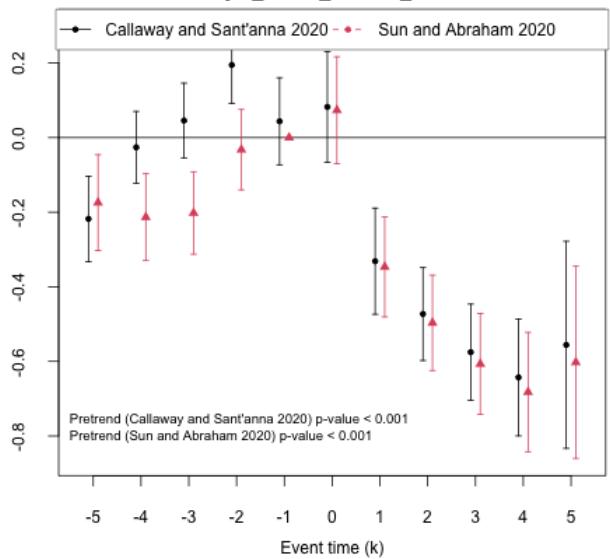
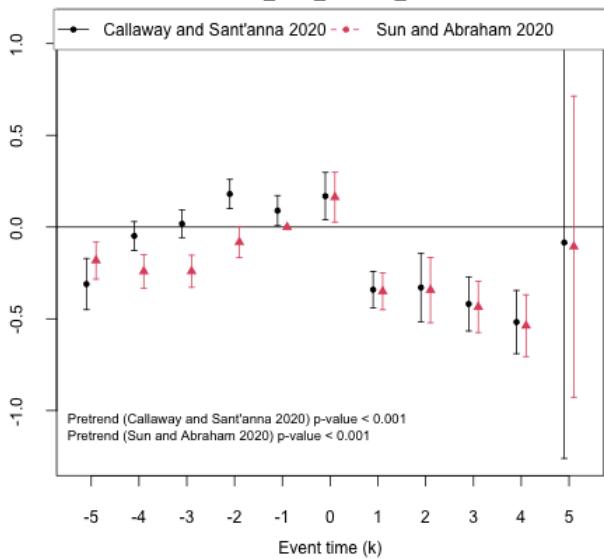
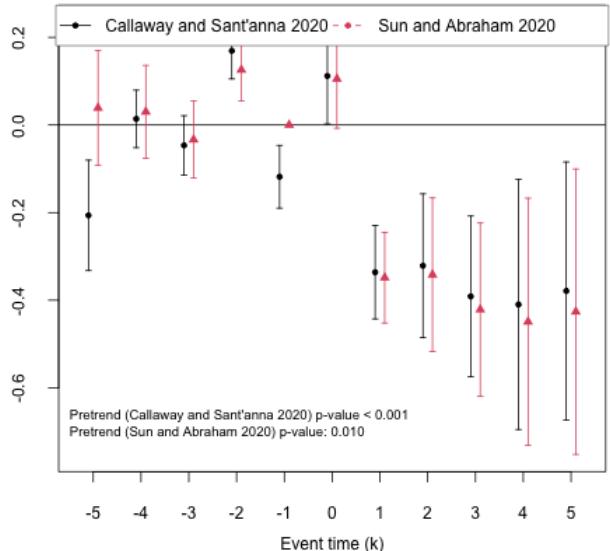
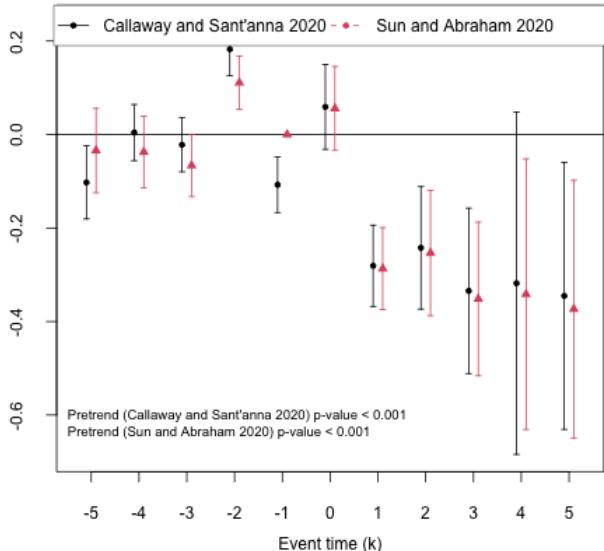
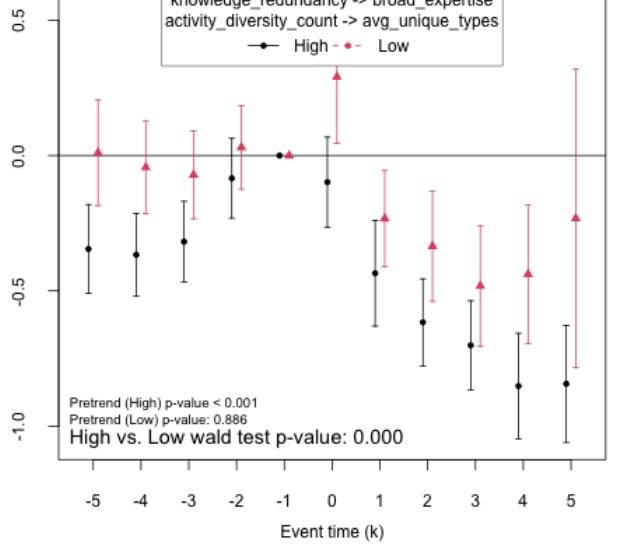


major_minor_release_count**overall_new_release_count****pull_request_merged****pull_request_opened**

major_minor_release_count rolling5**Sample: all obs**

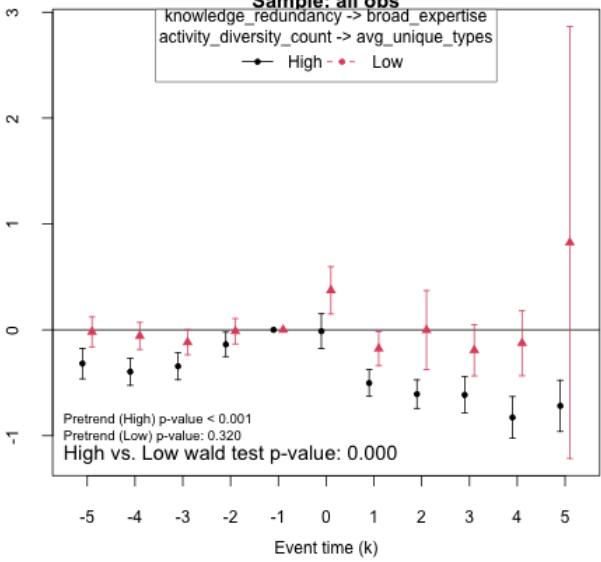
knowledge_redundancy -> broad_expertise
 activity_diversity_count -> avg_unique_types

● High ▲ Low

**overall_new_release_count rolling5****Sample: all obs**

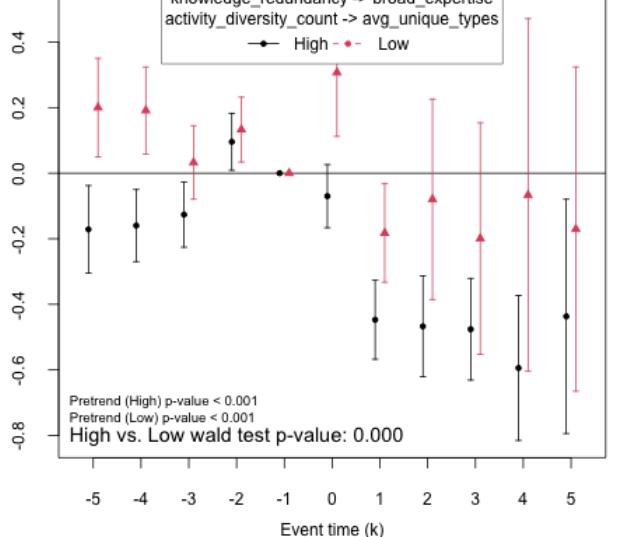
knowledge_redundancy -> broad_expertise
 activity_diversity_count -> avg_unique_types

● High ▲ Low

**pull_request_merged rolling5****Sample: all obs**

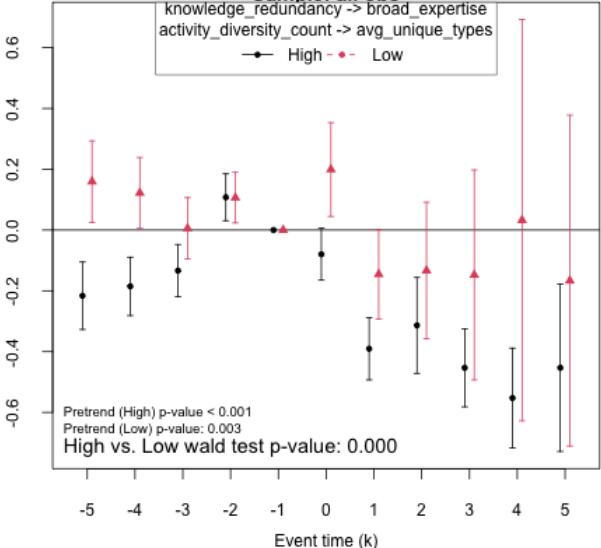
knowledge_redundancy -> broad_expertise
 activity_diversity_count -> avg_unique_types

● High ▲ Low

**pull_request_opened rolling5****Sample: all obs**

knowledge_redundancy -> broad_expertise
 activity_diversity_count -> avg_unique_types

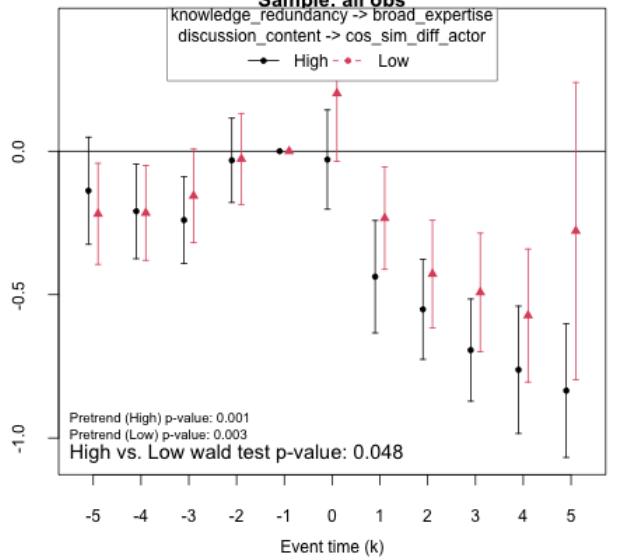
● High ▲ Low



major_minor_release_count rolling5**Sample: all obs**

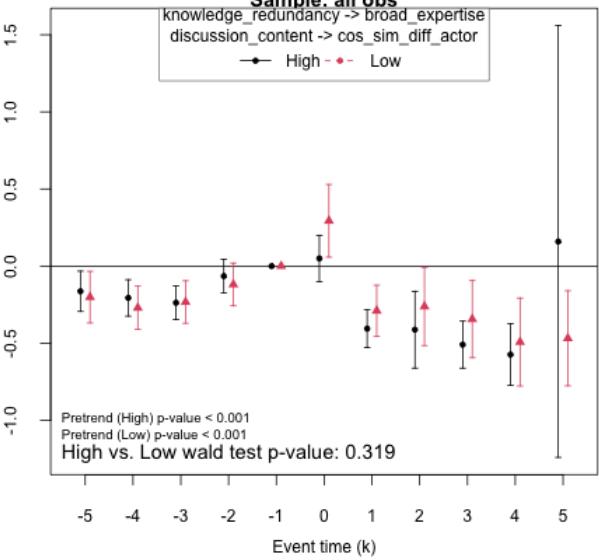
knowledge_redundancy -> broad_expertise
 discussion_content -> cos_sim_diff_actor

