

# Is it Still Fair? A Comparative Evaluation of Fairness Algorithms through the Lens of Covariate Drift-Supplementary

Anonymous Author(s)\*

## CCS CONCEPTS

- Computing methodologies → Regularization; Multi-agent systems;
- Applied computing → Law; *Interactive learning environments*;
- Information systems → Clustering and classification.

## KEYWORDS

Algorithmic Fairness, Covariate Drift, Fairness Algorithms, Robustness

### ACM Reference Format:

Anonymous Author(s). 2024. Is it Still Fair? A Comparative Evaluation of Fairness Algorithms through the Lens of Covariate Drift-Supplementary. In *Proceedings of The 47th International ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR'24)*. ACM, New York, NY, USA, 31 pages. <https://doi.org/XXXXXXXX.XXXXXXXX>

## 1 ROBUSTNESS OF FAIRNESS-AWARE-MODELS IN TERMS OF FAIRNESS AND PREDICTIVE PERFORMANCE

### 1.1 NWF Dataset

### 1.2 ITF Dataset

---

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for components of this work owned by others than the author(s) must be honored. Abstracting with credit is permitted. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. Request permissions from [permissions@acm.org](mailto:permissions@acm.org).

SIGIR'24, July 14–18, 2024, Washington D.C., USA

© 2024 Copyright held by the owner/author(s). Publication rights licensed to ACM.  
ACM ISBN 978-1-4503-XXXX-X/18/06  
<https://doi.org/XXXXXXXX.XXXXXXXX>

Data: NWF | Metric: Accuracy | Sensitive Attribute: CITIZENSHIP\_STATUS

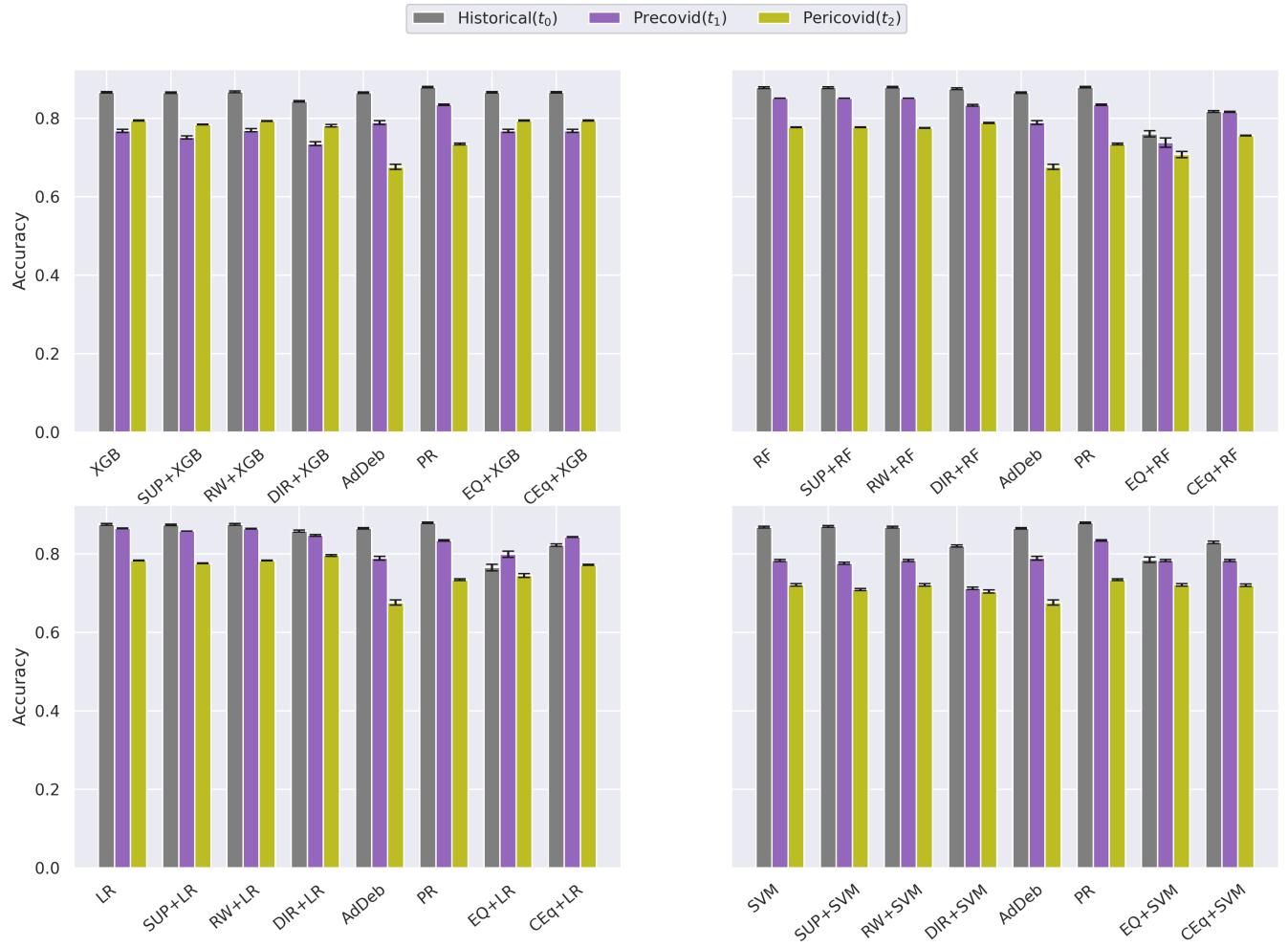


Figure 1: Accuracy for NWF dataset.

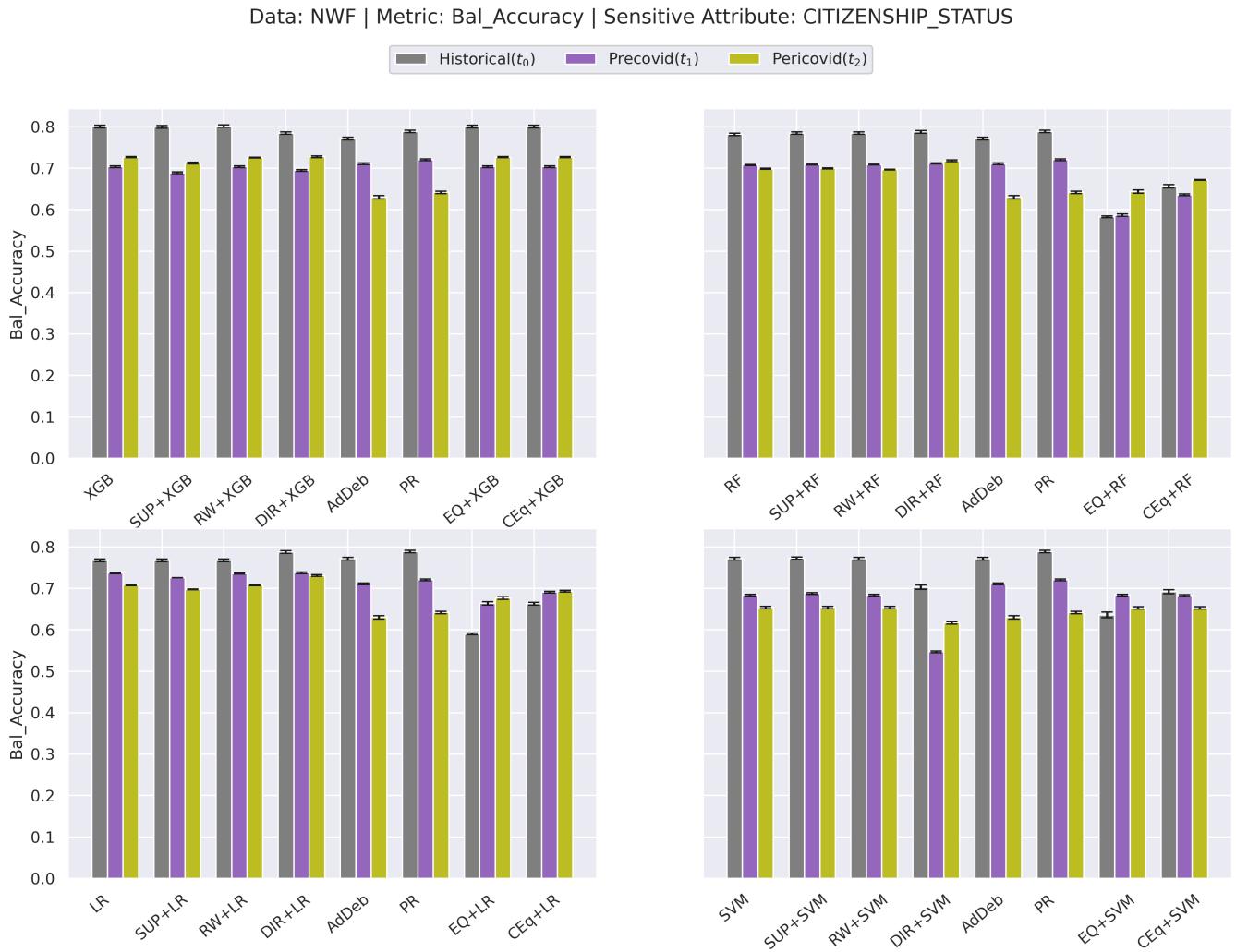
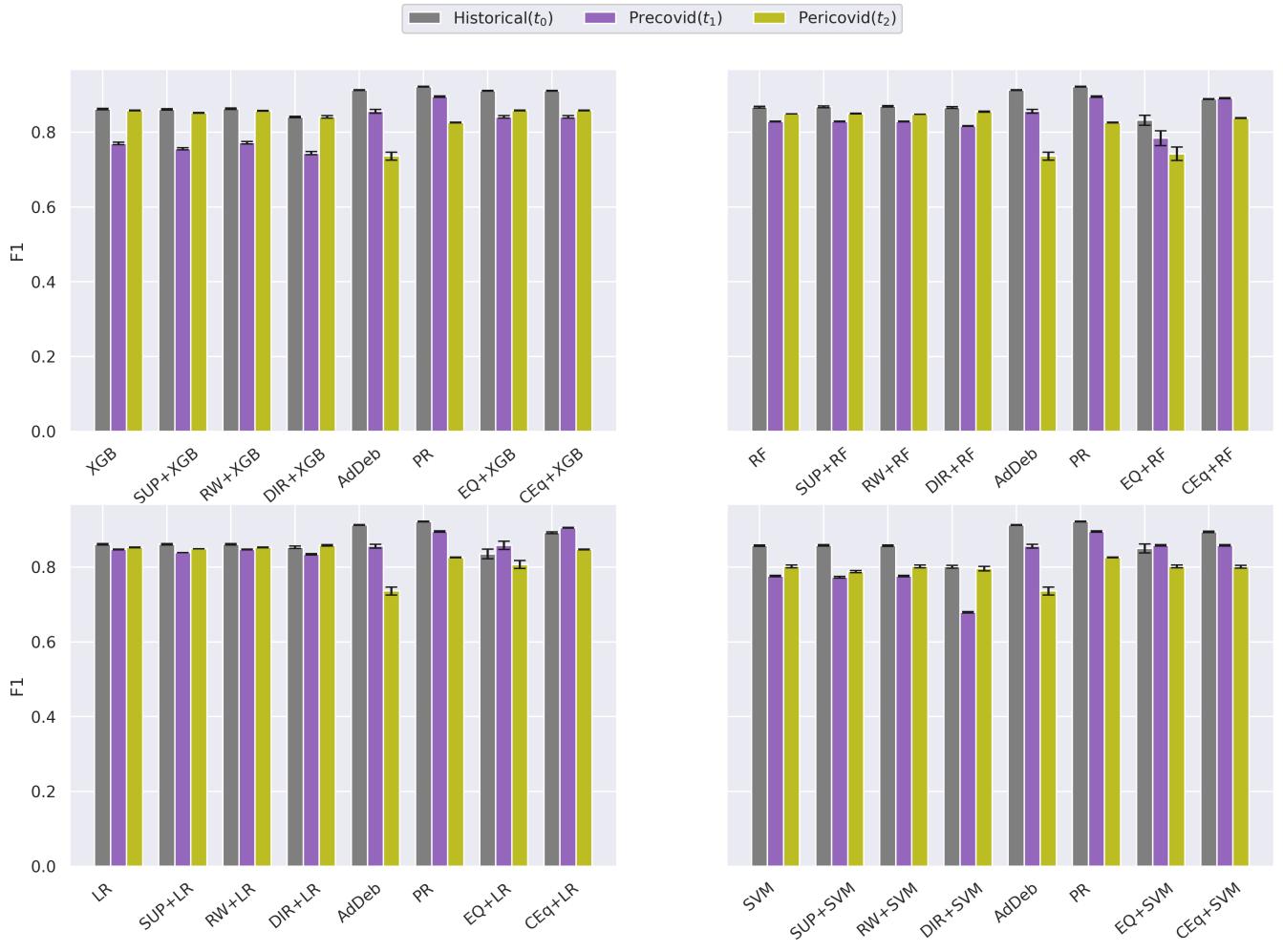


Figure 2: Balanced Accuracy for NWF dataset.

