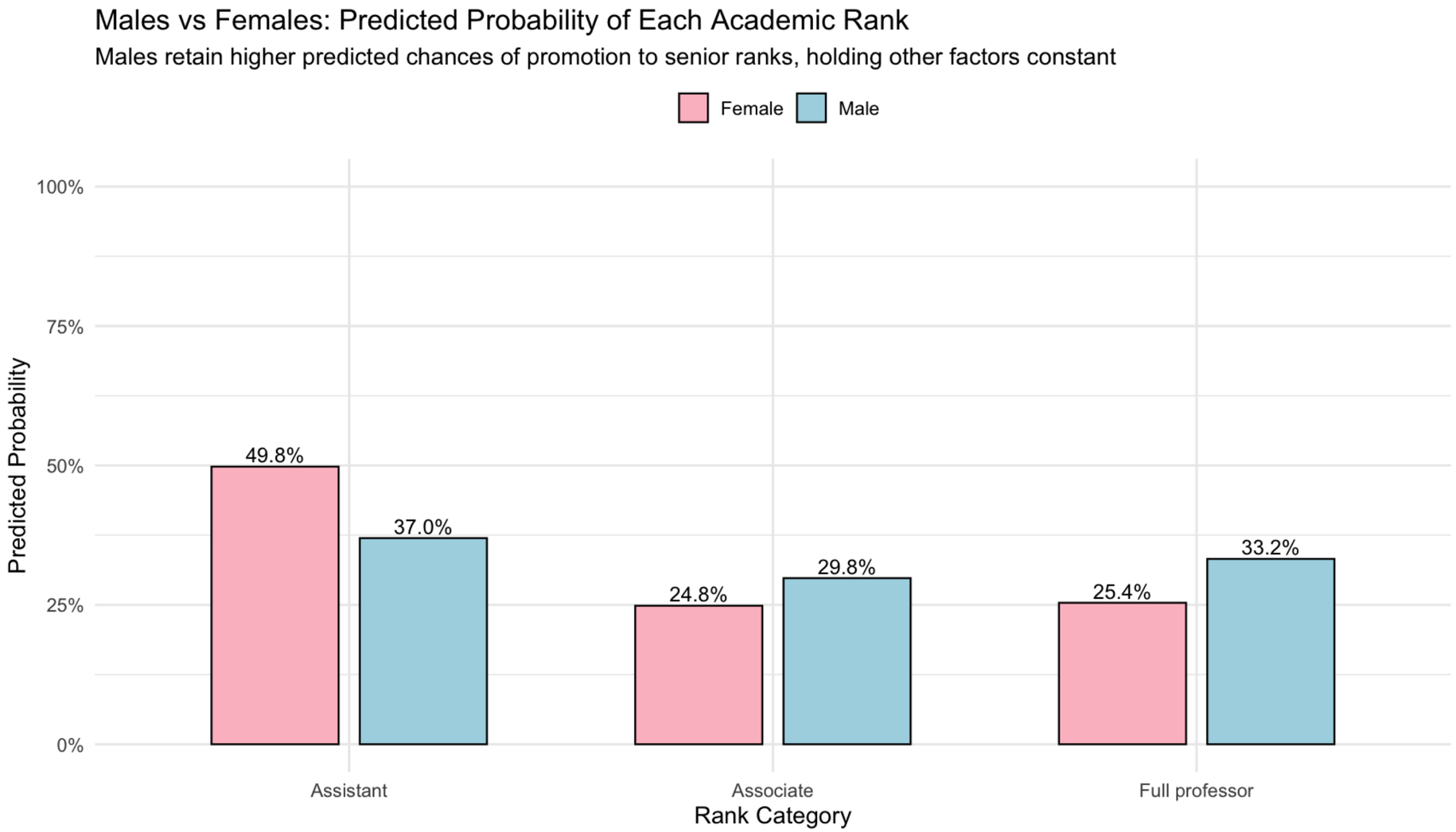


Overall accuracy: **60.9%**

*** *Model used: multi-logistic regression*

Zhao Hengjie, Nguyen Ngoc Thien Huong

Climbing the Ladder: Males Have Higher Chances of Reaching Higher Academic Ranks



Overall accuracy: **72.8%**

**** Model used: multi-logistic regression*

Zhao Hengjie, Nguyen Ngoc Thien Huong

Conclusions

Salary Analysis

- Descriptive comparisons show clear pay differences between genders.
- Regression analysis, which controls for potential confounding factors, further confirms that female doctors' salaries remain consistently lower than male doctors' salaries.