● High ▲ Low

**overall_new_release_count rolling5****Sample: all obs**

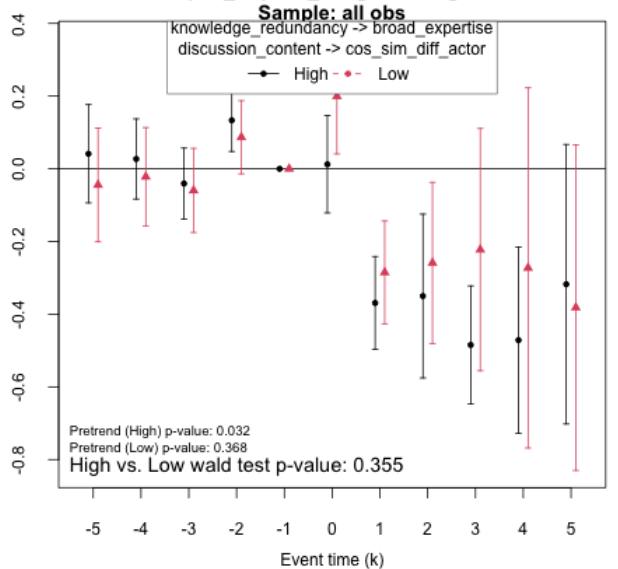
knowledge_redundancy -> broad_expertise
 discussion_content -> cos_sim_diff_actor

● High ▲ Low

**pull_request_merged rolling5****Sample: all obs**

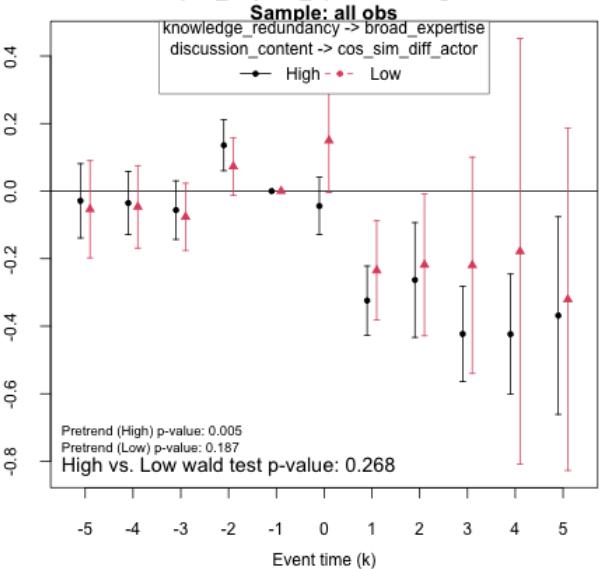
knowledge_redundancy -> broad_expertise
 discussion_content -> cos_sim_diff_actor

● High ▲ Low

**pull_request_opened rolling5****Sample: all obs**

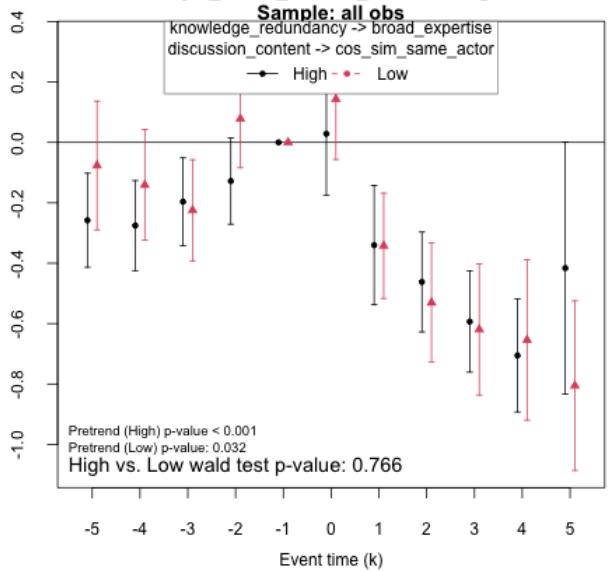
knowledge_redundancy -> broad_expertise
 discussion_content -> cos_sim_diff_actor

● High ▲ Low



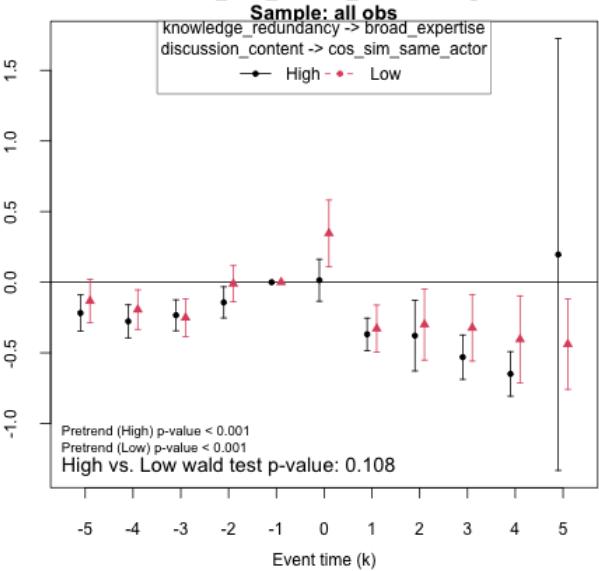
major_minor_release_count rolling5

Sample: all obs



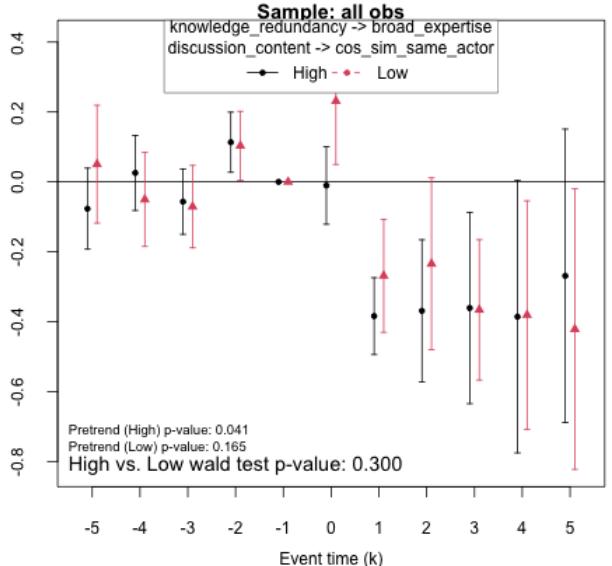
overall_new_release_count rolling5

Sample: all obs



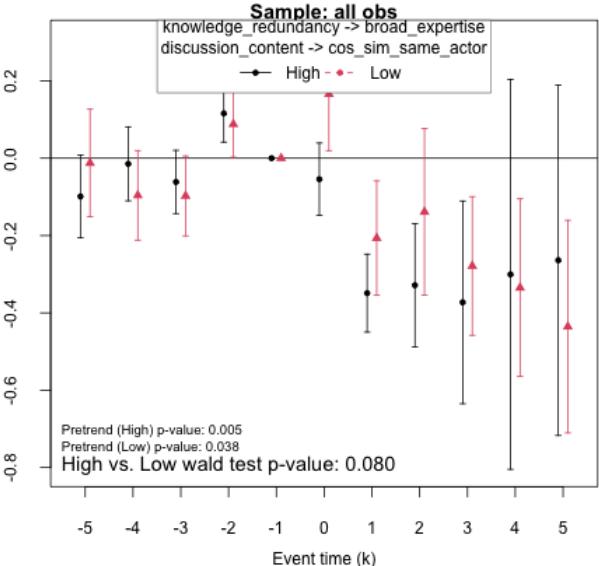
pull_request_merged rolling5

Sample: all obs



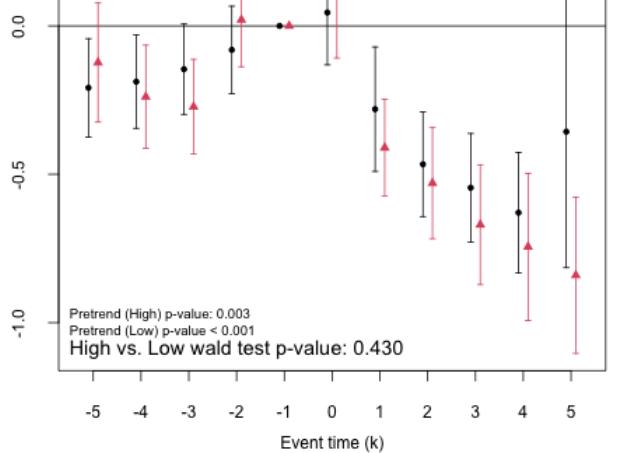
pull_request_opened rolling5

Sample: all obs

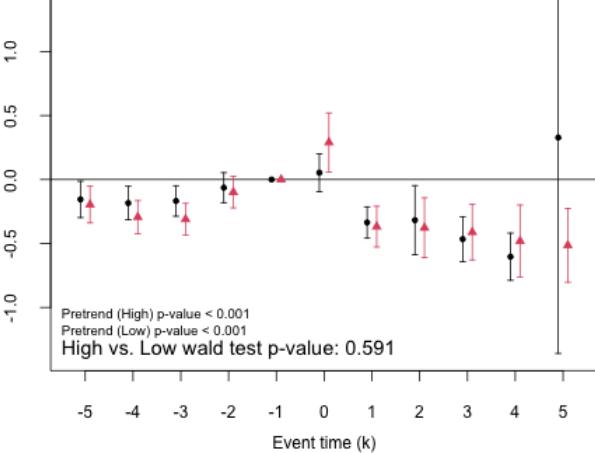


major_minor_release_count rolling5**Sample: all obs**

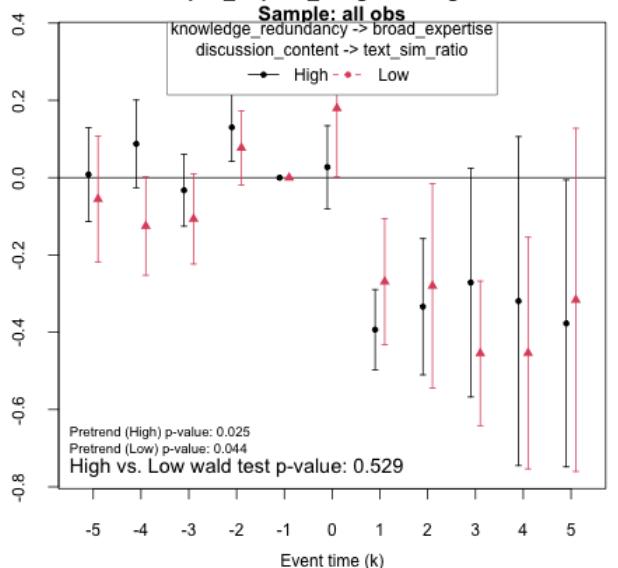
knowledge_redundancy -> broad_expertise
 discussion_content -> text_sim_ratio
 ● High ▲ Low

**overall_new_release_count rolling5****Sample: all obs**

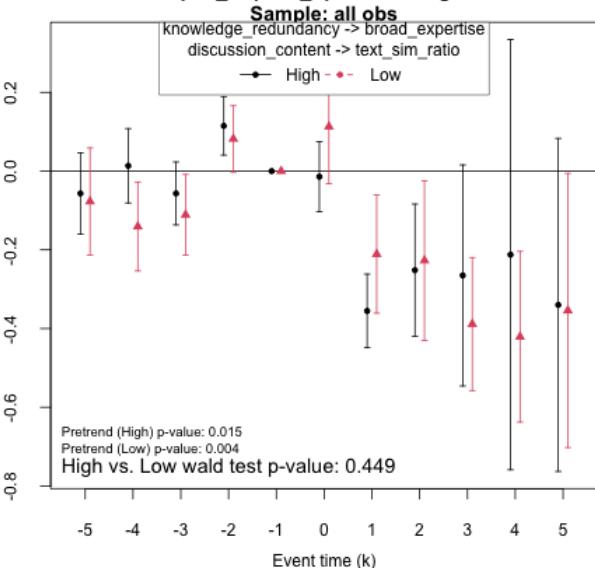
knowledge_redundancy -> broad_expertise
 discussion_content -> text_sim_ratio
 ● High ▲ Low