Data: NWF | Metric: F1 | Sensitive Attribute: CITIZENSHIP\_STATUS

**Figure 3: F1 for NWF dataset.**

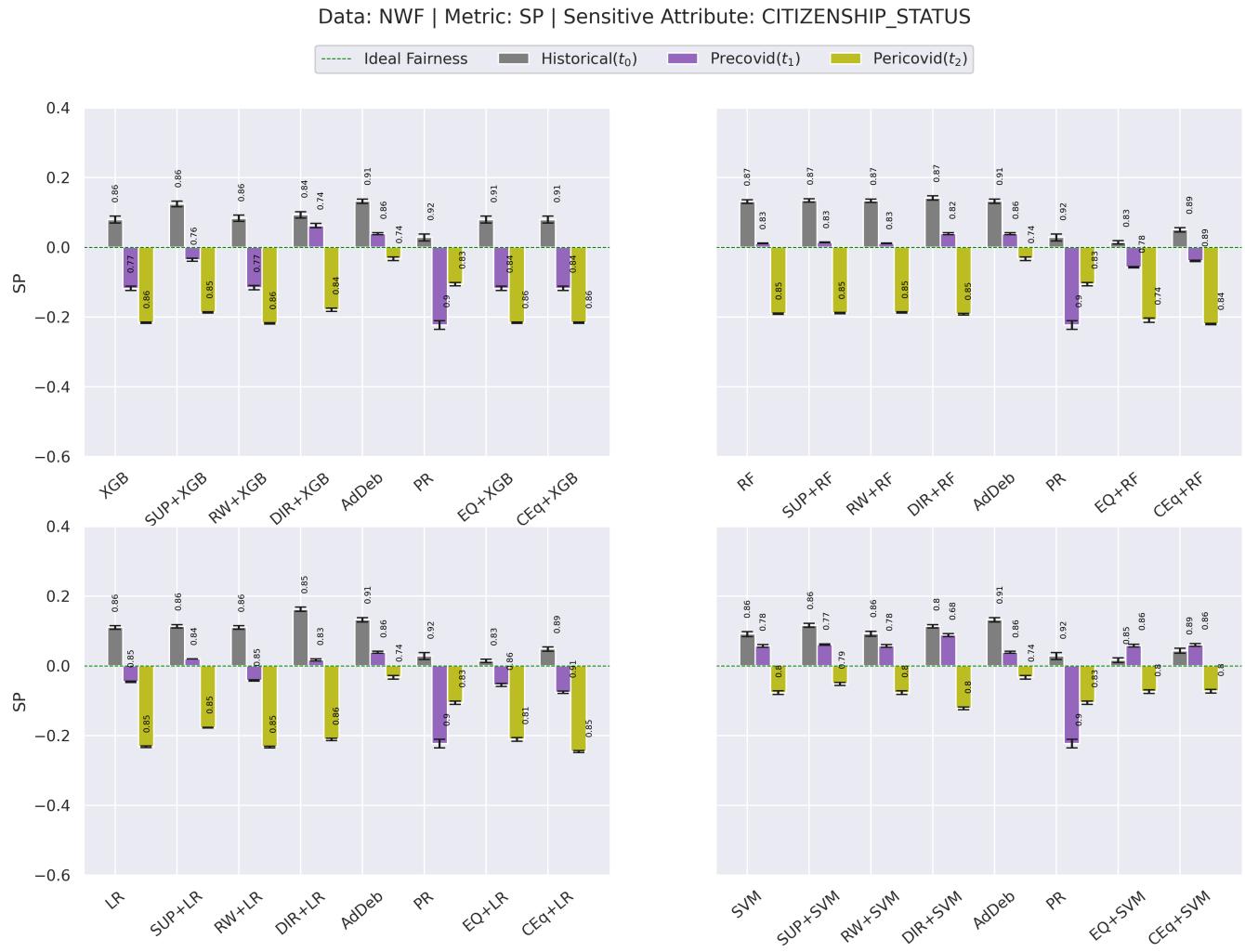


Figure 4: SP for NWF dataset.

Data: NWF | Metric: DI | Sensitive Attribute: CITIZENSHIP\_STATUS

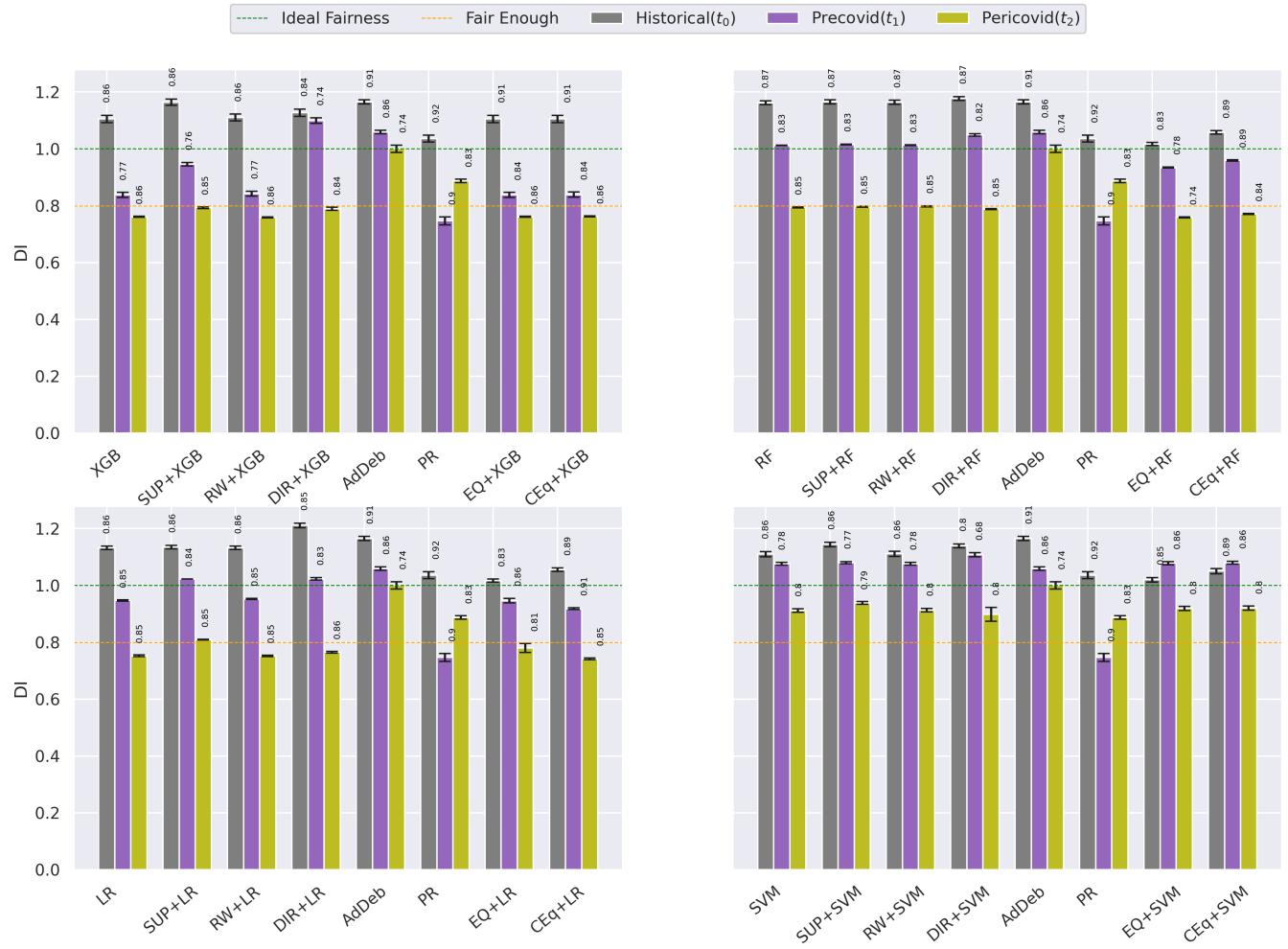


Figure 5: DI for NWF dataset.

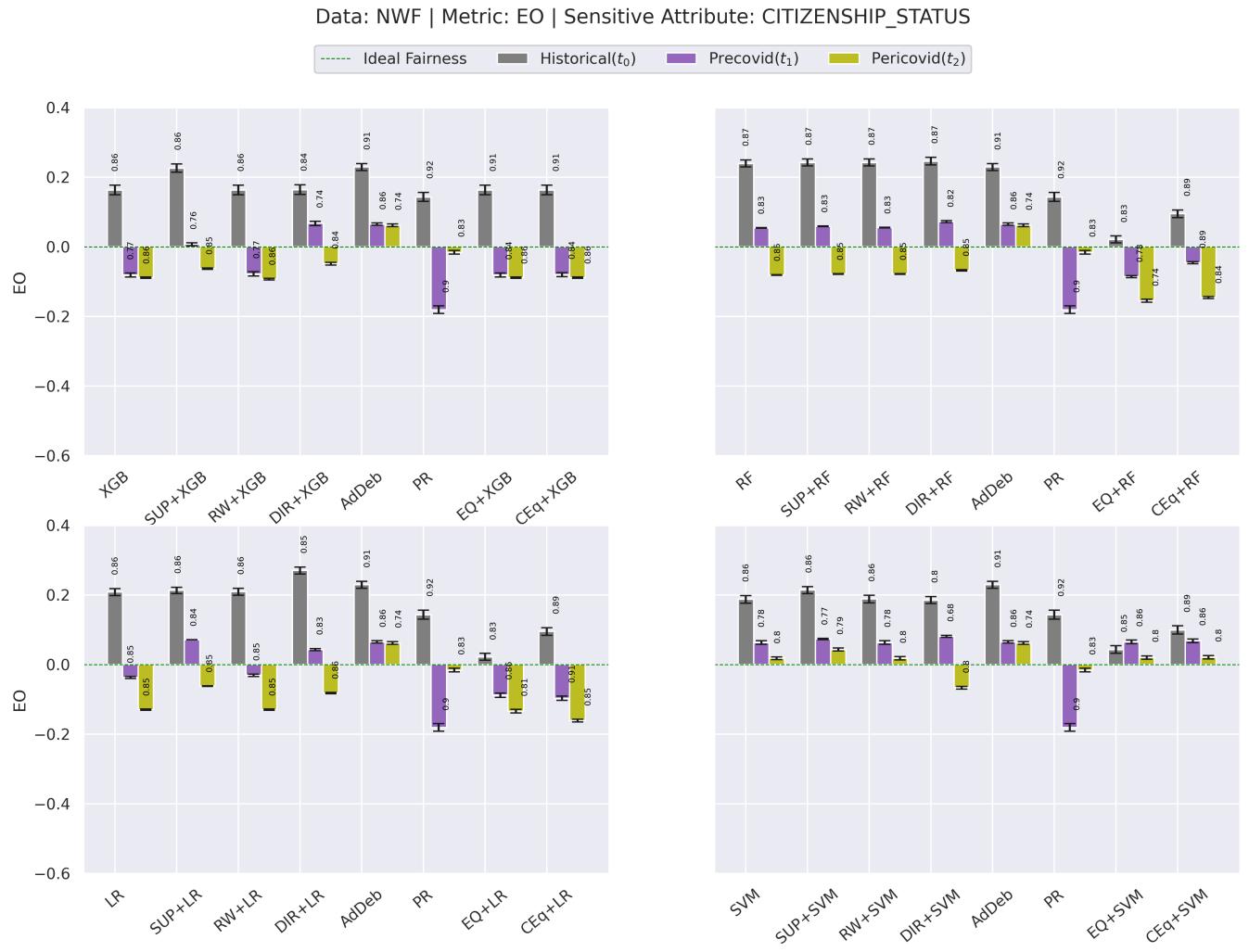


Figure 6: EO for NWF dataset.



Figure 7: EOP for NWF dataset.



Figure 8: ERD for NWF dataset.