Promotion Perspective

- Statistical modelling of career progression and visualization of hierarchical outcomes reveal that women are substantially underrepresented in higher ranks.
- The likelihood of female doctors advancing up the corporate ladder is evidently lower than for their male counterparts.

The consistency across multiple methods strengthens the reliability of this conclusion

GENDER DISCRIMINATION is present in the environment of female doctors

Jo Bum Joon

Appendix

Salary Levels (Linear Regression Model)

Model	Constant	Gender	Clin	Cert	log_Prate	log_Exper	Physiology	Genetics	Pediatrics	Medicine	Surgery	Associate	Full Professor	R^2	Adj. R^2
m1: Sal95 ~ Gender + Dept + Rank + Exper + Prate + Cert + Clin	15621.2	-297.4	16695.8	17152.1***			-10347	22746.1*	21712.2	74331.6***	174875***	16335.2**	34366.8***	0.9027	0.8967
m2: Log_Sal94 ~ Gender + Clin + Cert + log_Prate + log_Exper + Dept + Rank	10.46***	0.04	0.19***	0.17***	-0.08	0.20***	-0.17***	0.16***	0.19**	0.53***	0.87***	0.09**	0.22***	0.931	0.927

*** *Model used: linear regression*

* represents the level of significance: * p<.05, ** p<.01, *** p<.001;
log-model % ≈ 100·(exp(β)−1)