**pull_request_merged rolling5****Sample: all obs**

knowledge_redundancy -> broad_expertise
 discussion_content -> text_sim_ratio
 ● High ▲ Low

**pull_request_opened rolling5****Sample: all obs**

knowledge_redundancy -> broad_expertise
 discussion_content -> text_sim_ratio
 ● High ▲ Low

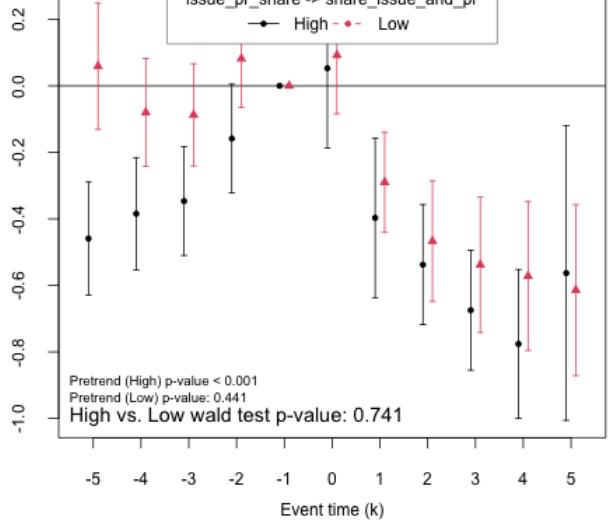


major_minor_release_count rolling5

Sample: all obs

knowledge_redundancy -> broad_expertise
issue_pr_share -> share_issue_and_pr

● High ▲ Low

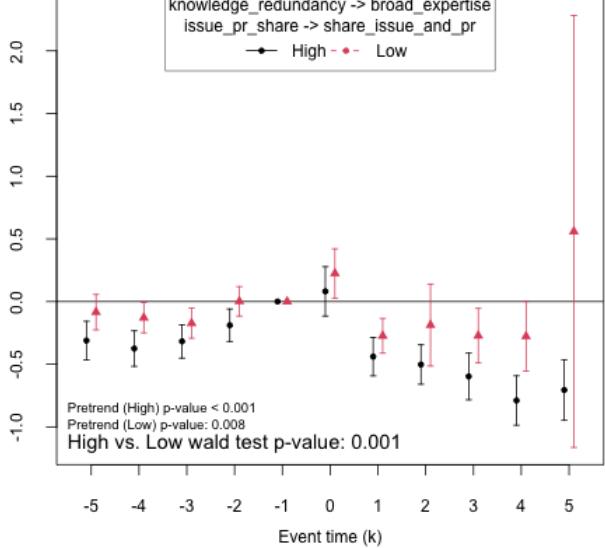


overall_new_release_count rolling5

Sample: all obs

knowledge_redundancy -> broad_expertise
issue_pr_share -> share_issue_and_pr

● High ▲ Low

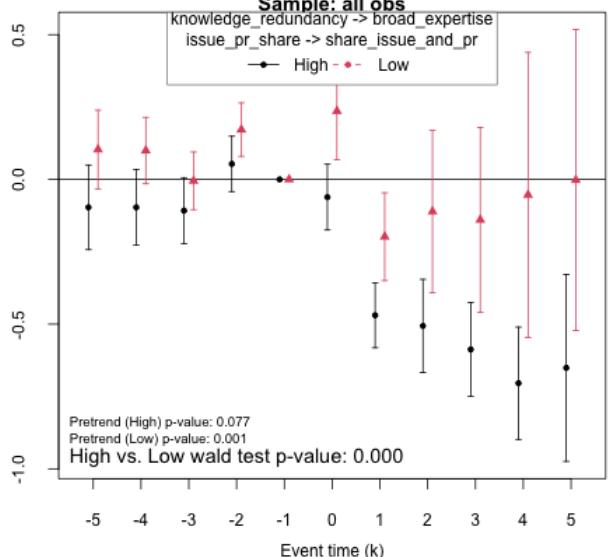


pull_request_merged rolling5

Sample: all obs

knowledge_redundancy -> broad_expertise
issue_pr_share -> share_issue_and_pr

● High ▲ Low

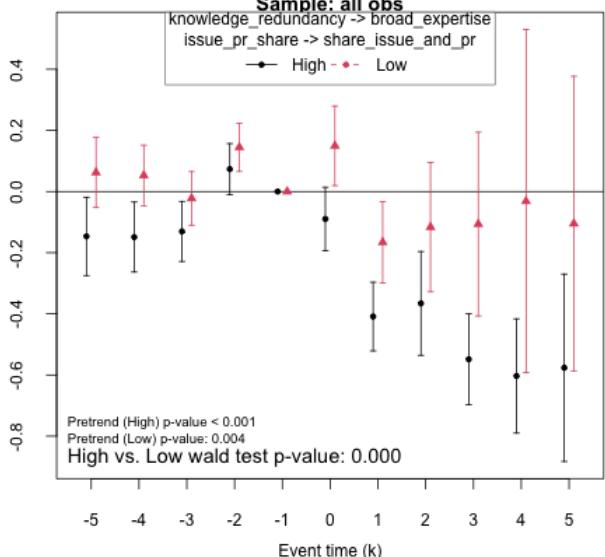


pull_request_opened rolling5

Sample: all obs

knowledge_redundancy -> broad_expertise
issue_pr_share -> share_issue_and_pr

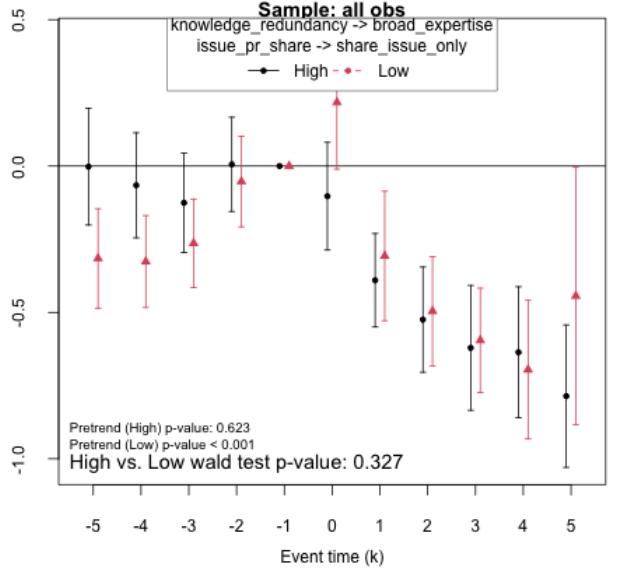
● High ▲ Low



major_minor_release_count rolling5**Sample: all obs**

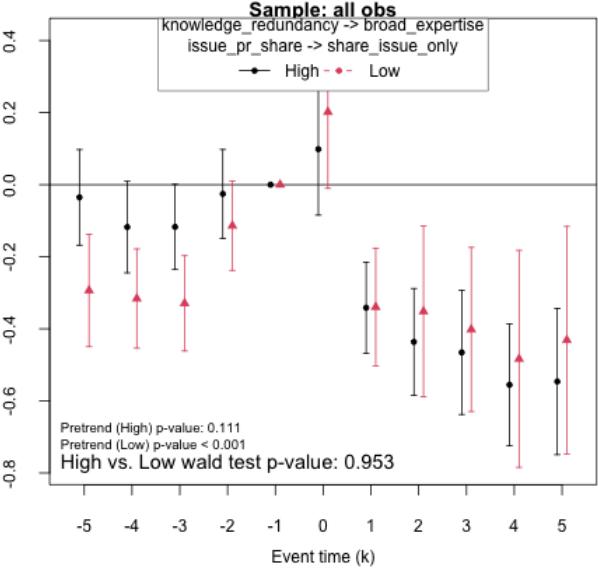
knowledge_redundancy -> broad_expertise
 issue_pr_share -> share_issue_only

● High ▲ Low

**overall_new_release_count rolling5****Sample: all obs**

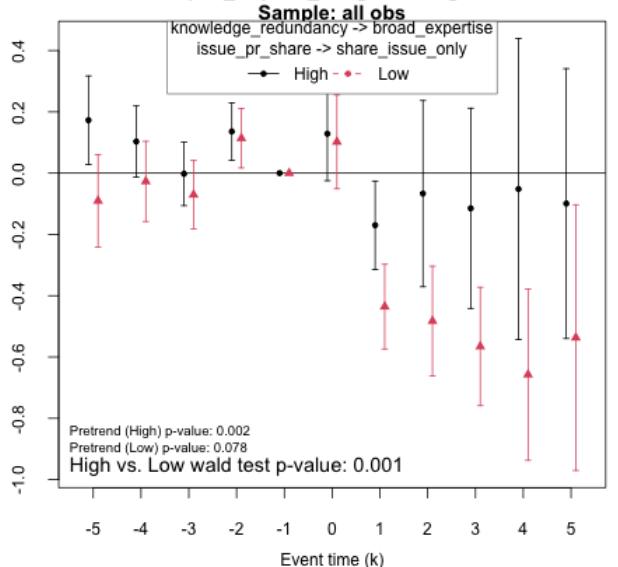
knowledge_redundancy -> broad_expertise
 issue_pr_share -> share_issue_only

● High ▲ Low

**pull_request_merged rolling5****Sample: all obs**

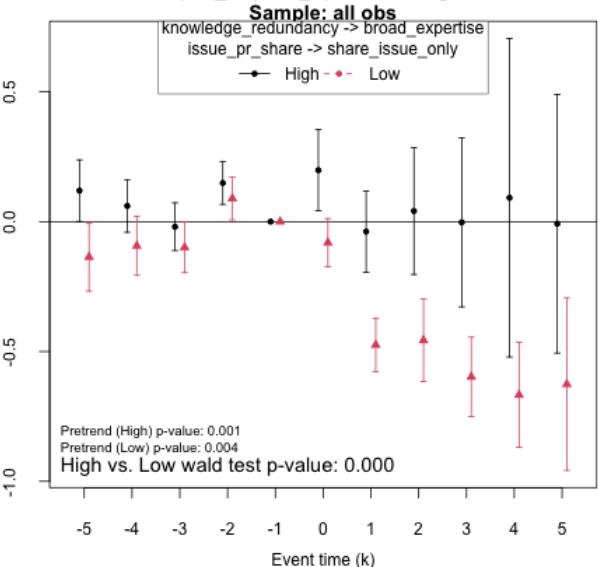
knowledge_redundancy -> broad_expertise
 issue_pr_share -> share_issue_only