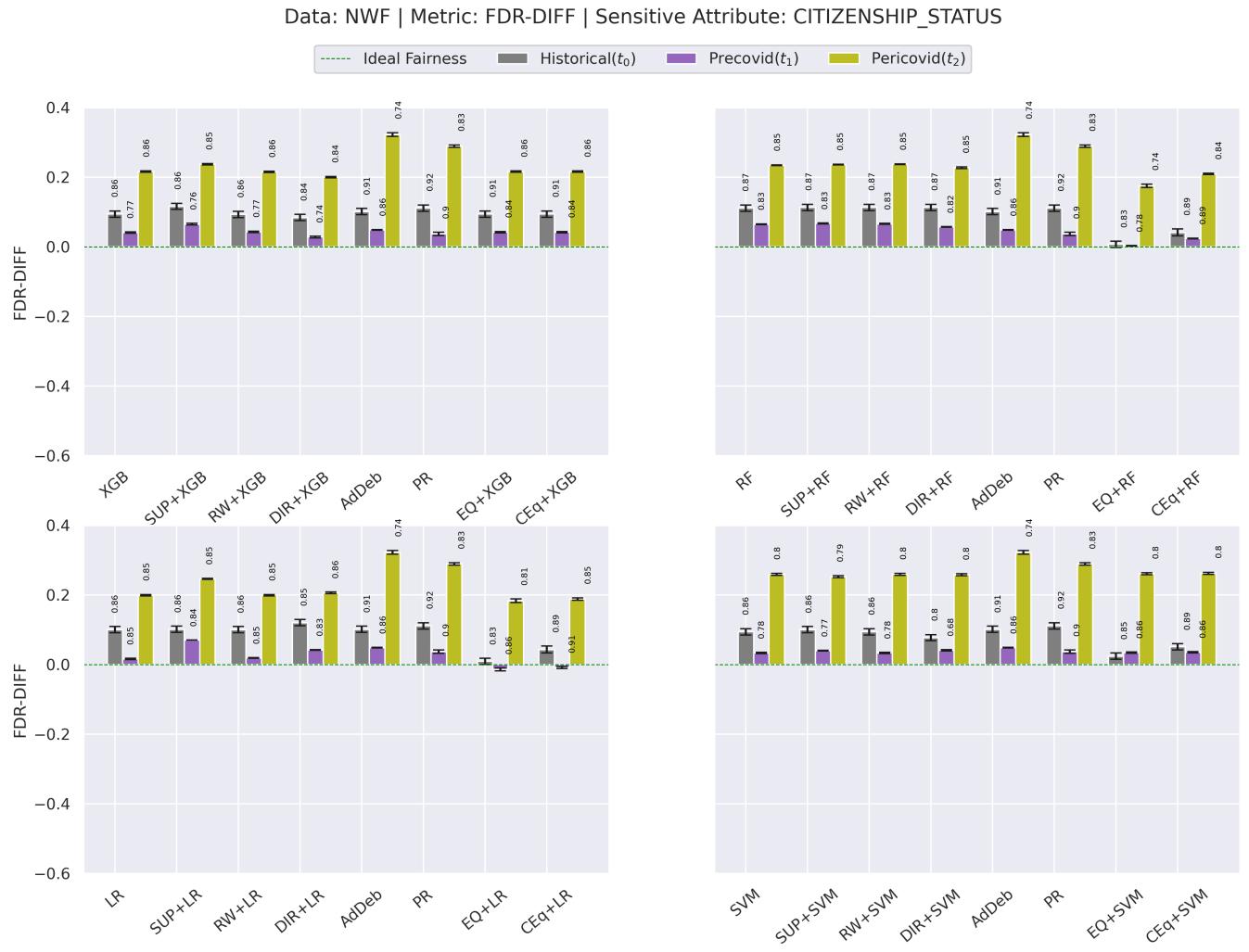


Figure 9: FDR-DIFF for NWF dataset.

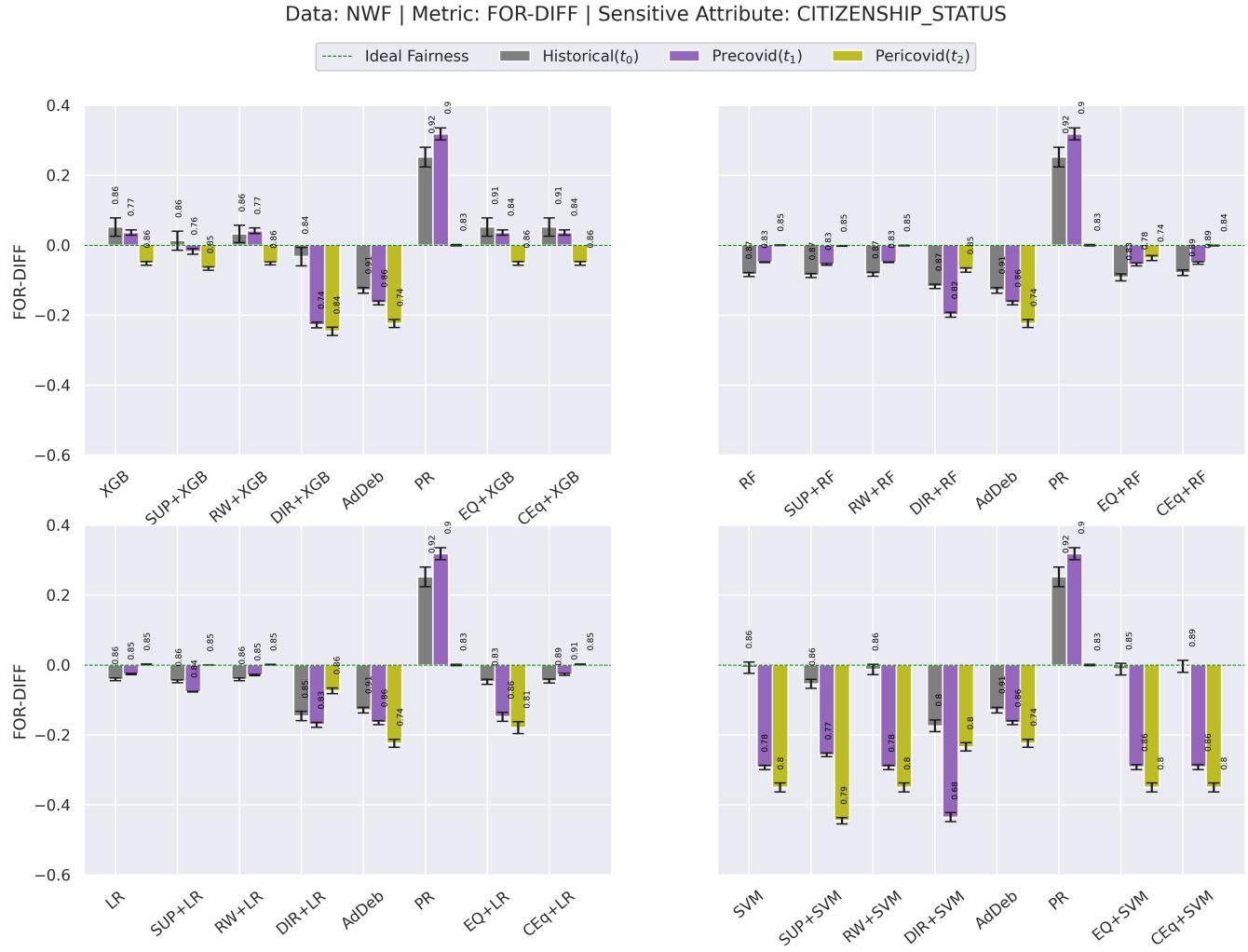


Figure 10: FOR-DIFF for NWF dataset.

Data: NWF | Metric: IF | Sensitive Attribute: CITIZENSHIP\_STATUS

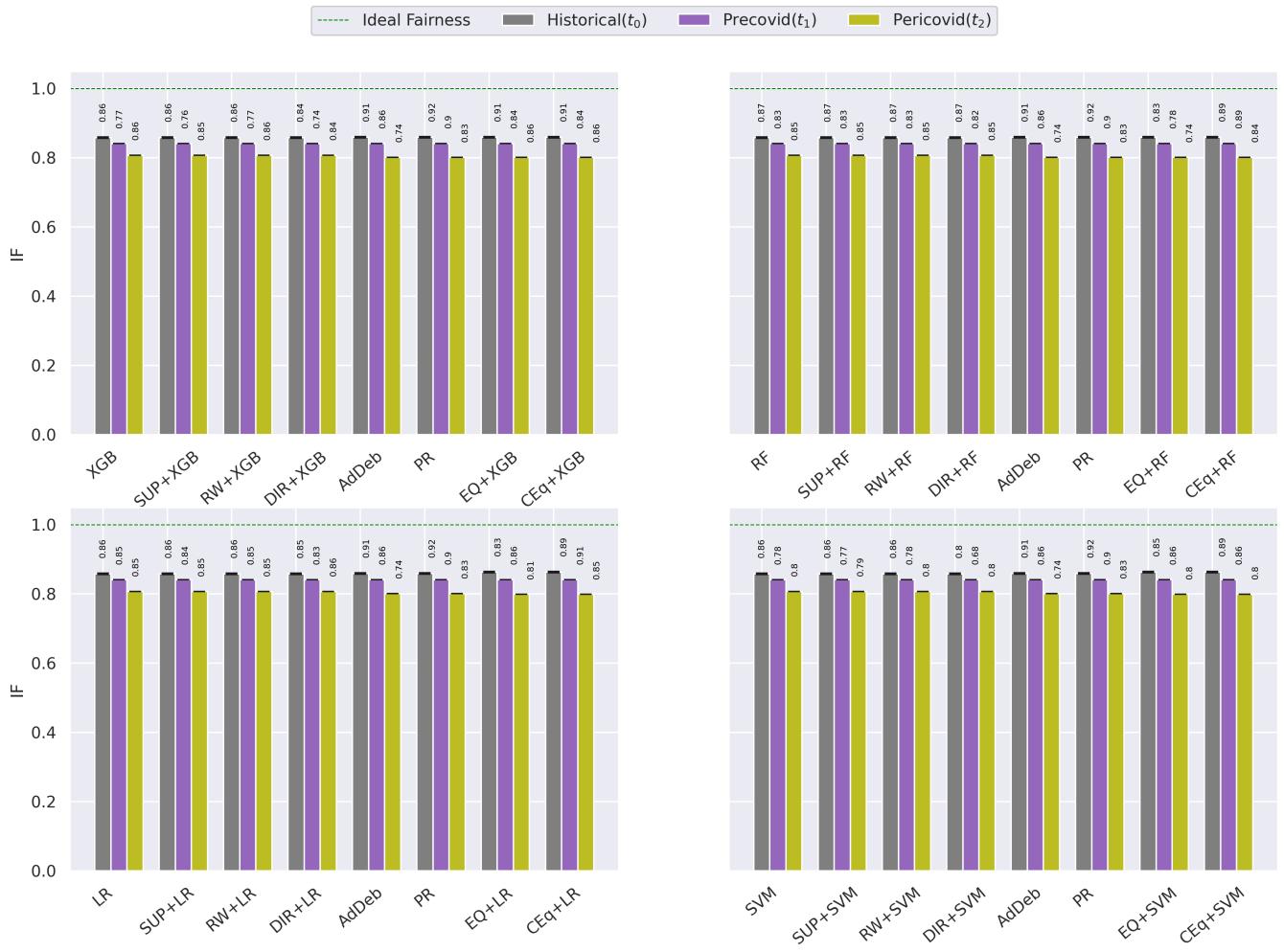


Figure 11: Consistency for NWF dataset.