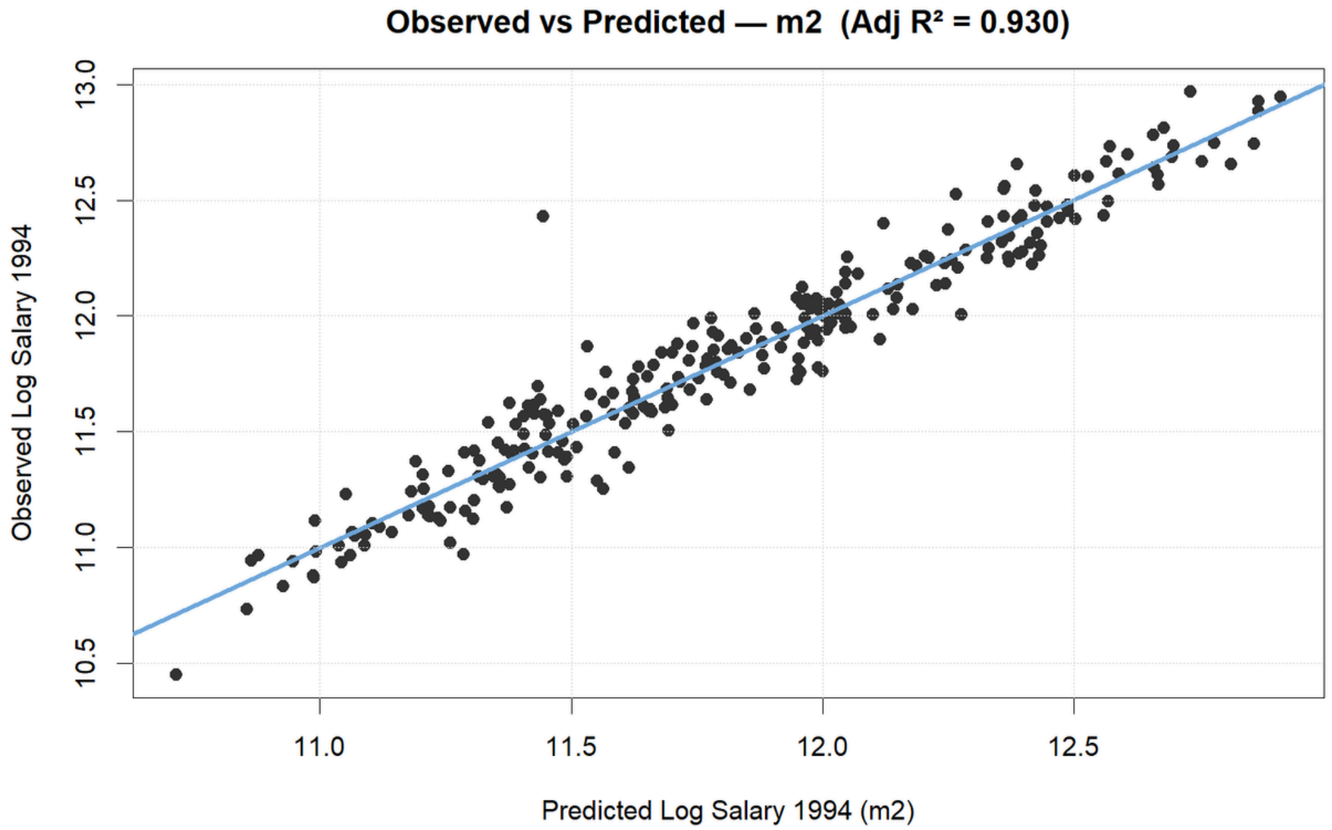
Zhang Jianyu

What the Linear Regression Models Show (m0–m2)

- **m1** (+ Dept + Rank + Exper + Prate + Cert + Clin): Gender n.s.; Experience ≈ +$3.3k/year; large Department and Rank effects ($R^2 \approx 0.90$).
- **m2** (perform log transformation): Gender n.s.; strong Dept/Rank and log-Experience effects ($R^2 \approx 0.93$).

Key Takeaways:

- The overall gap is mostly explained by department & rank composition.
- The model achieved high reliability.