● High ▲ Low

**pull_request_opened rolling5****Sample: all obs**

knowledge_redundancy -> broad_expertise
 issue_pr_share -> share_issue_only

● High ▲ Low

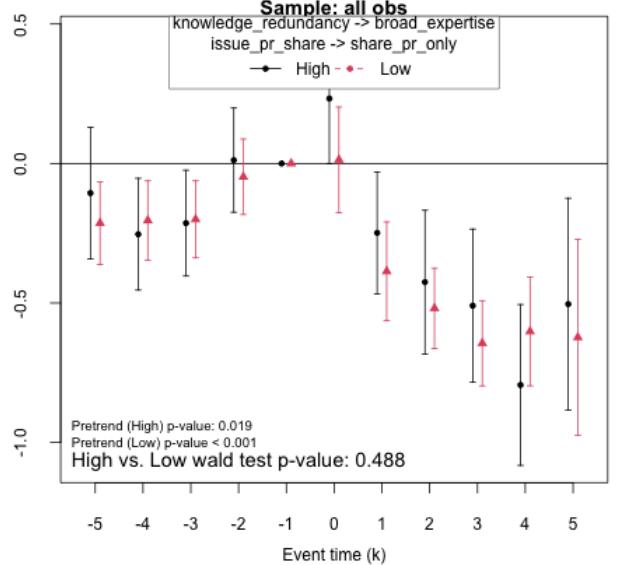


major_minor_release_count rolling5

Sample: all obs

knowledge_redundancy -> broad_expertise
issue_pr_share -> share_pr_only

● High ▲ Low

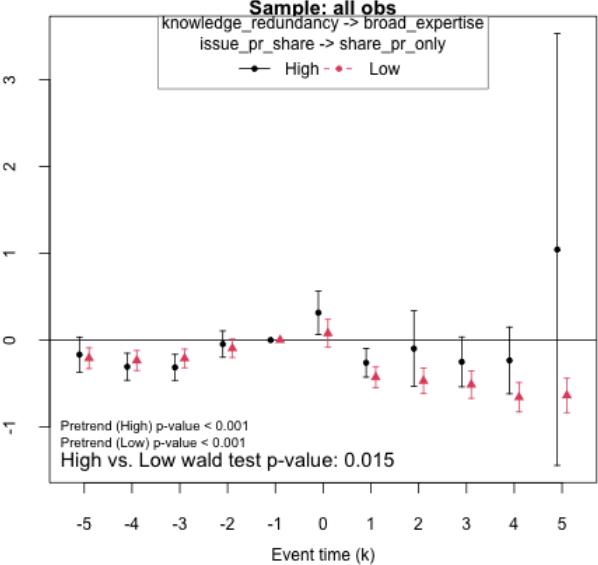


overall_new_release_count rolling5

Sample: all obs

knowledge_redundancy -> broad_expertise
issue_pr_share -> share_pr_only

● High ▲ Low

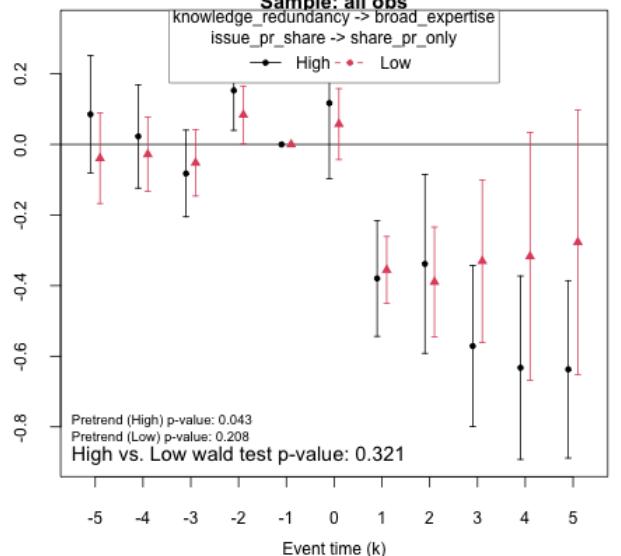


pull_request_merged rolling5

Sample: all obs

knowledge_redundancy -> broad_expertise
issue_pr_share -> share_pr_only

● High ▲ Low

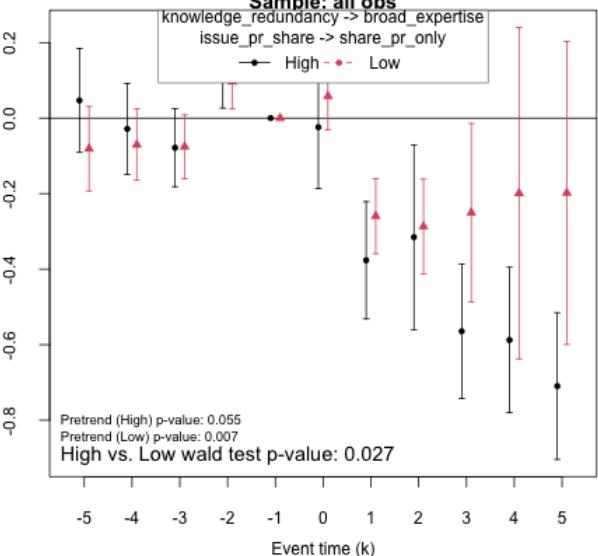


pull_request_opened rolling5

Sample: all obs

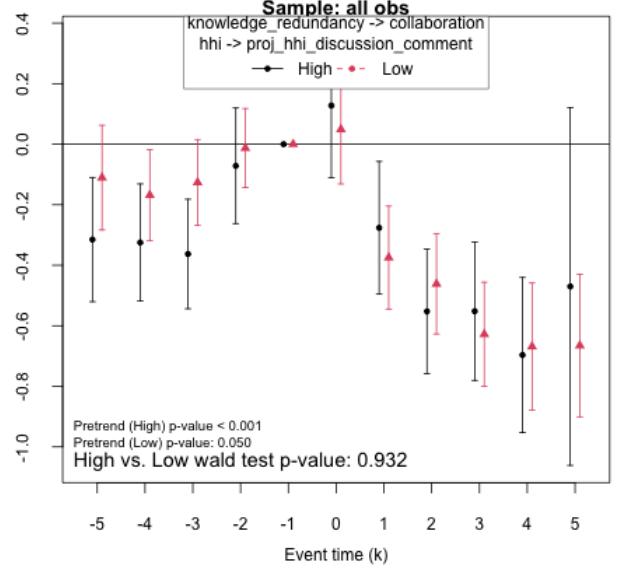
knowledge_redundancy -> broad_expertise
issue_pr_share -> share_pr_only