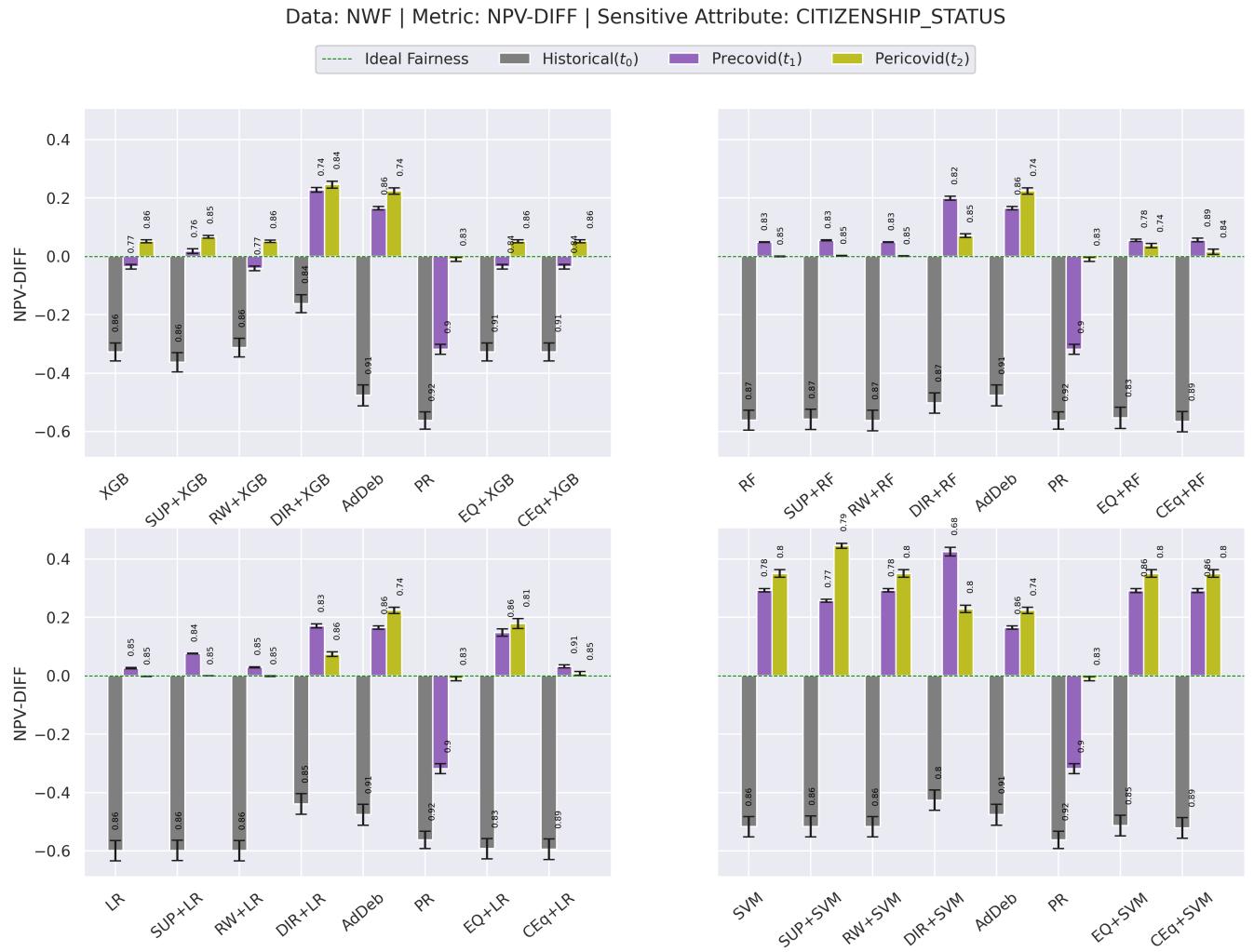


Figure 12: NPV-DIFF for NWF dataset.

Data: NWF | Metric: PPV-DIFF | Sensitive Attribute: CITIZENSHIP\_STATUS

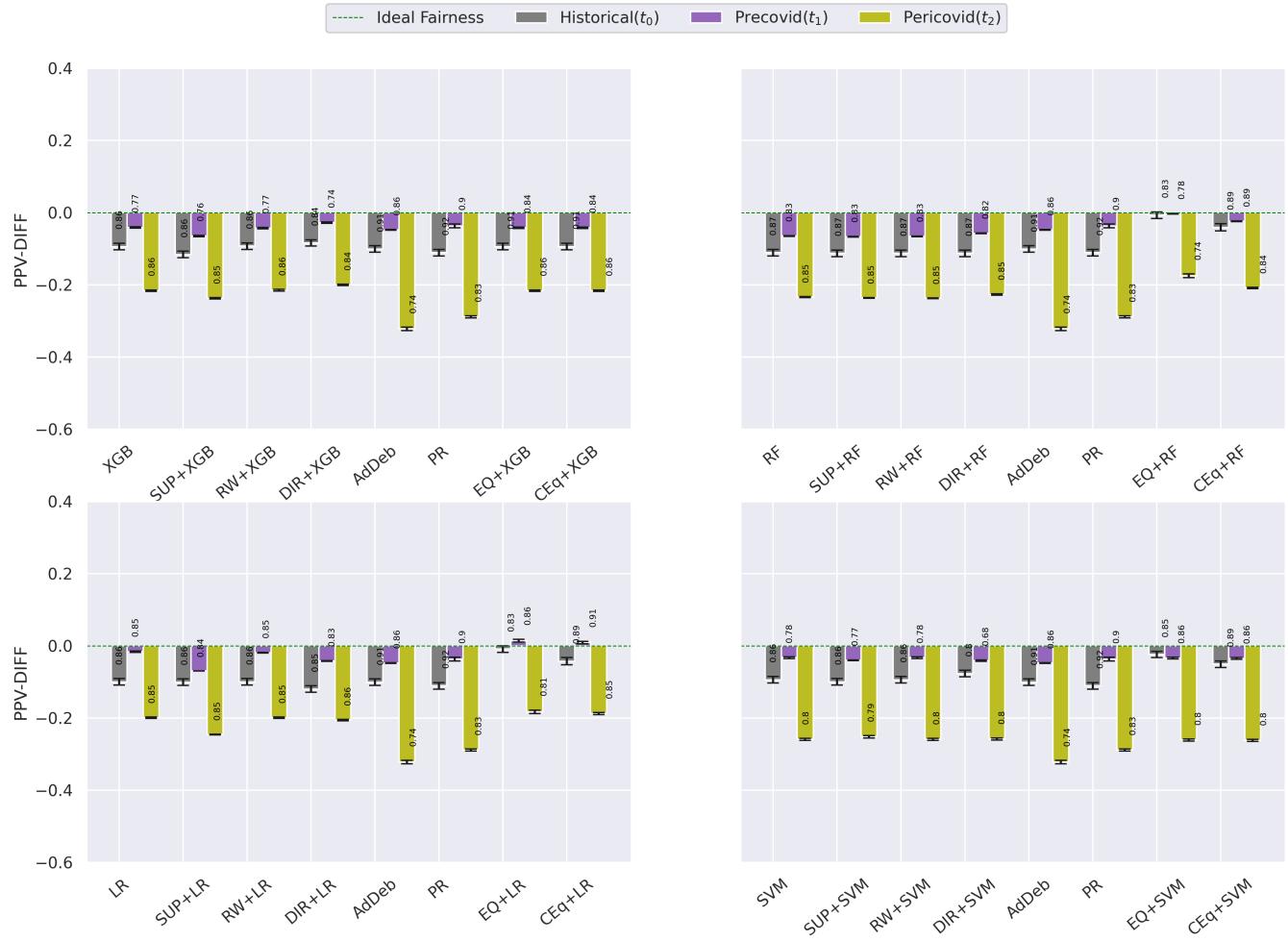


Figure 13: PPV-DIFF for NWF dataset.

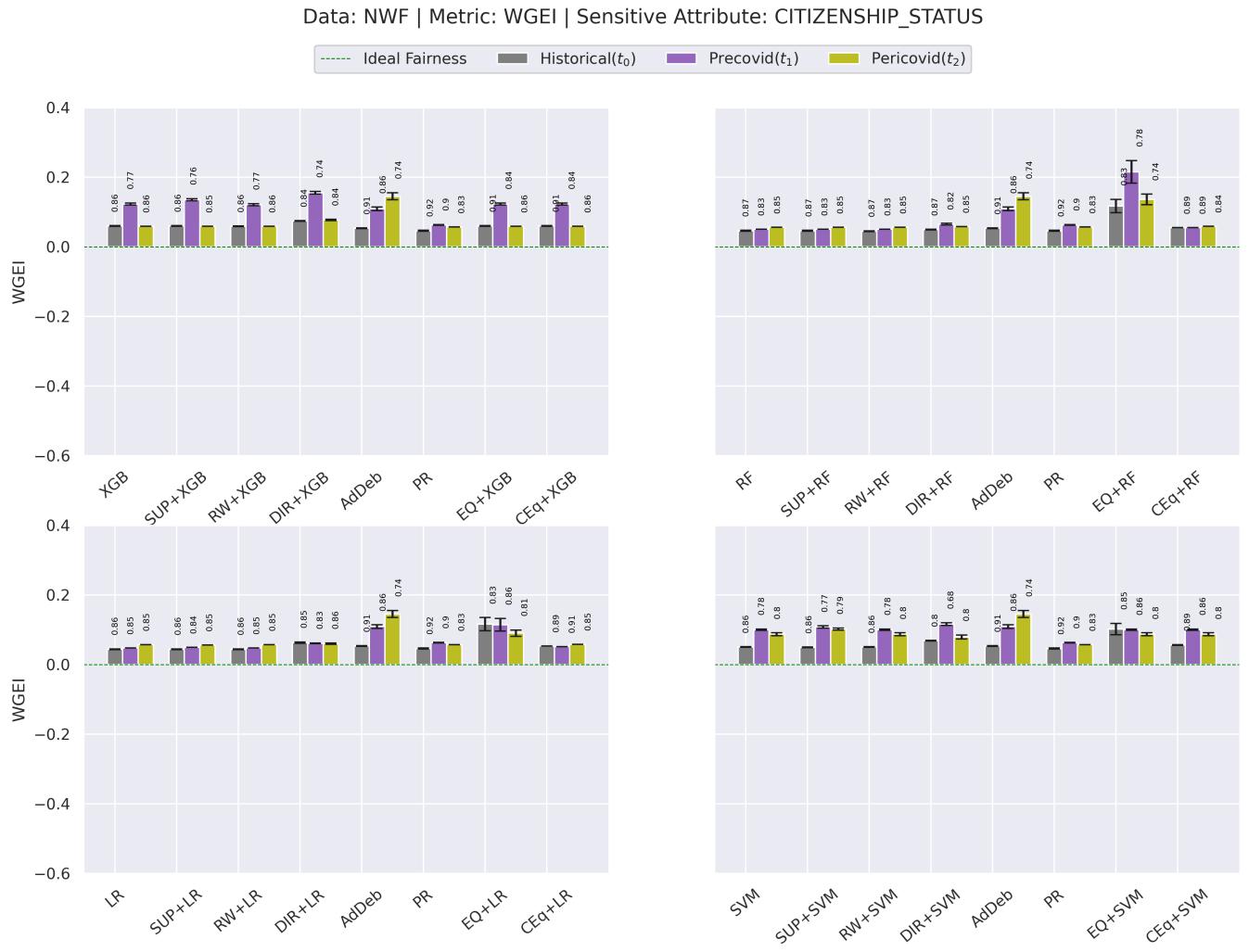


Figure 14: WGEI for NWF dataset.

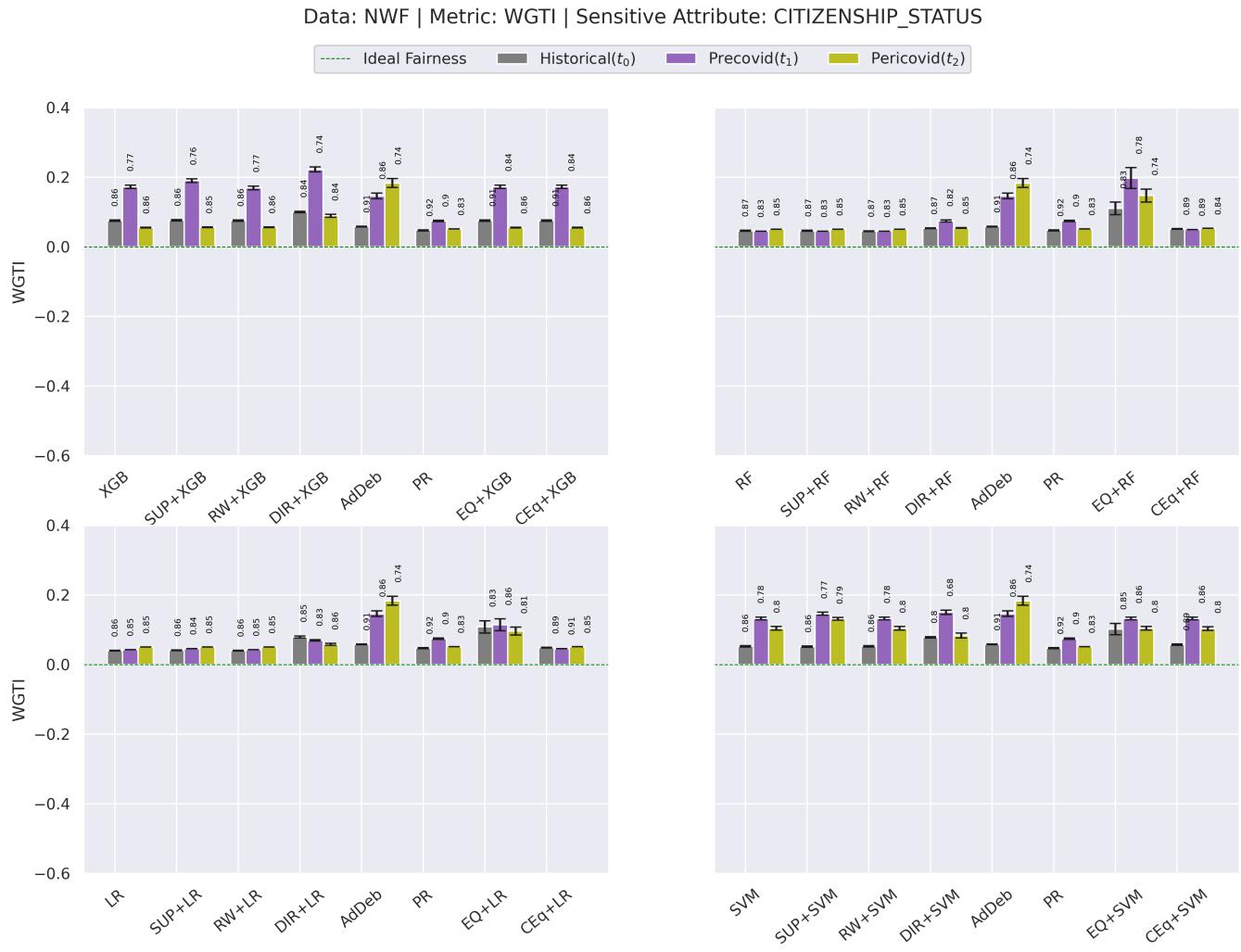


Figure 15: WGTI for NWF dataset.