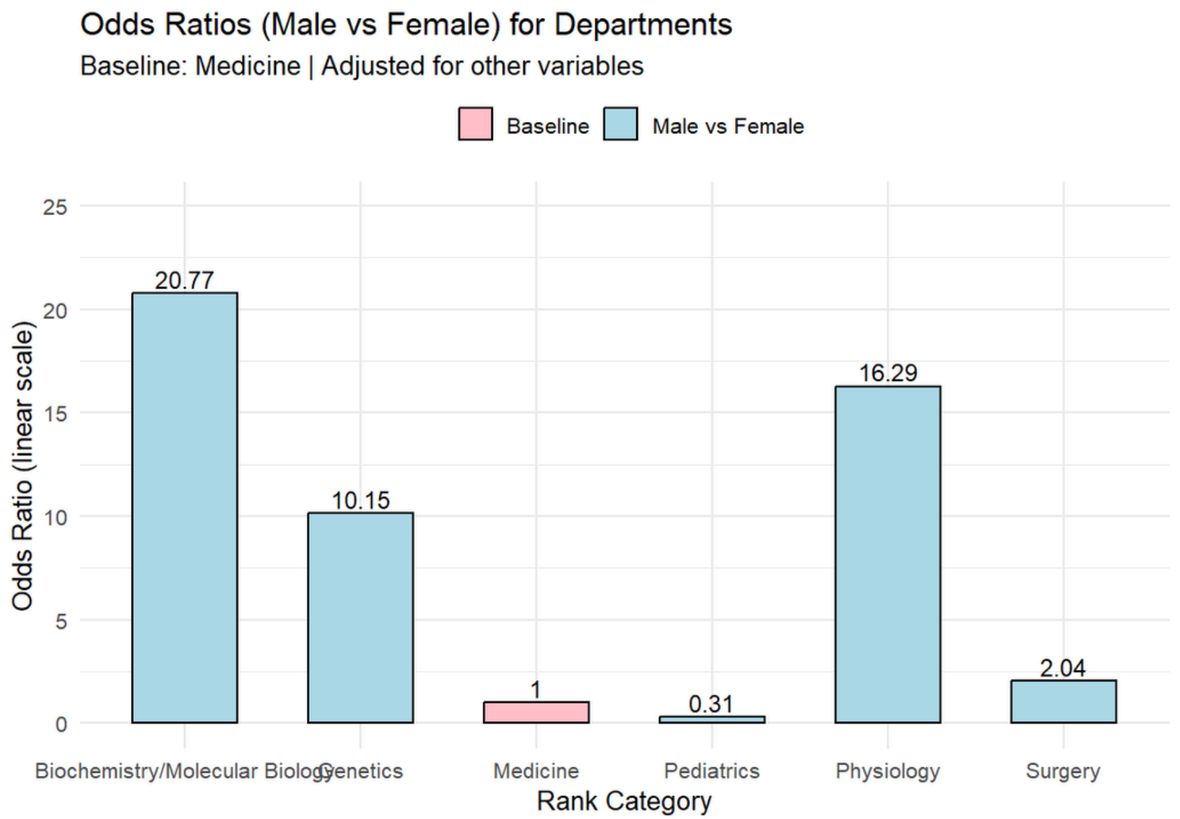


Logistic Regression Result – Department

```
Coefficients:
                            (Intercept) GenderMale RankAssociate RankFull professor
Biochemistry/Molecular Biology  -67.203022  3.0332770    0.63693807          3.2275770
Physiology                      -68.480742  2.7903633    0.82501673          3.2015326
Genetics                        -48.934490  2.3177236   -0.51543370          1.8224048
Pediatrics                        8.277456 -1.1649664    0.49637354         -0.8723539
Surgery                          17.517177  0.7126758   -0.03703428         -0.7480315
                            ClinPrimarily clinical emphasis CertBoard certified     Prate       Exper
Biochemistry/Molecular Biology                     19.237367          -5.2701351 10.653185 -0.01193282
Physiology                                         21.316542          -4.9550763 10.851131 -0.07056389
Genetics                                           15.345054          -4.0331756  8.064849 -0.04321957
Pediatrics                                         -4.123047           0.3349324 -1.448437 -0.02417956
Surgery                                            -7.264527           1.5846128 -4.339547  0.07049989
```

Multi-logistic regression output

Logistic Regression Result – Department



Odds ratio comparison against baseline group (Medicine)

Using **Department** as the target variable and the rest as predictor variable, we found that: Keeping other variables constant, being a male increase the relevant chance of joining **all other departments** except pediatrics department.