● High ▲ Low



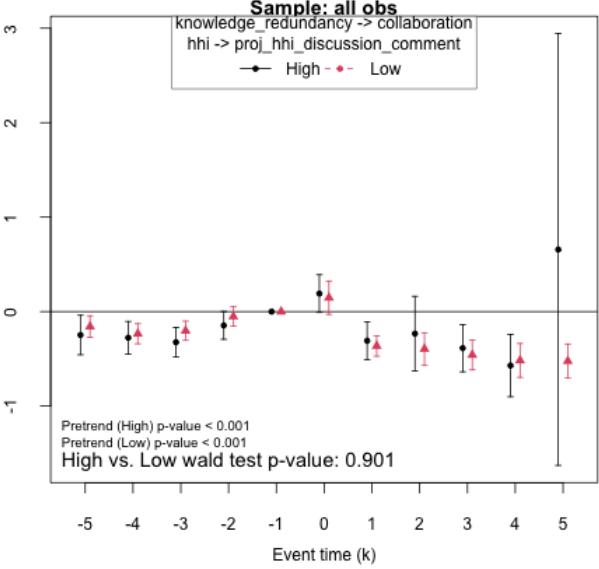
major_minor_release_count rolling5

Sample: all obs



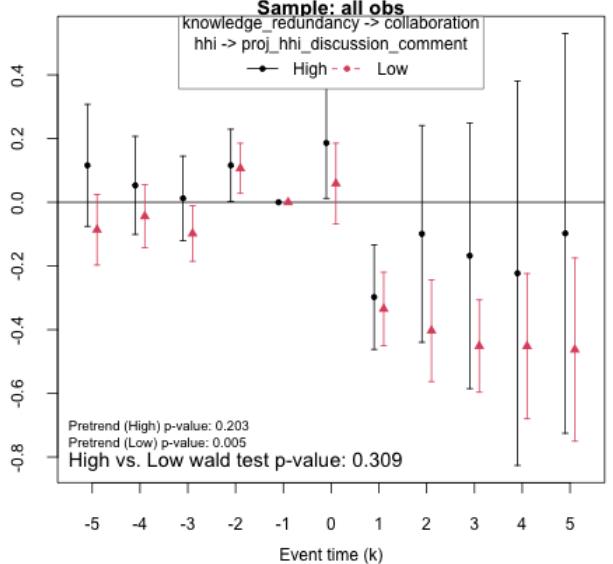
overall_new_release_count rolling5

Sample: all obs



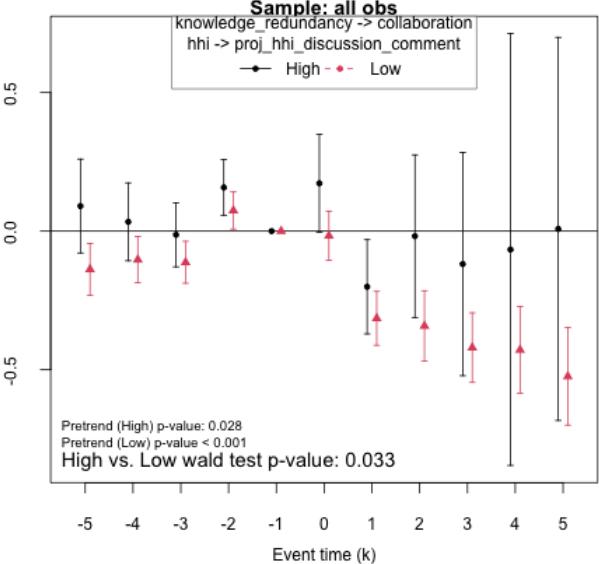
pull_request_merged rolling5

Sample: all obs



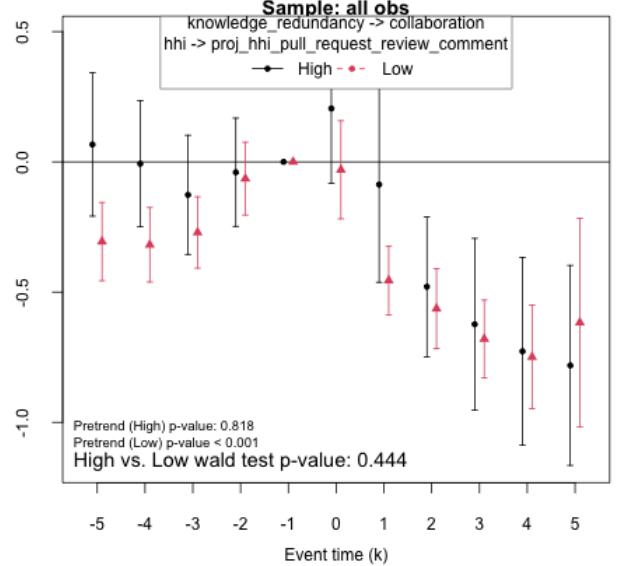
pull_request_opened rolling5

Sample: all obs



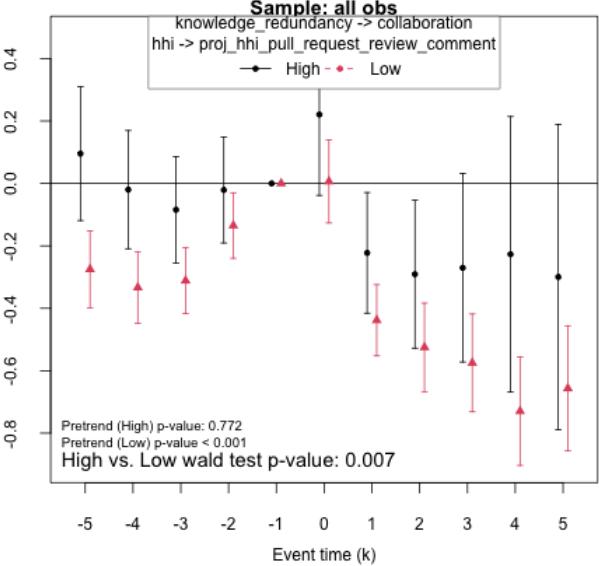
major_minor_release_count rolling5

Sample: all obs



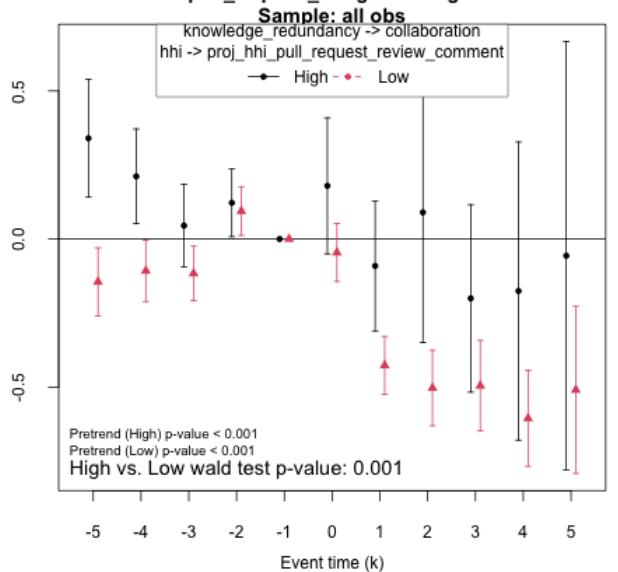
overall_new_release_count rolling5

Sample: all obs



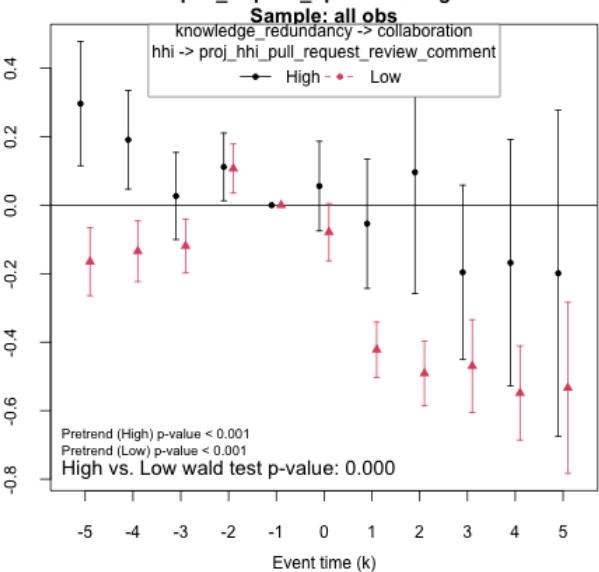
pull_request_merged rolling5

Sample: all obs



pull_request_opened rolling5

Sample: all obs

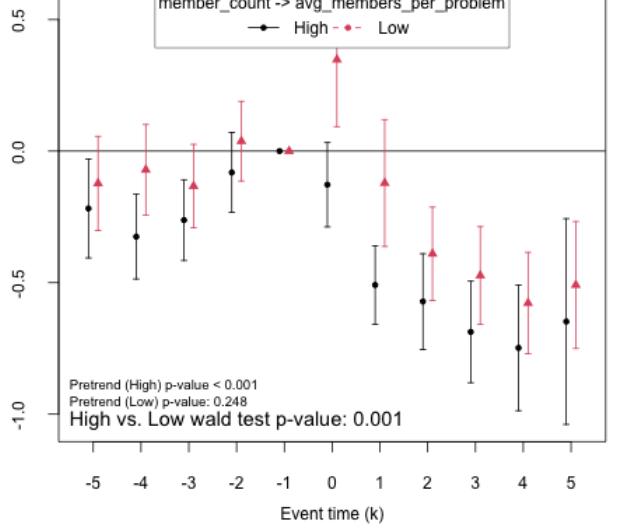


major_minor_release_count rolling5

Sample: all obs

knowledge_redundancy -> collaboration
member_count -> avg_members_per_problem

● High ▲ Low

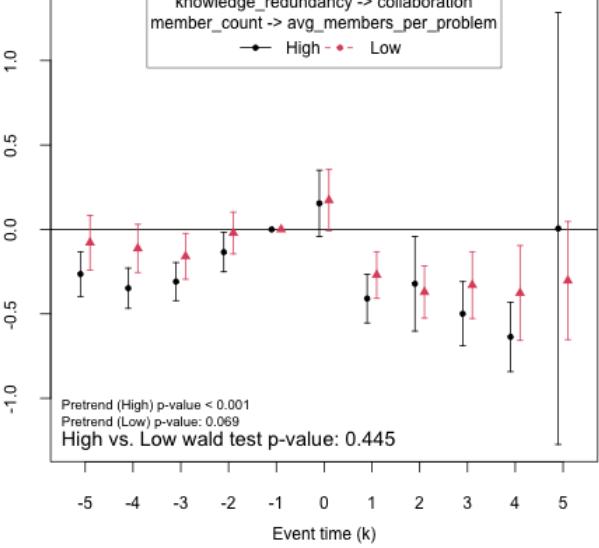


overall_new_release_count rolling5

Sample: all obs

knowledge_redundancy -> collaboration
member_count -> avg_members_per_problem

● High ▲ Low

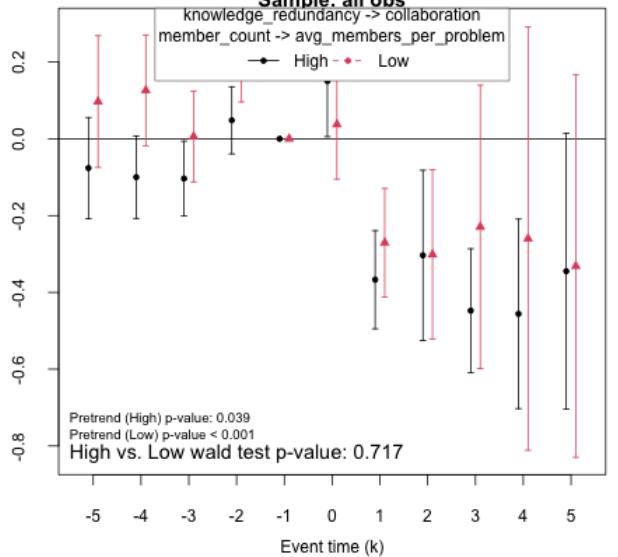


pull_request_merged rolling5

Sample: all obs

knowledge_redundancy -> collaboration
member_count -> avg_members_per_problem

● High ▲ Low

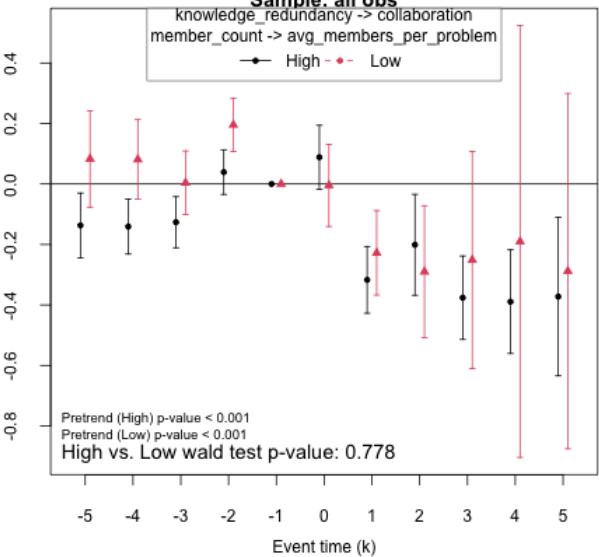


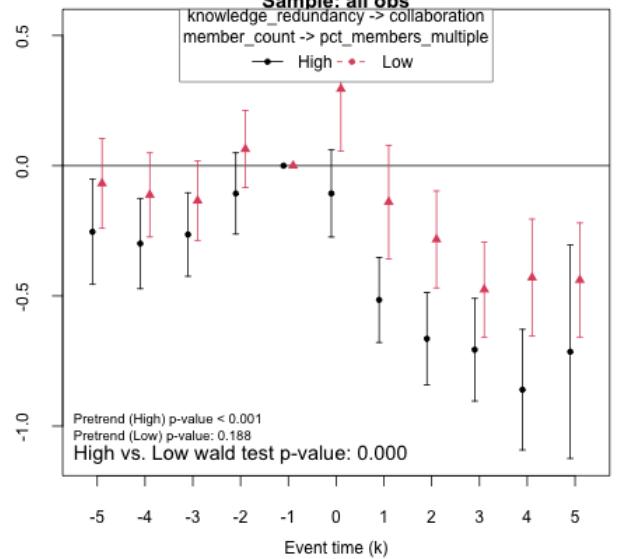
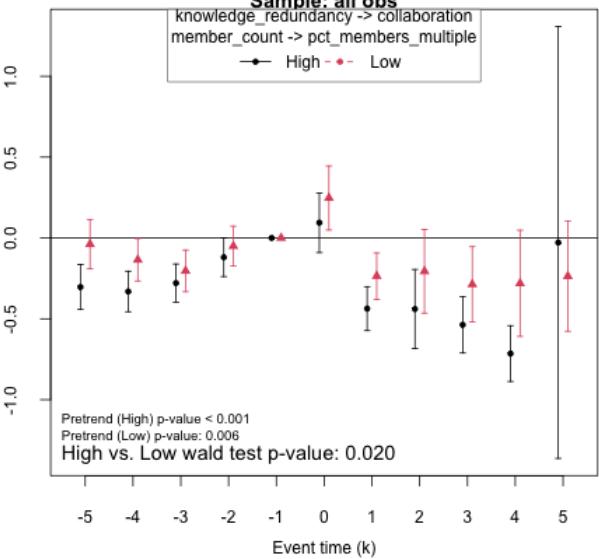
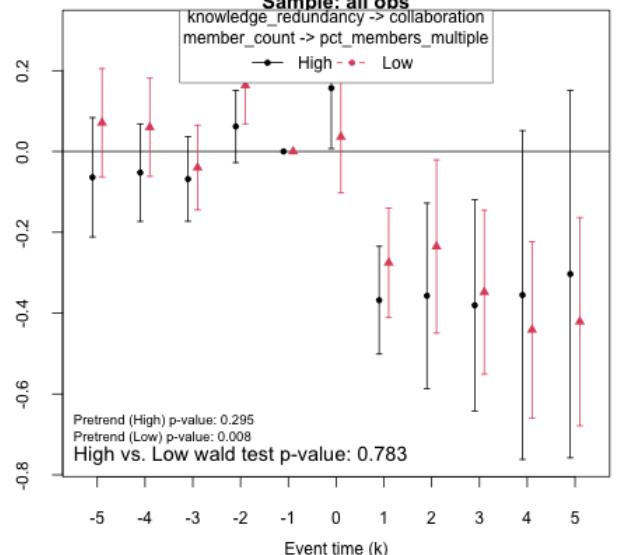
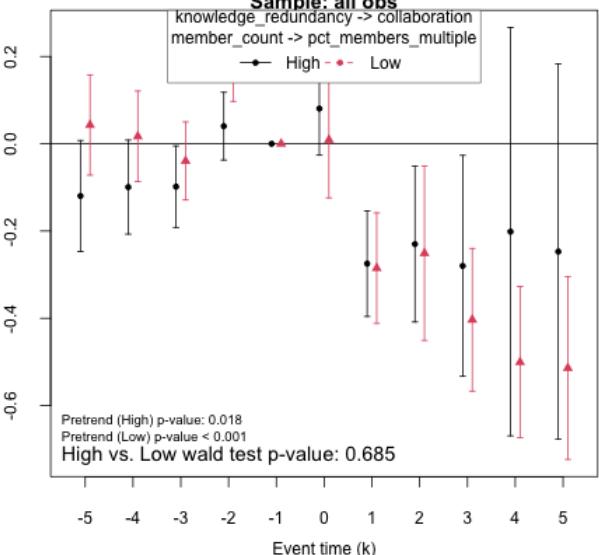
pull_request_opened rolling5