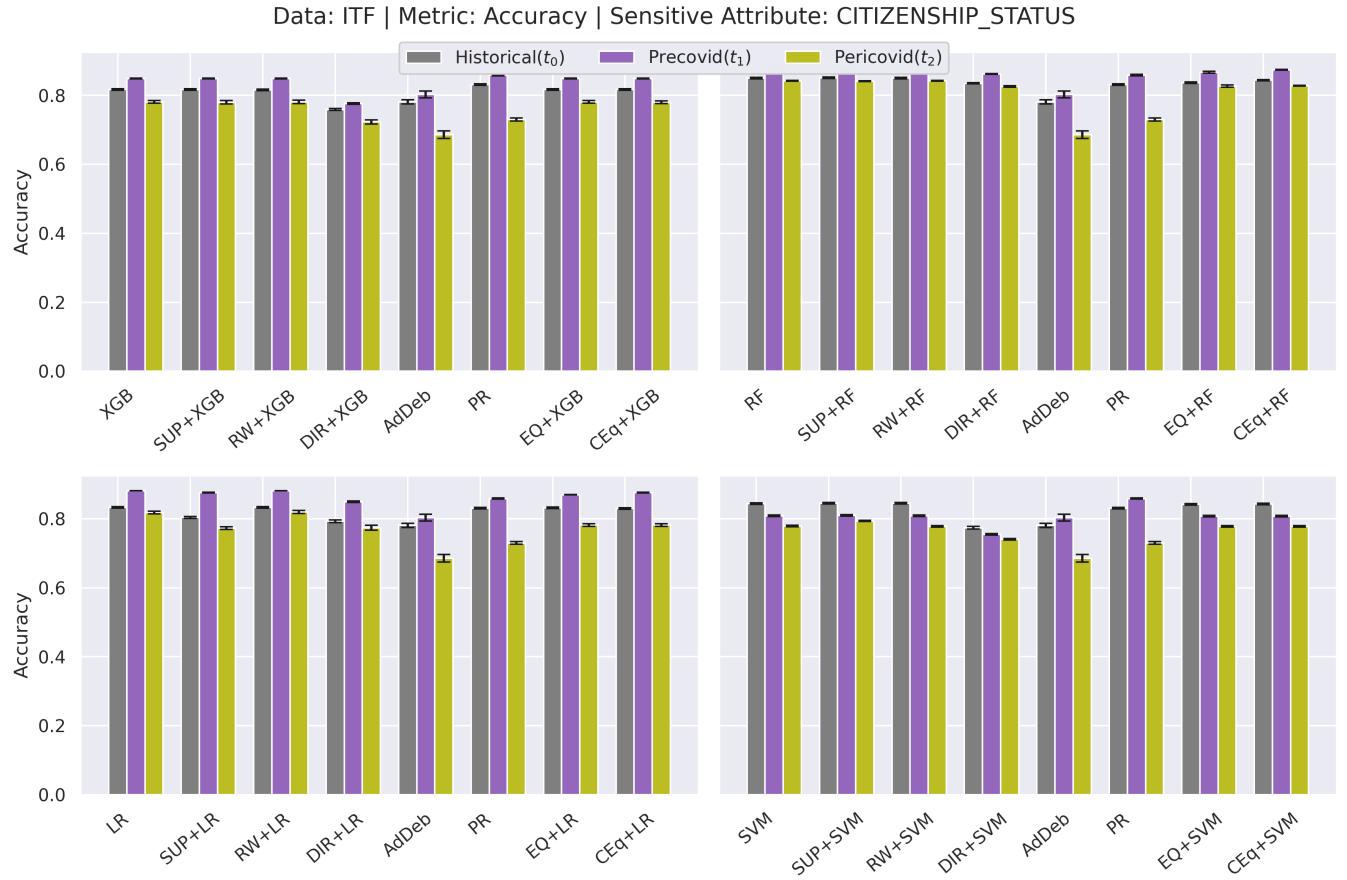
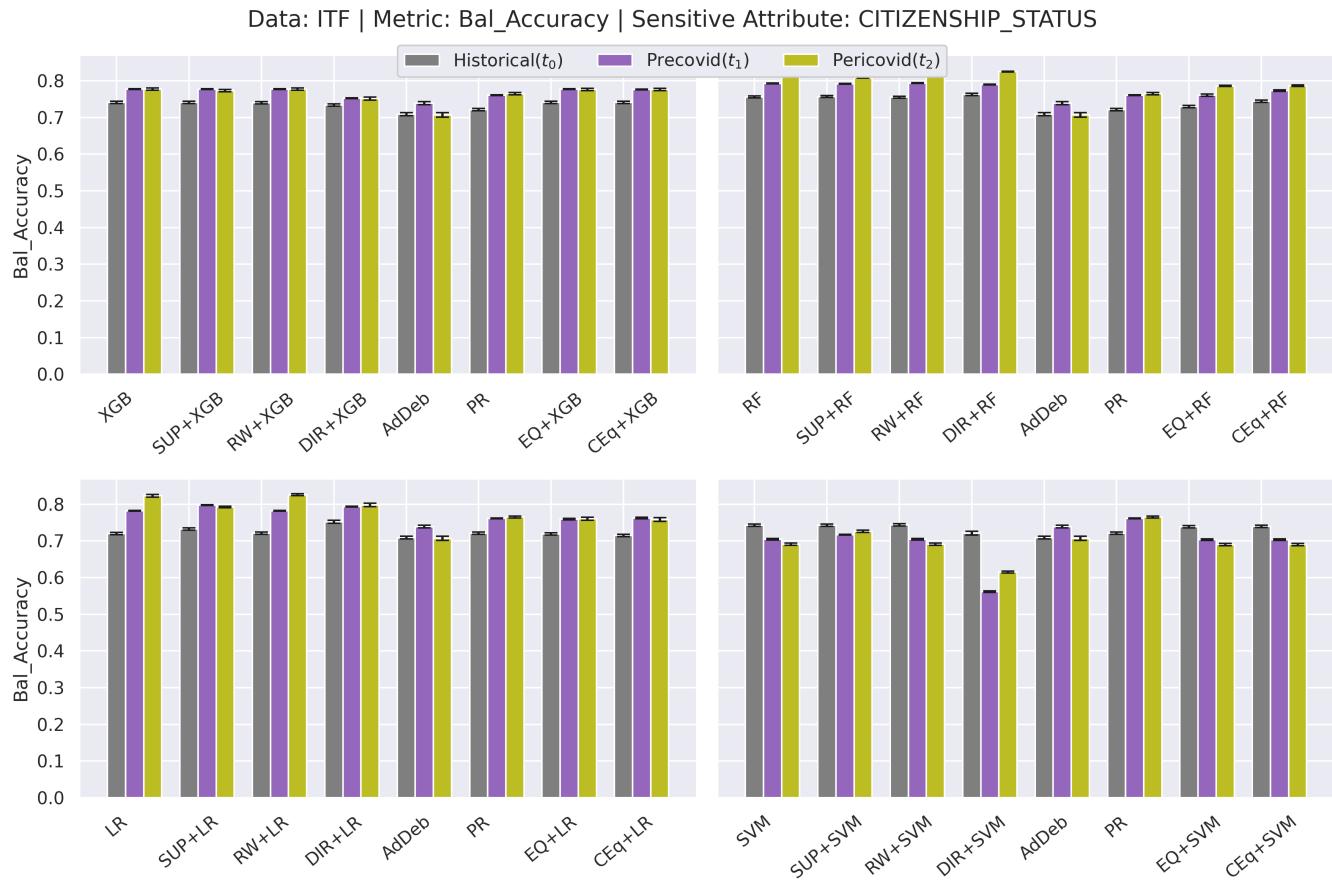
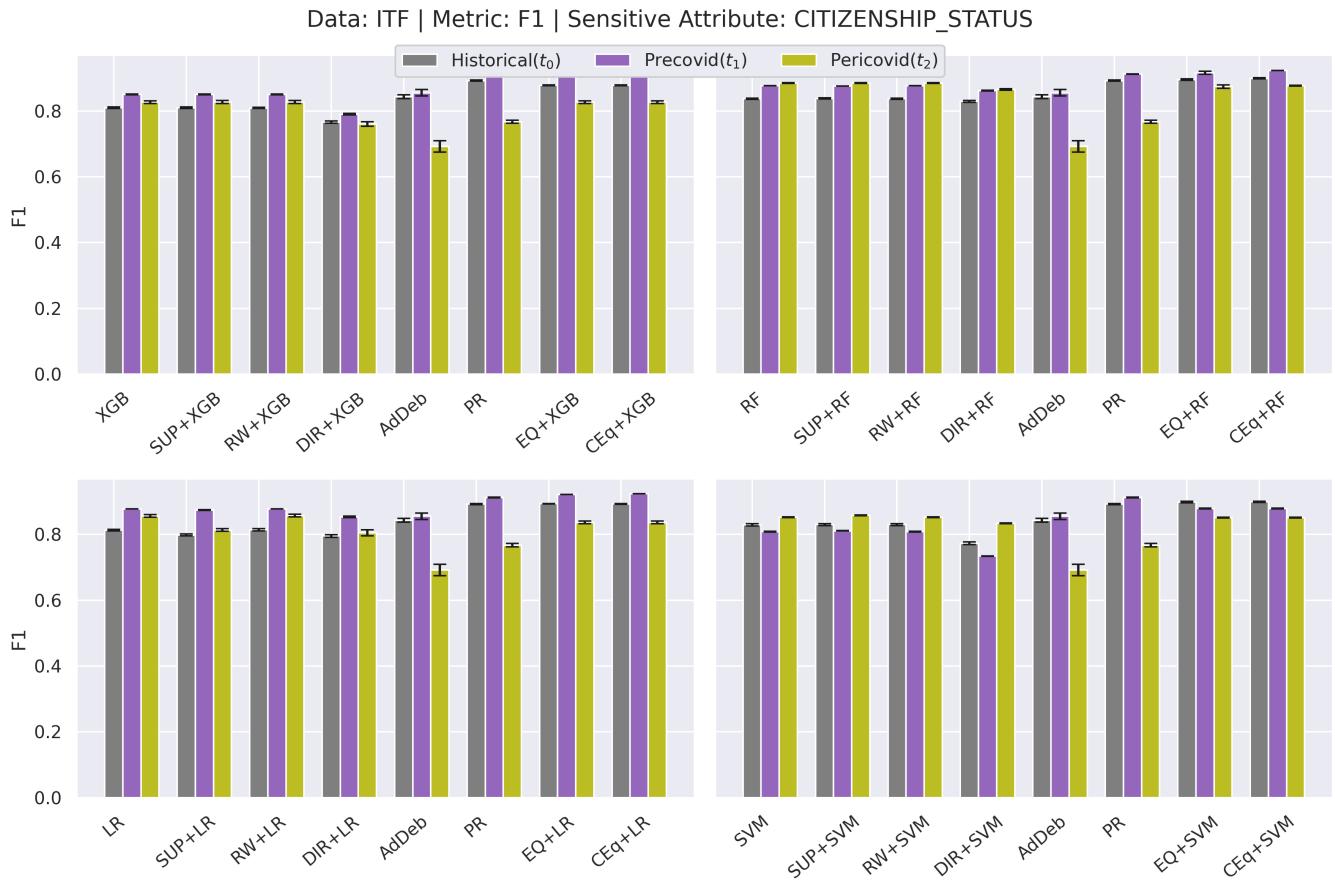


Figure 16: Accuracy for ITF dataset.