Logistic Regression Prediction Logic

Original Table

Gender	Cert	Exper
Male	1	8
Female	0	9
Male	0	7
Female	1	2

Male Table

Gender	Cert	Exper
Male	1	8
Male	0	9
Male	0	7
Male	1	2

Female Table

Gender	Cert	Exper
Female	1	8
Female	0	9
Female	0	7
Female	1	2

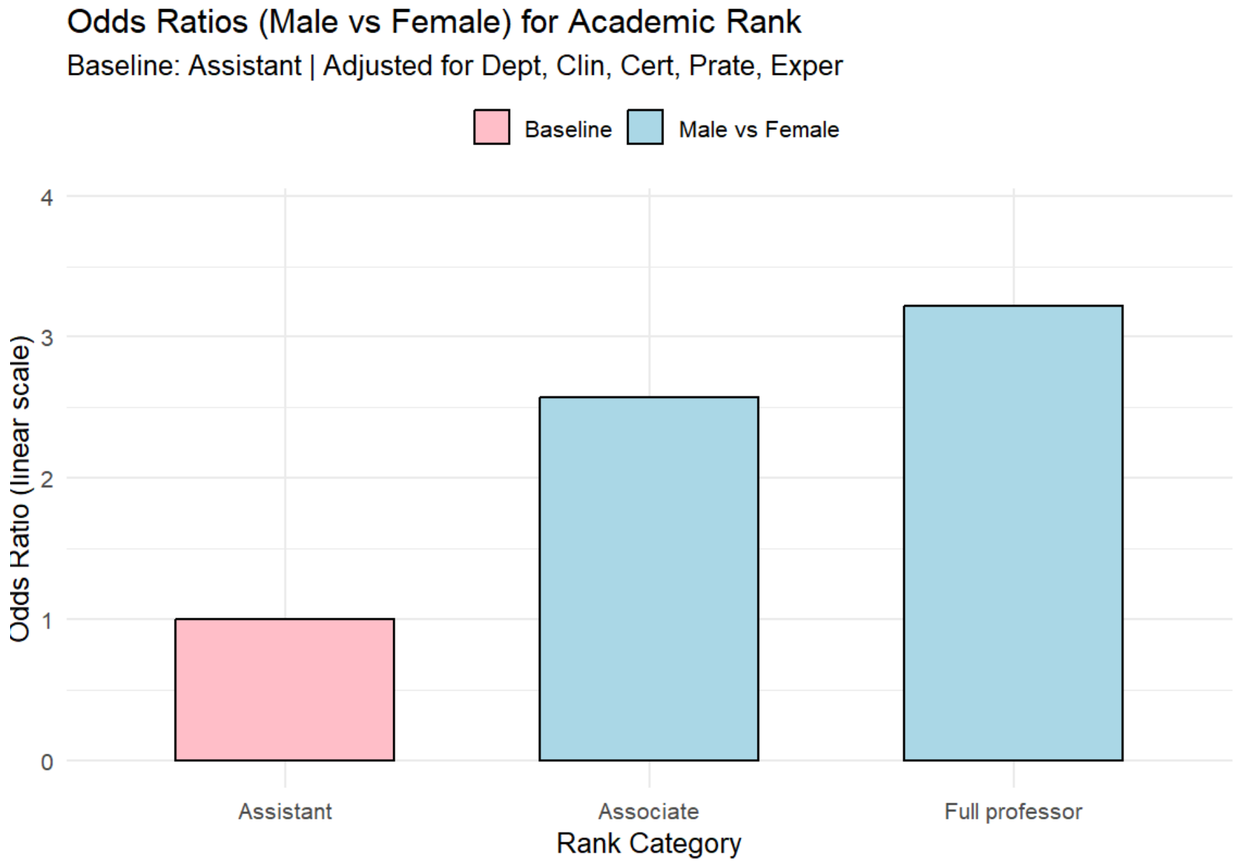
Given this hypothetical dataset, we manipulate the dataset to create **2 new ones** to assume that one are all males and one are all females, so that we keep all other variables constant and use our logistic regression model to predict the chance that male or female can be promoted to higher positions.

Logistic Regression Result - Rank

```
Coefficients:
               (Intercept) GenderMale DeptPhysiology DeptGenetics DeptPediatrics DeptMedicine DeptSurgery
Associate        -1.118726  0.9443212      0.9285269   0.02587890      0.2214147   -0.3956320   -1.533060
Full professor   -2.668739  1.1681863      0.9621182   0.05475274     -1.2262315   -0.7718433   -2.590581
               ClinPrimarily clinical emphasis CertBoard certified      Prate     Exper
Associate                         -0.8738808          -1.2807891 -0.4047080 0.4516098
Full professor                    -0.7515261          -0.5936204 -0.3799801 0.5414052
```

Multi-logistic regression output

Logistic Regression Result - Rank



Odds ratio comparison against baseline group (Assistant)

Using **Rank** as the target variable and the rest as predictor variable, we found that:
Keeping other variables constant, being a male increase the relevant chance of becoming an associate professor by about **1.5 times**, and are more than **2 times** likely to become a full professor.