Sample: all obs

knowledge_redundancy -> collaboration
member_count -> avg_members_per_problem

● High ▲ Low

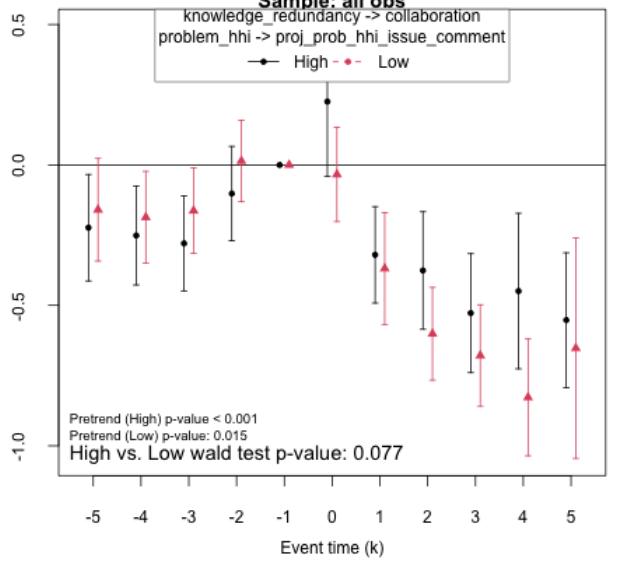


major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

major_minor_release_count rolling5**Sample: all obs**

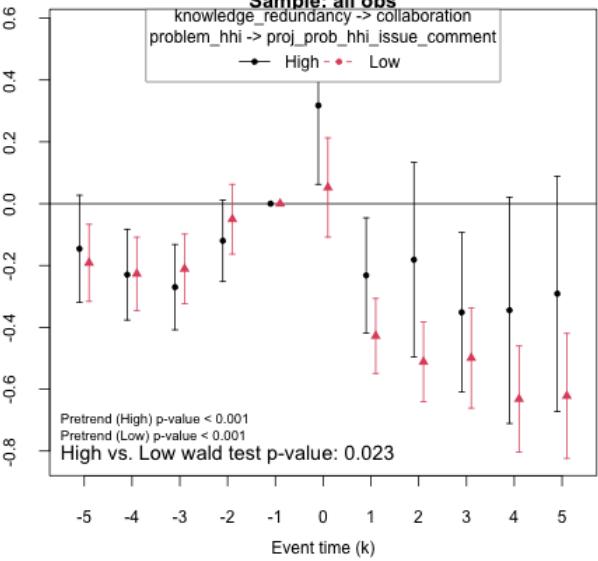
knowledge_redundancy->collaboration
problem_hhi->proj_prob_hhi_issue_comment

● High ▲ Low

**overall_new_release_count rolling5****Sample: all obs**

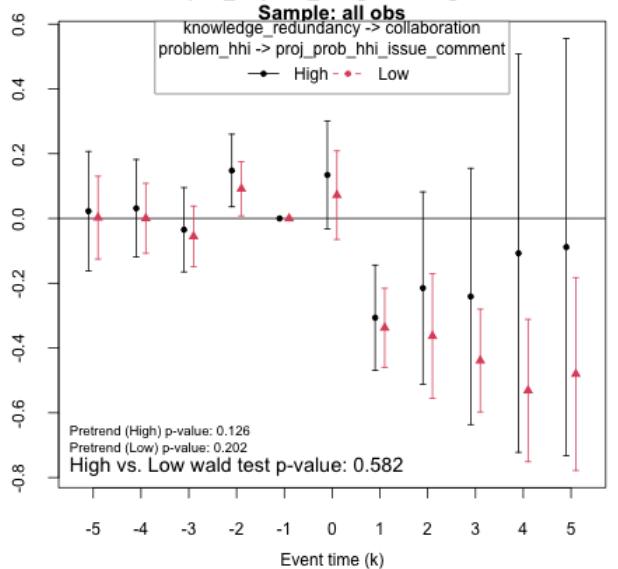
knowledge_redundancy->collaboration
problem_hhi->proj_prob_hhi_issue_comment

● High ▲ Low

**pull_request_merged rolling5****Sample: all obs**

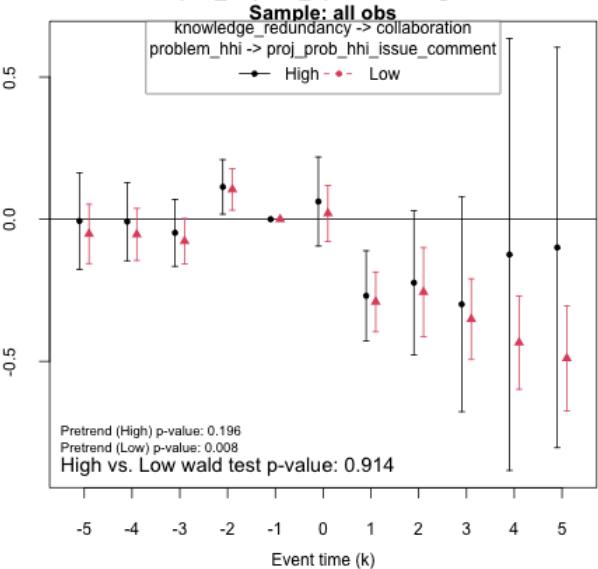
knowledge_redundancy->collaboration
problem_hhi->proj_prob_hhi_issue_comment

● High ▲ Low

**pull_request_opened rolling5****Sample: all obs**

knowledge_redundancy->collaboration
problem_hhi->proj_prob_hhi_issue_comment

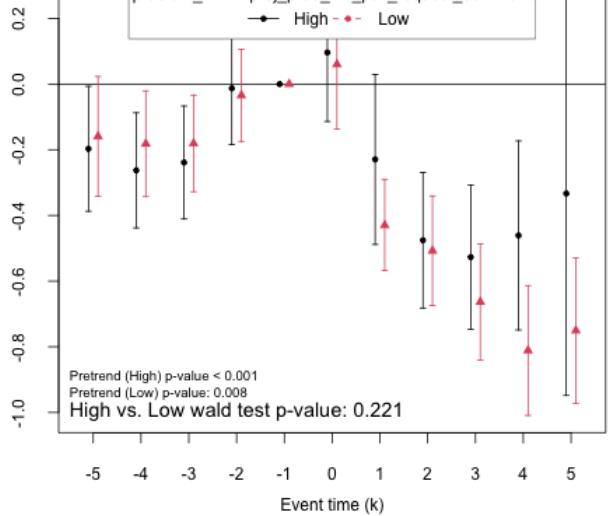
● High ▲ Low



major_minor_release_count rolling5**Sample: all obs**

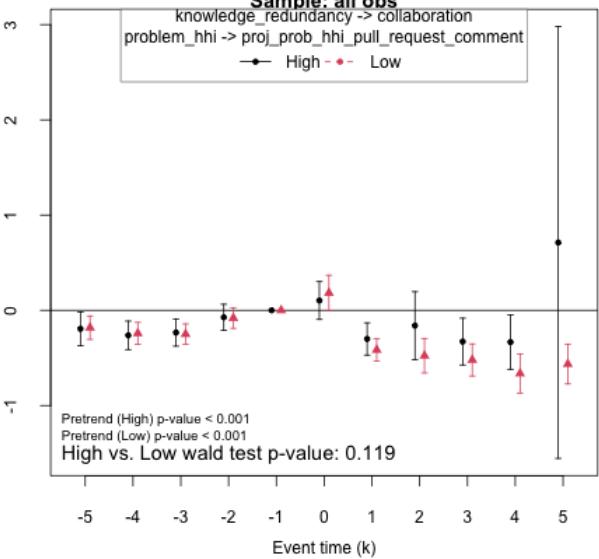
knowledge_redundancy -> collaboration
 problem_hhi -> proj_prob_hhi_pull_request_comment

● High ▲ Low

**overall_new_release_count rolling5****Sample: all obs**

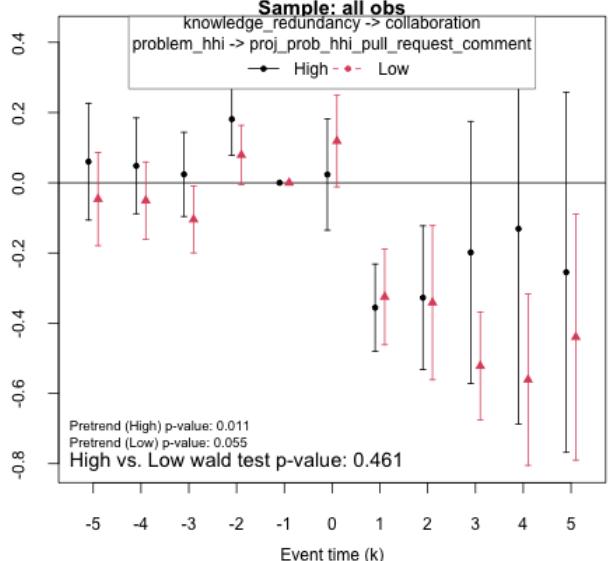
knowledge_redundancy -> collaboration
 problem_hhi -> proj_prob_hhi_pull_request_comment

● High ▲ Low

**pull_request_merged rolling5****Sample: all obs**

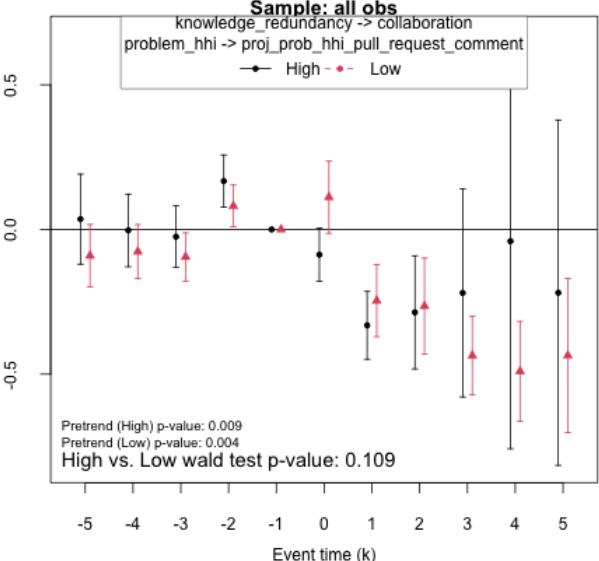
knowledge_redundancy -> collaboration
 problem_hhi -> proj_prob_hhi_pull_request_comment