**Figure 17: Balanced Accuracy for ITF dataset.**

**Figure 18: F1 for ITF dataset.**

Data: ITF | Metric: SP | Sensitive Attribute: CITIZENSHIP\_STATUS

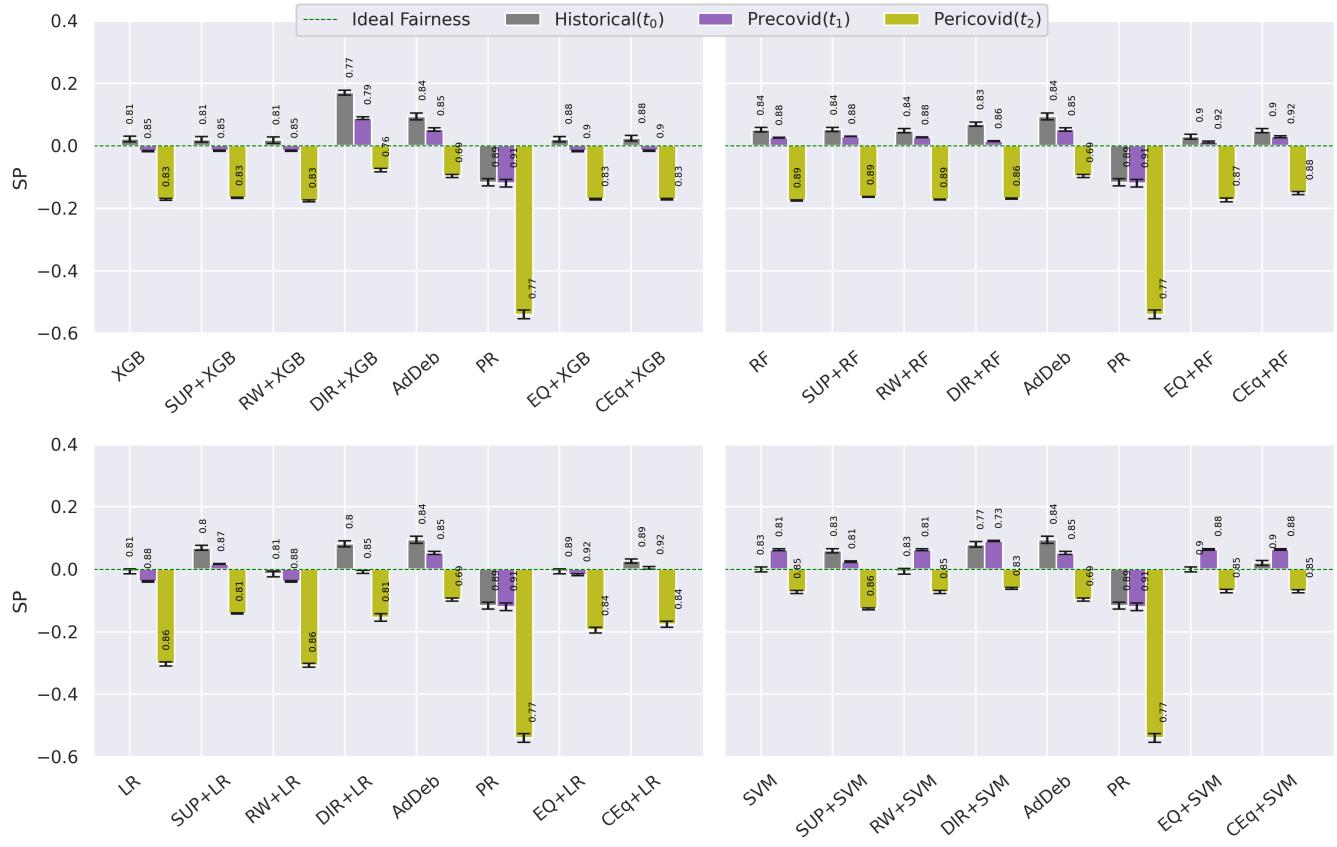
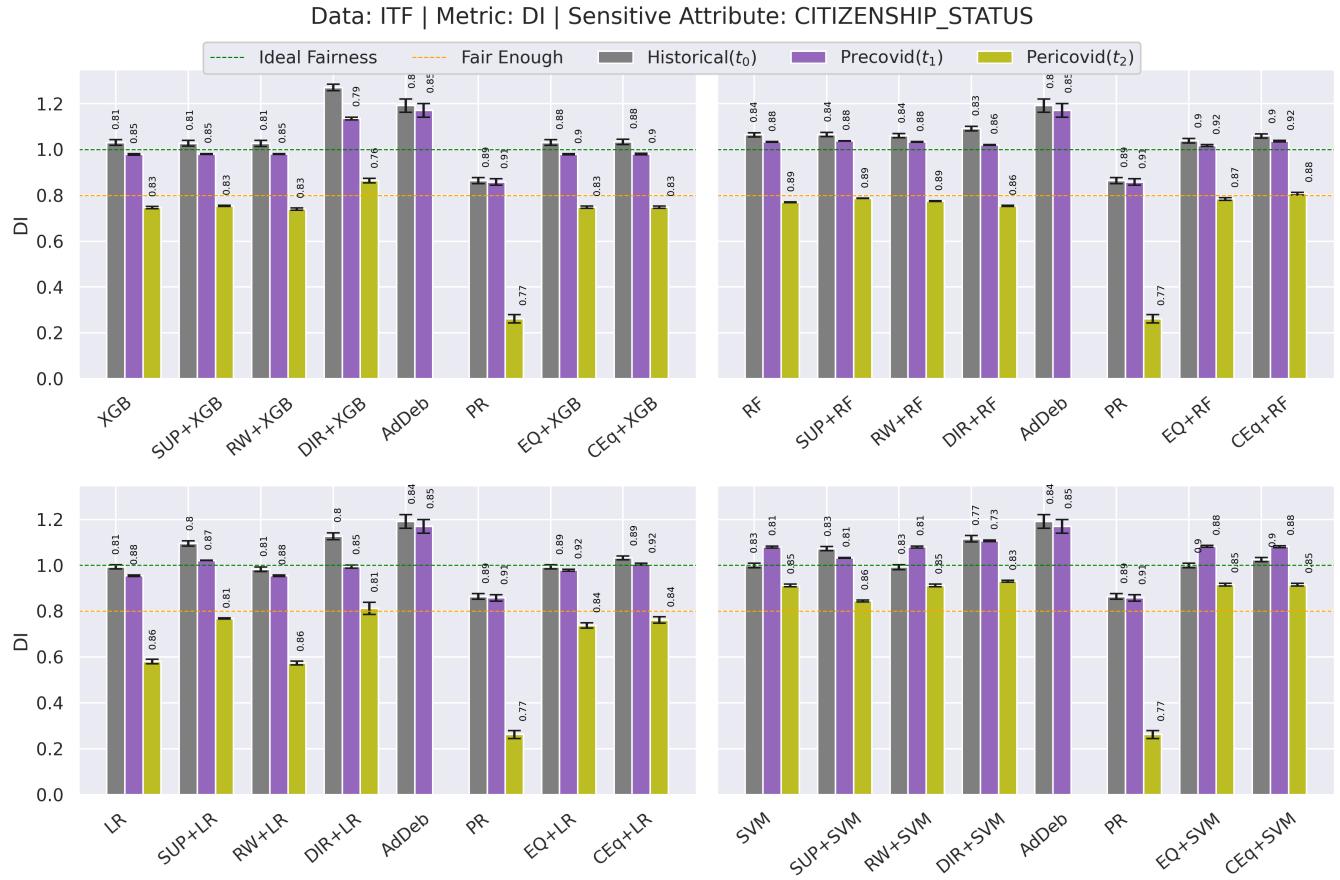


Figure 19: SP for ITF dataset.

**Figure 20: DI for ITF dataset.**

Data: ITF | Metric: EO | Sensitive Attribute: CITIZENSHIP\_STATUS

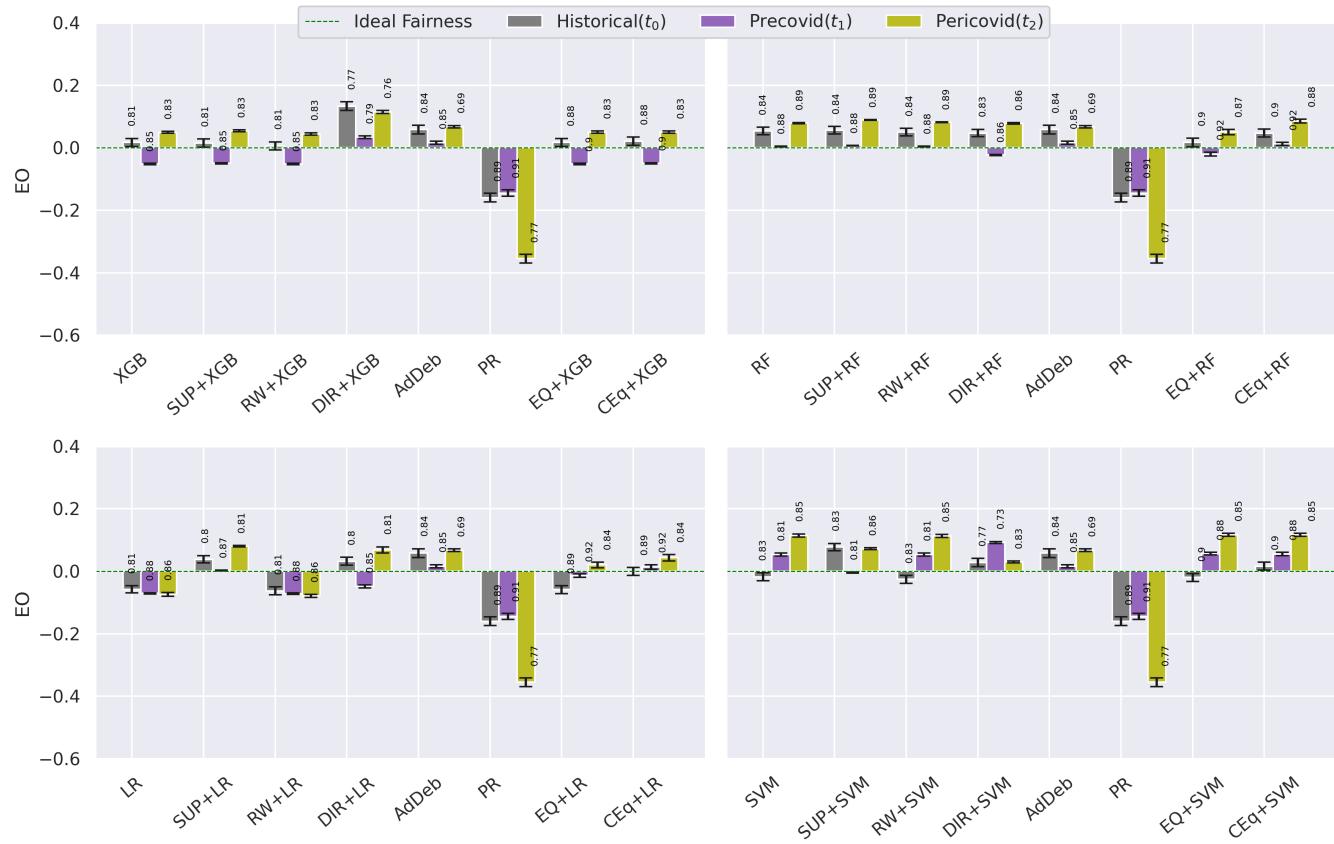


Figure 21: EO for ITF dataset.

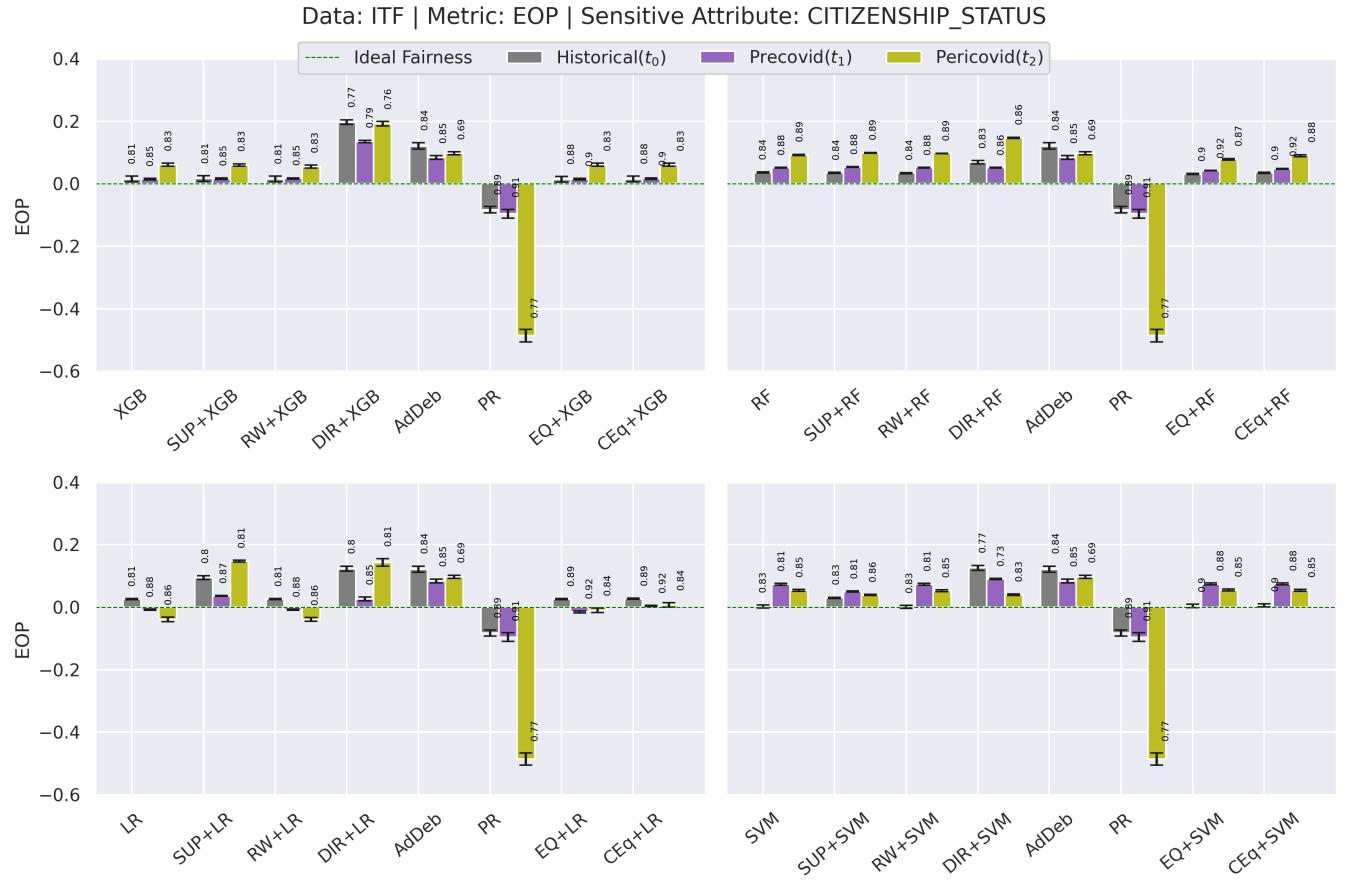


Figure 22: EOP for ITF dataset.

Data: ITF | Metric: ERD | Sensitive Attribute: CITIZENSHIP\_STATUS

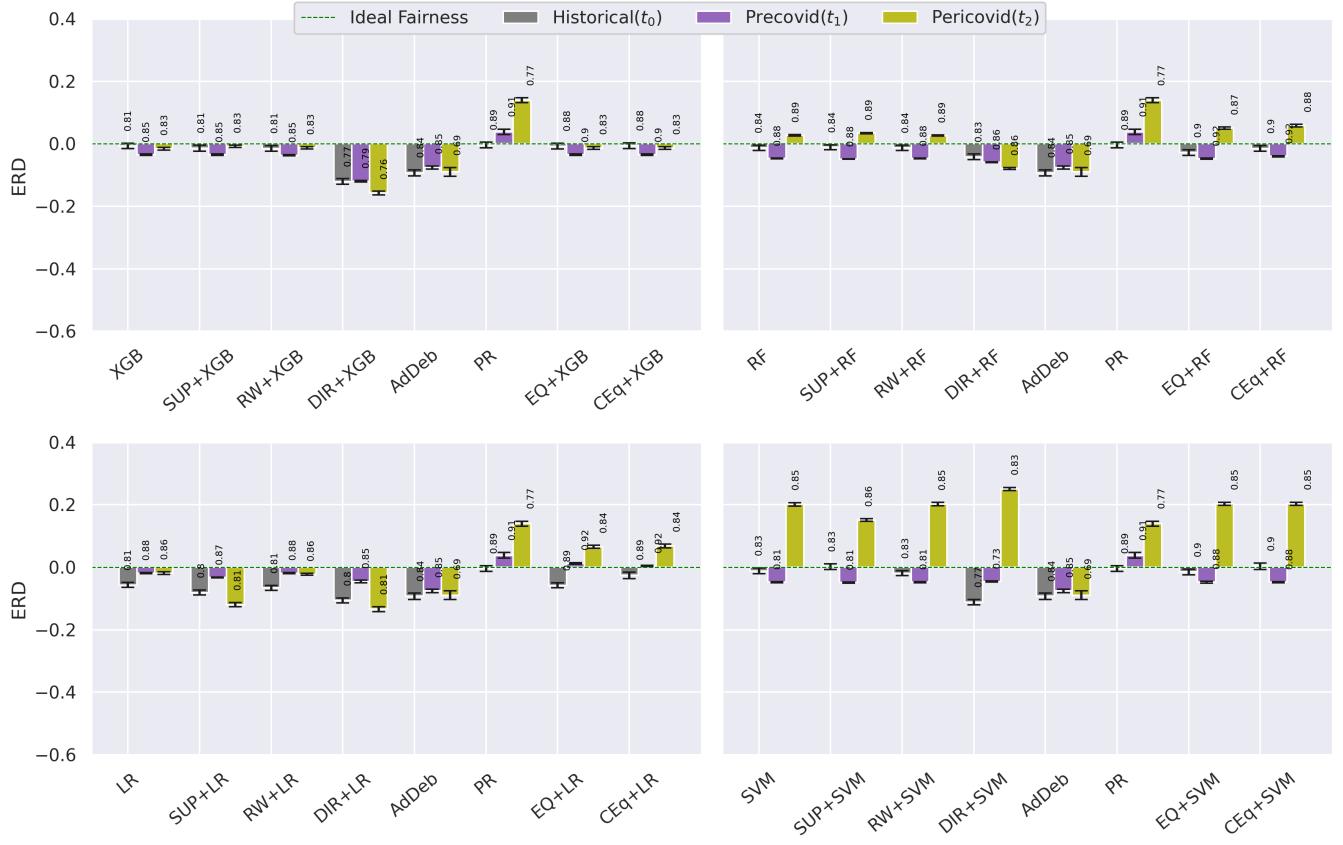


Figure 23: ERD for ITF dataset.

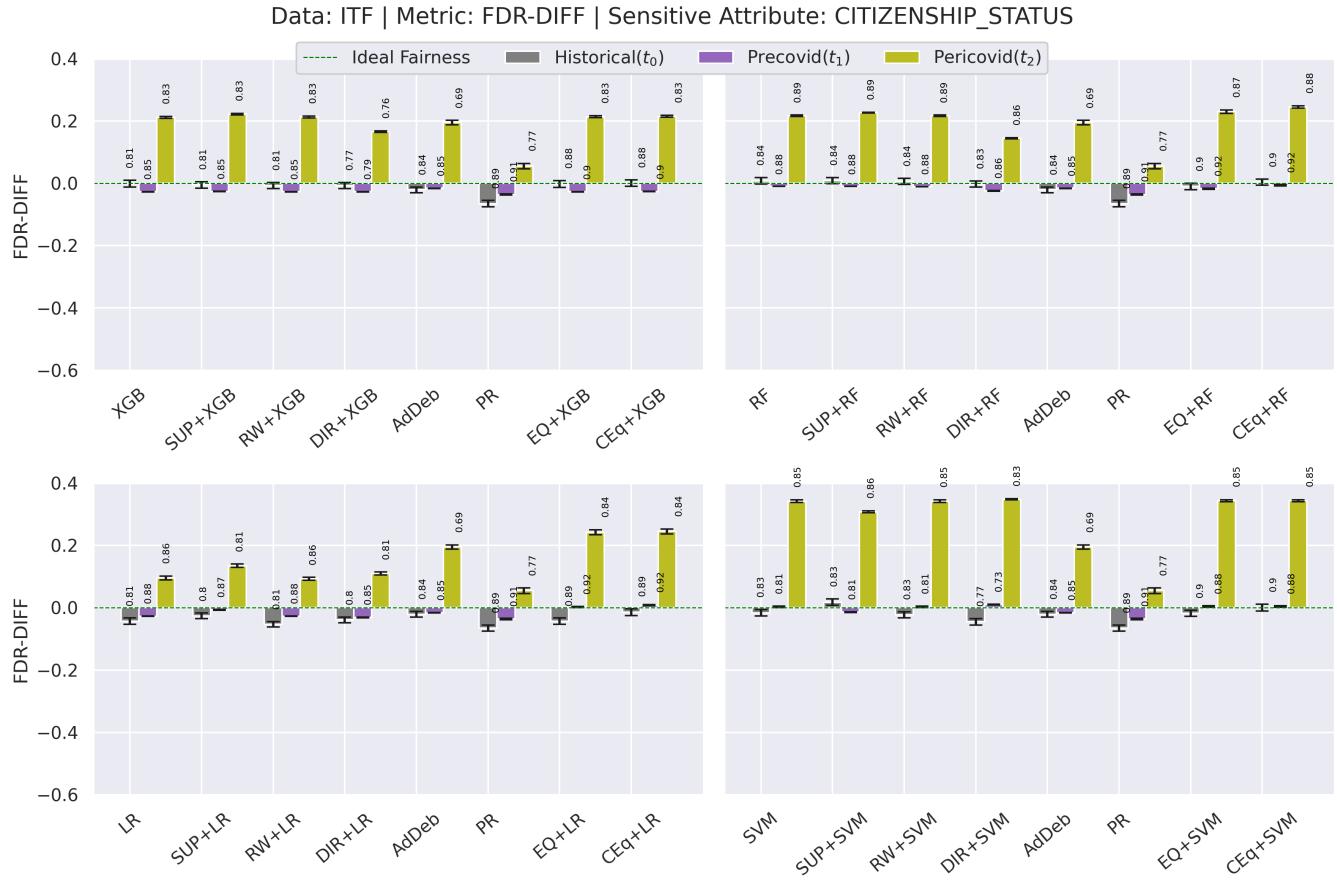
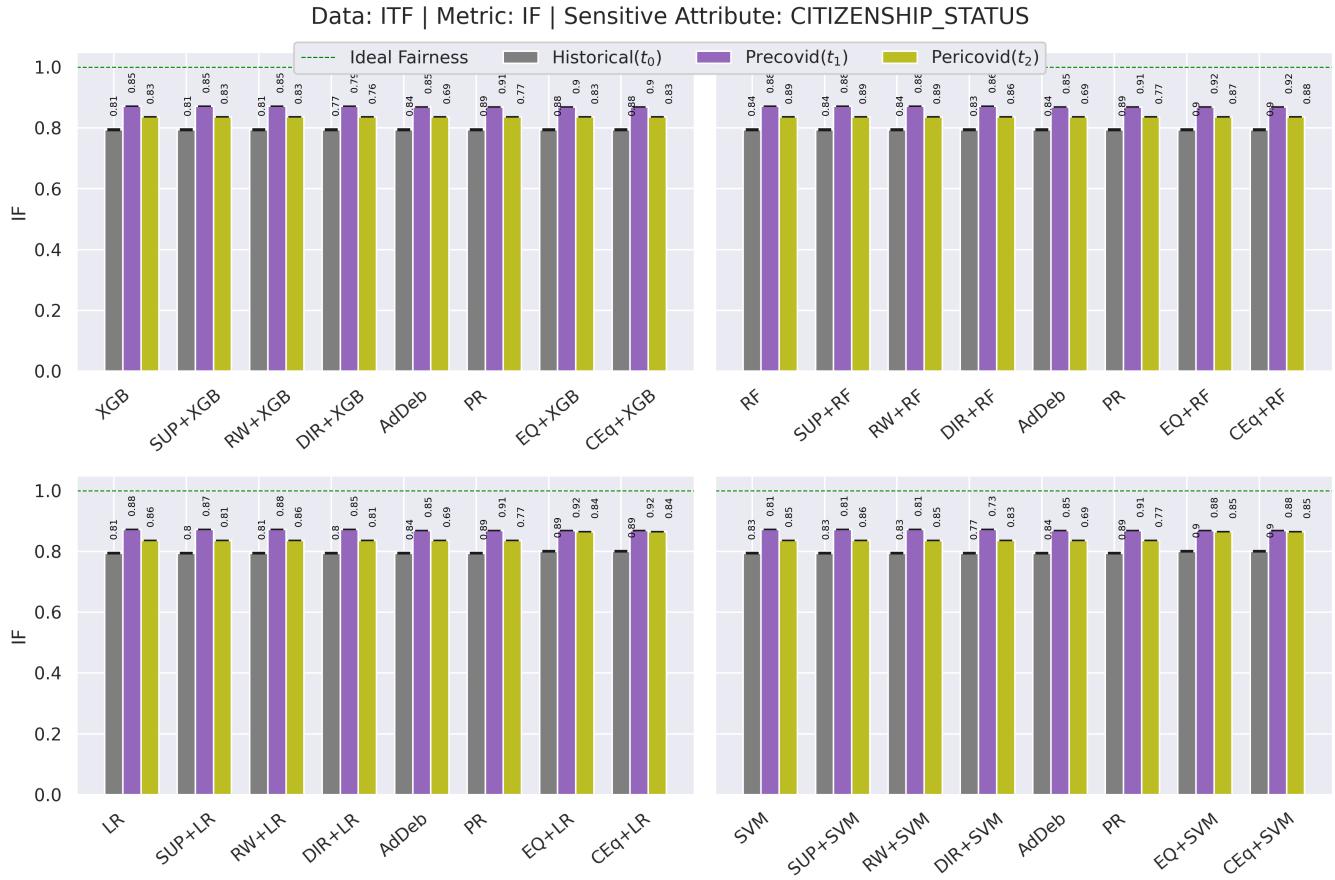


Figure 24: FDR-DIFF for ITF dataset.