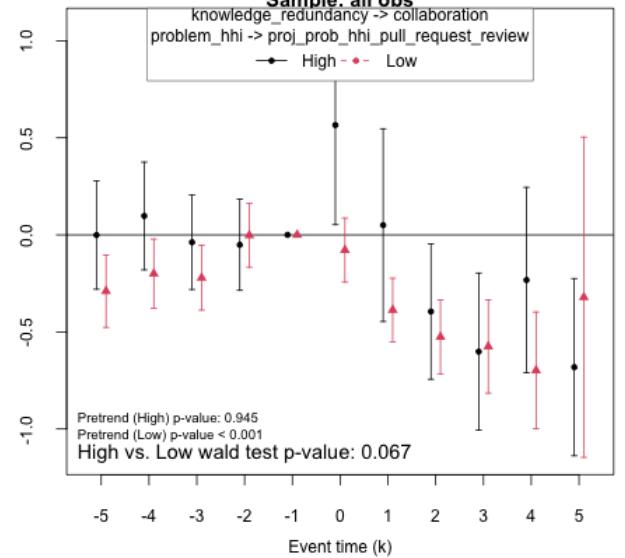
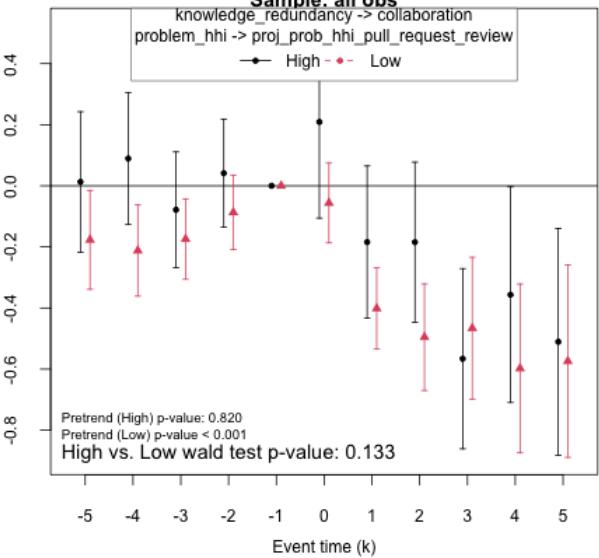
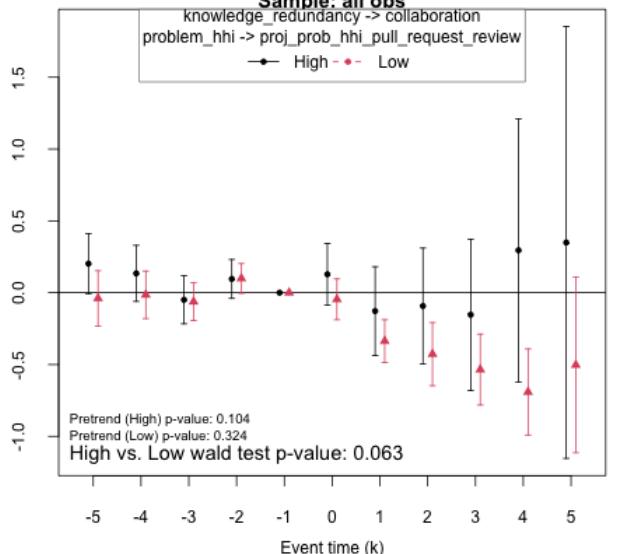
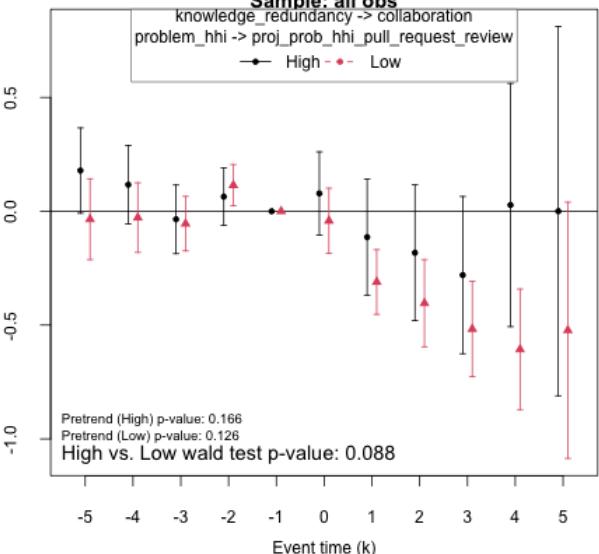
● High ▲ Low

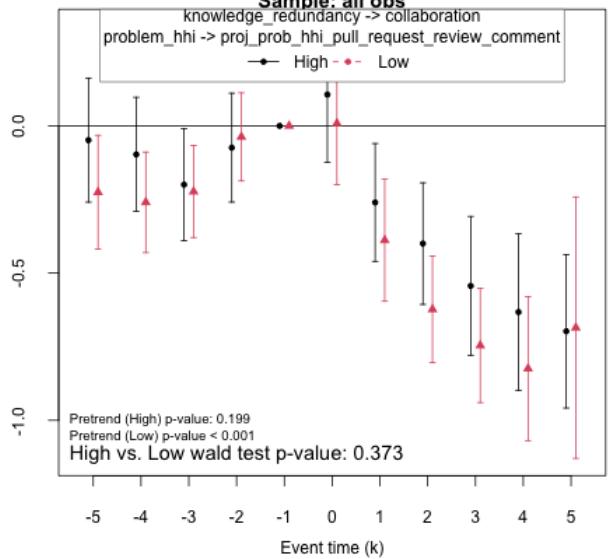
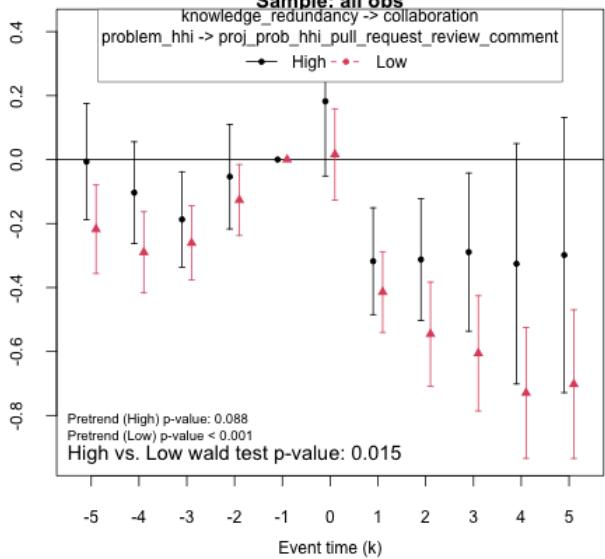
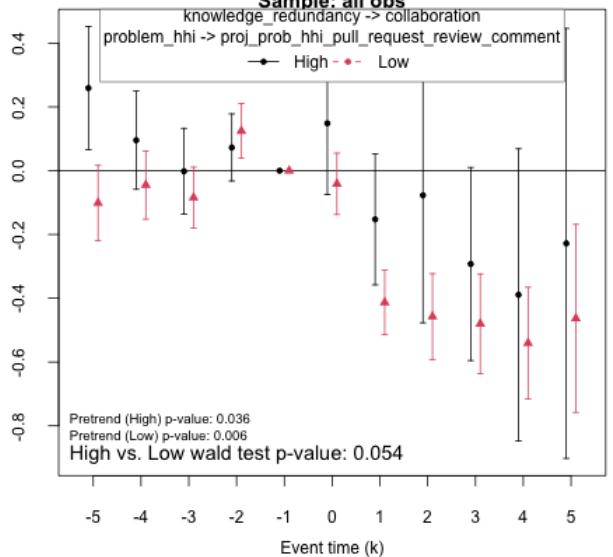
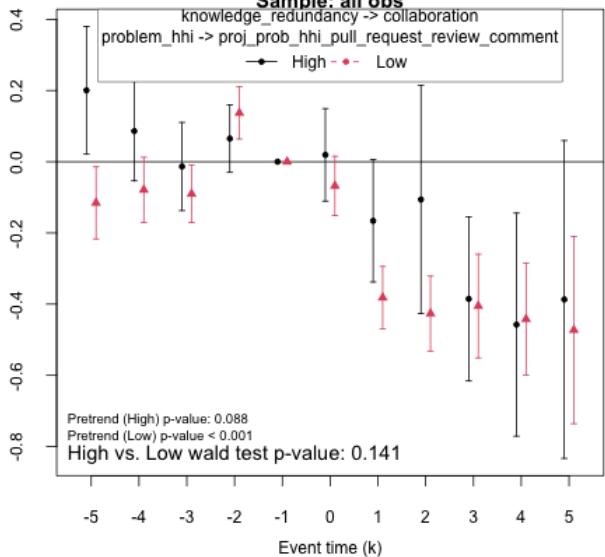
**pull_request_opened rolling5****Sample: all obs**

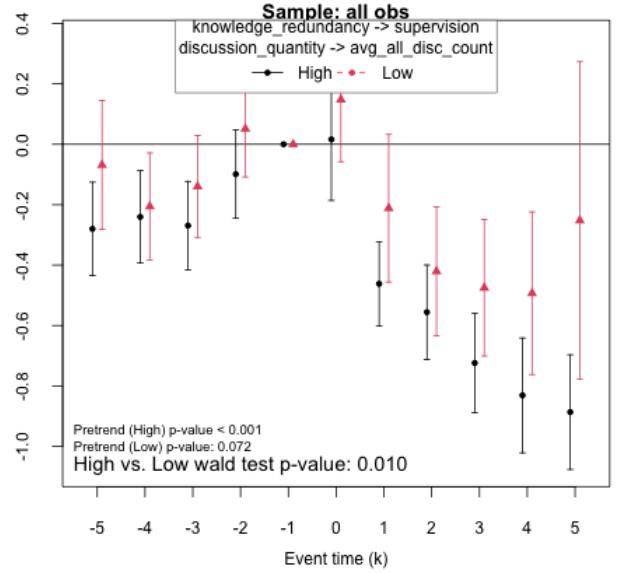
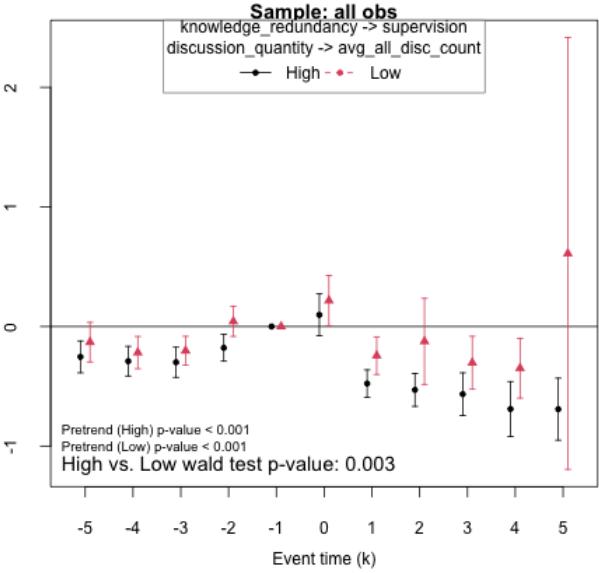
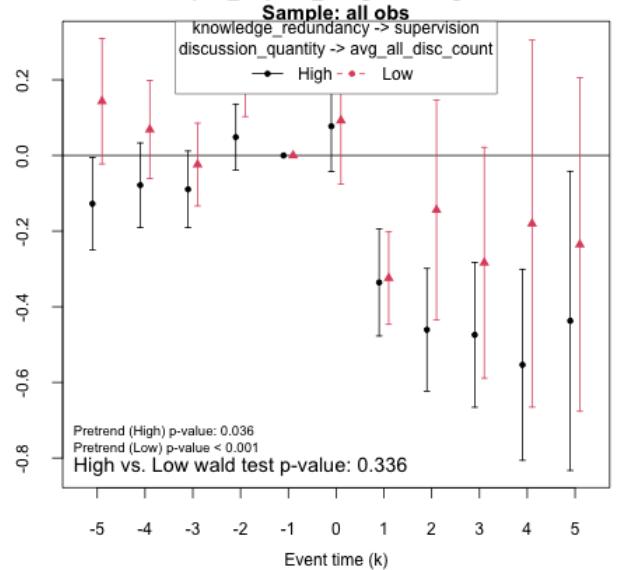
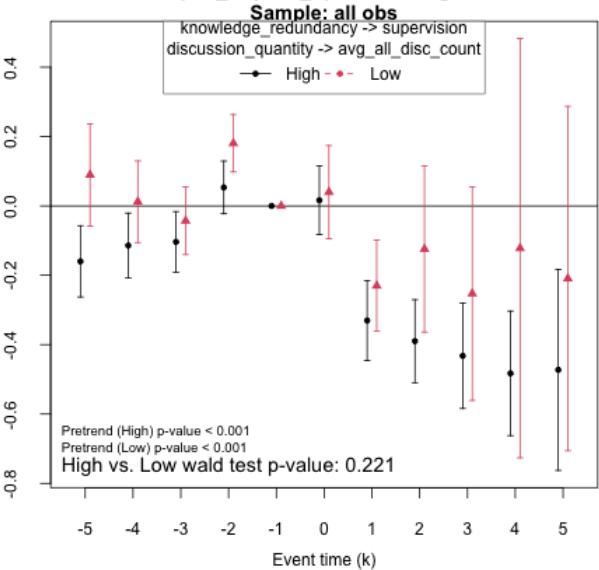
knowledge_redundancy -> collaboration
 problem_hhi -> proj_prob_hhi_pull_request_comment