Figure 25: FOR-DIFF for ITF dataset.

**Figure 26: Consistency for ITF dataset.**

Data: ITF | Metric: NPV-DIFF | Sensitive Attribute: CITIZENSHIP\_STATUS

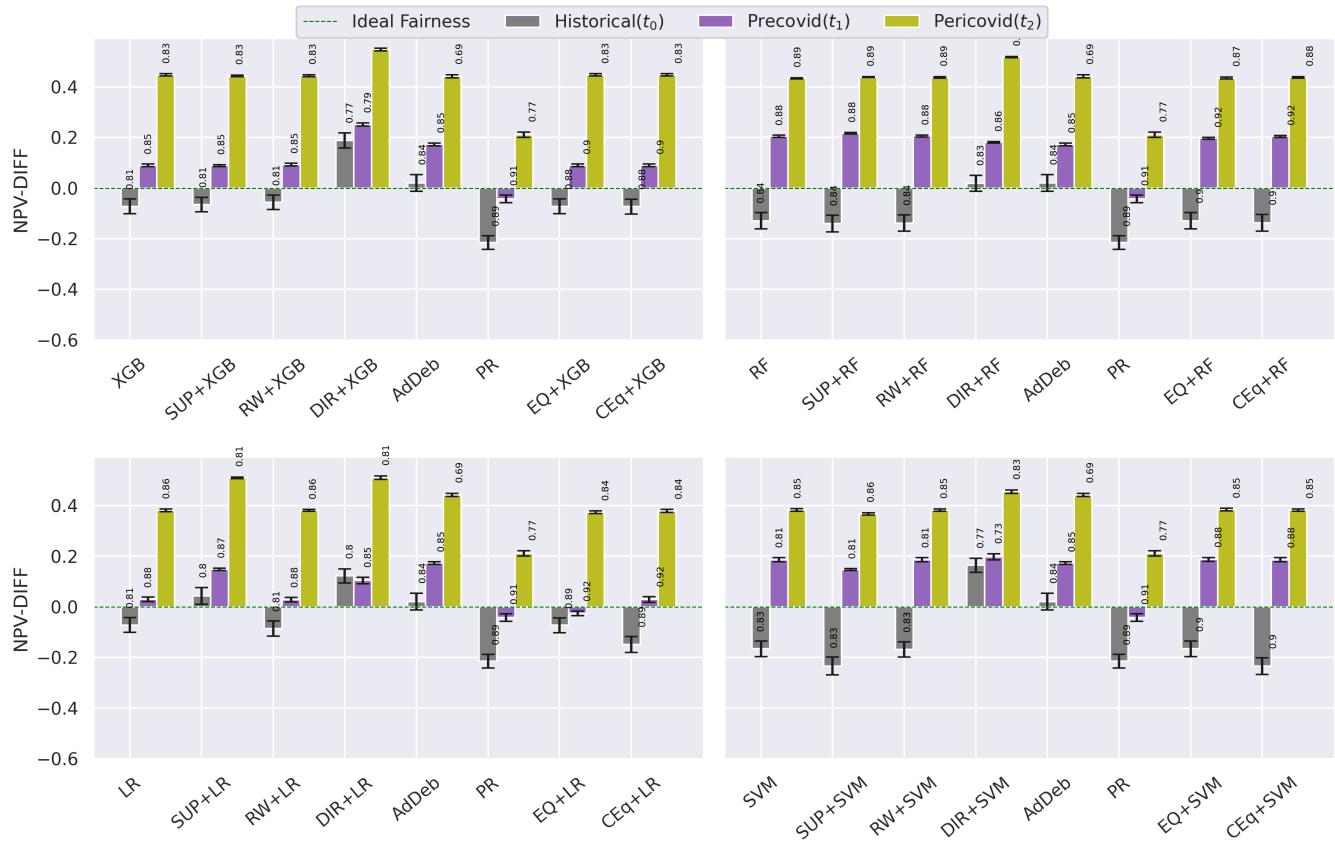


Figure 27: NPV-DIFF for ITF dataset.

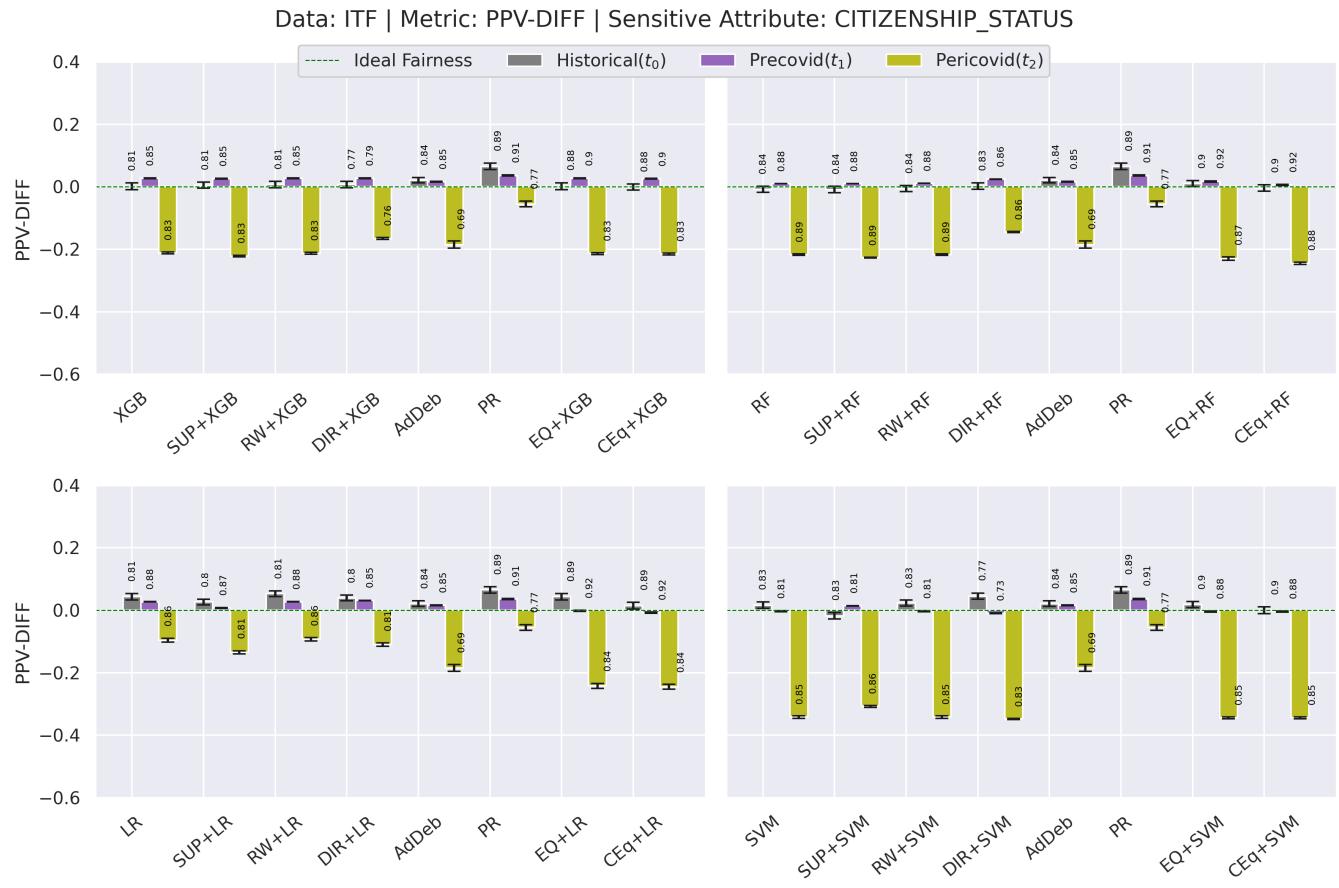


Figure 28: PPV-DIFF for ITF dataset.



Figure 29: WGEI for ITF dataset.

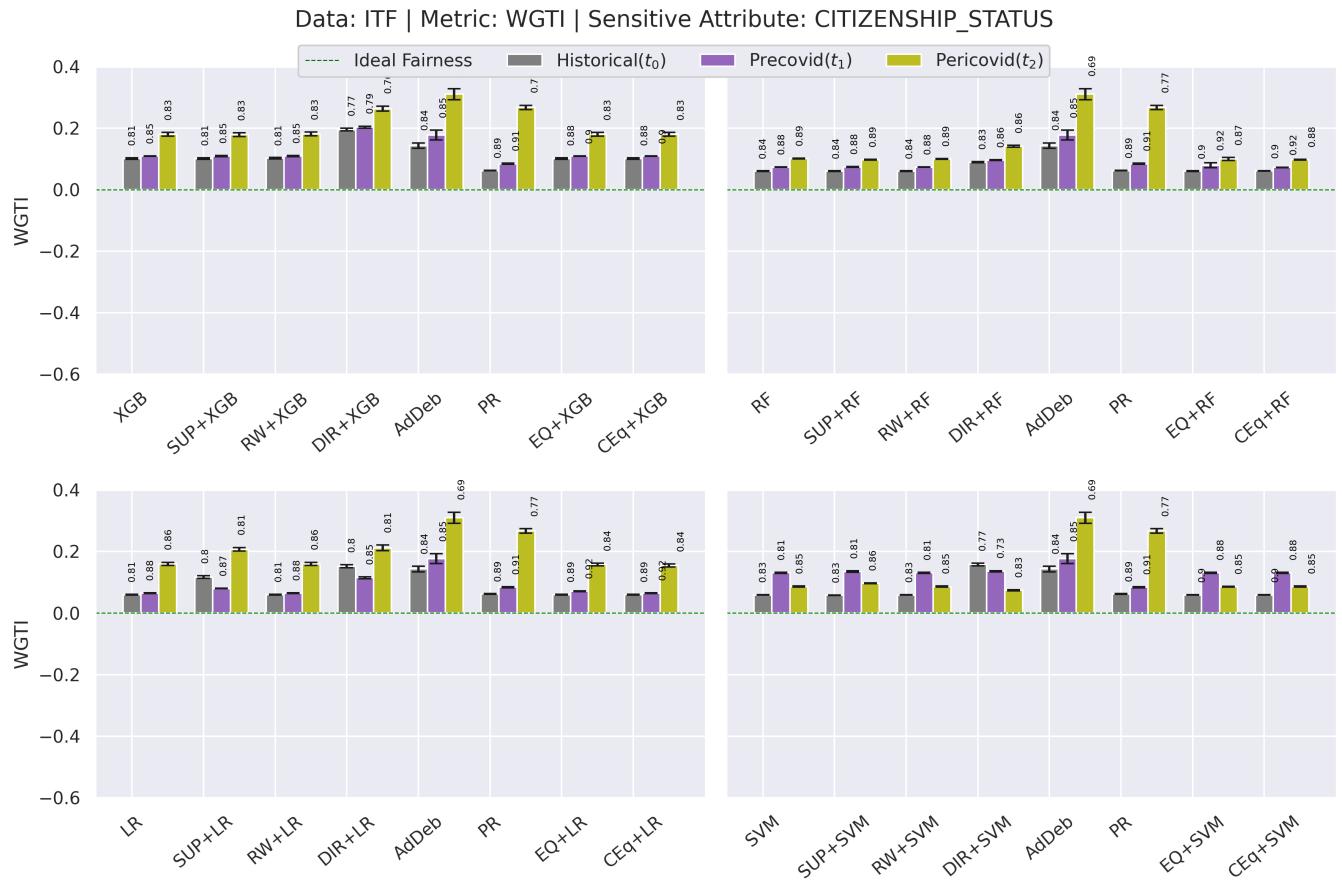


Figure 30: WGTI for ITF dataset.