● High ▲ Low



major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

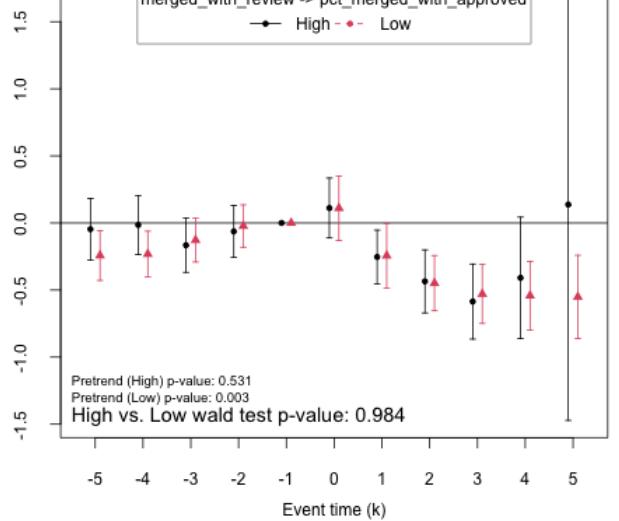
major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

major_minor_release_count rolling5**Sample: all obs**

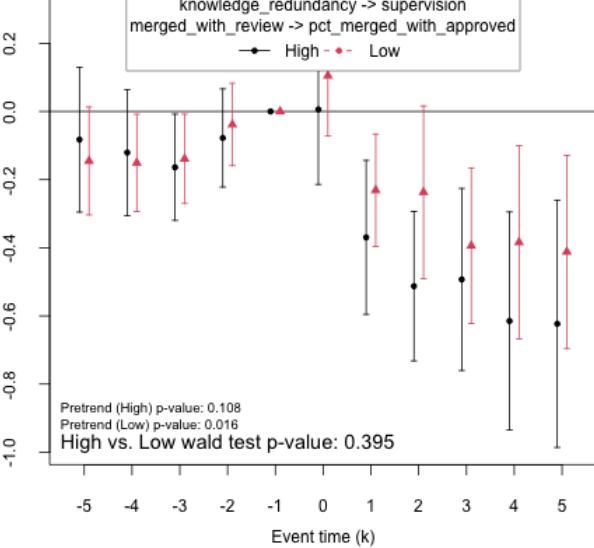
knowledge_redundancy -> supervision
 merged_with_review -> pct_merged_with_approved

- High
- Low

**overall_new_release_count rolling5****Sample: all obs**

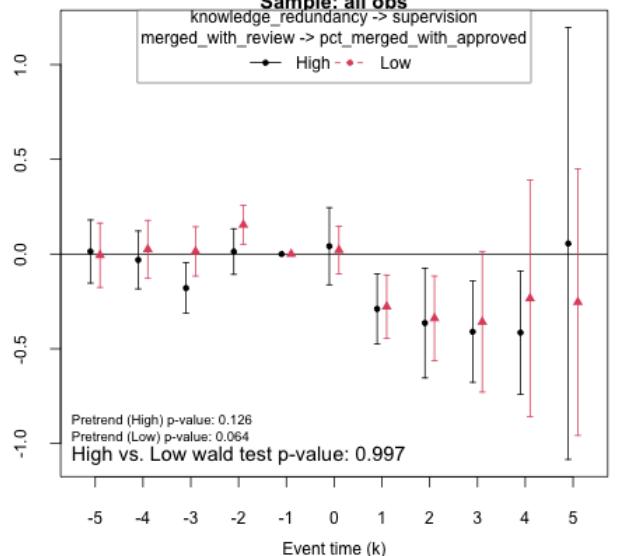
knowledge_redundancy -> supervision
 merged_with_review -> pct_merged_with_approved

- High
- Low

**pull_request_merged rolling5****Sample: all obs**

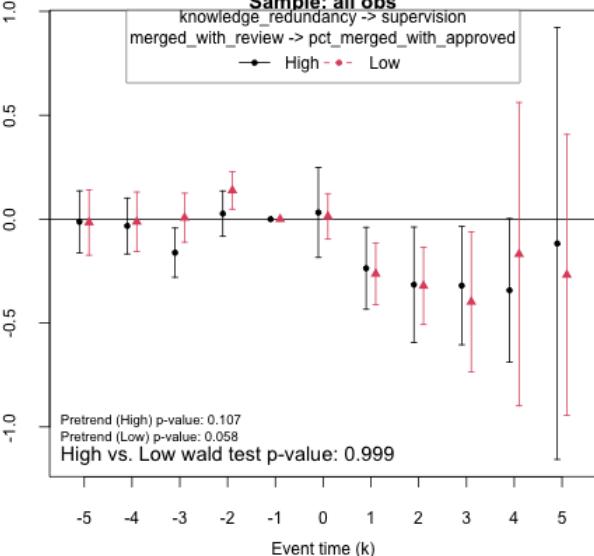
knowledge_redundancy -> supervision
 merged_with_review -> pct_merged_with_approved

- High
- Low

**pull_request_opened rolling5****Sample: all obs**

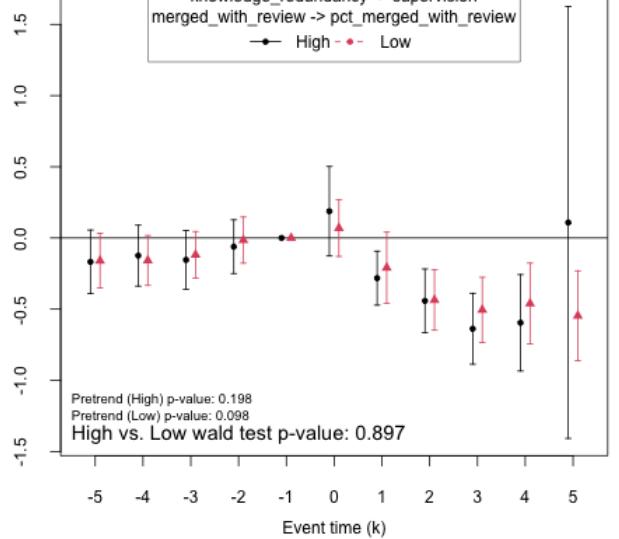
knowledge_redundancy -> supervision
 merged_with_review -> pct_merged_with_approved

- High
- Low

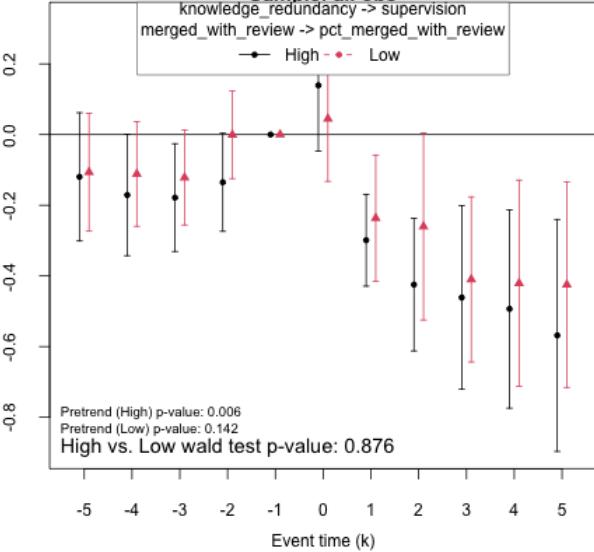


major_minor_release_count rolling5**Sample: all obs**

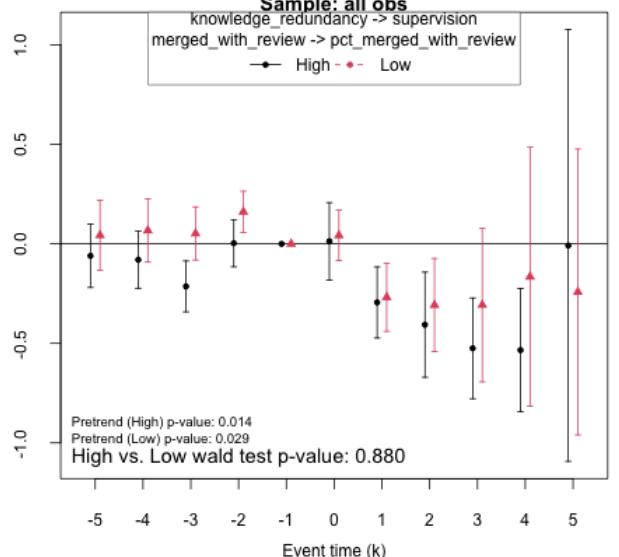
knowledge_redundancy-> supervision
 merged_with_review -> pct_merged_with_review
 ● High - ▲ Low

**overall_new_release_count rolling5****Sample: all obs**

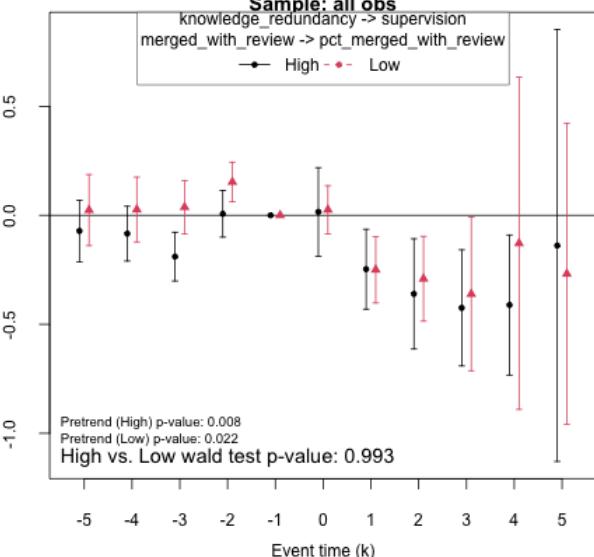
knowledge_redundancy-> supervision
 merged_with_review -> pct_merged_with_review
 ● High - ▲ Low

**pull_request_merged rolling5****Sample: all obs**

knowledge_redundancy-> supervision
 merged_with_review -> pct_merged_with_review
 ● High - ▲ Low

**pull_request_opened rolling5****Sample: all obs**

knowledge_redundancy-> supervision
 merged_with_review -> pct_merged_with_review
 ● High - ▲ Low

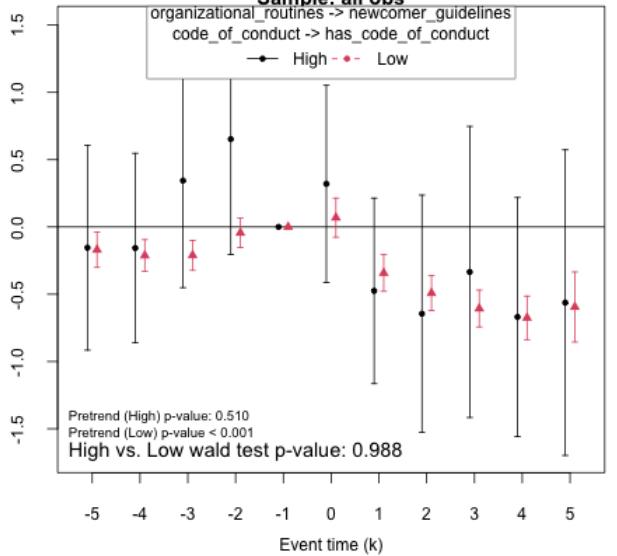


major_minor_release_count rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
code_of_conduct -> has_code_of_conduct

● High ● Low

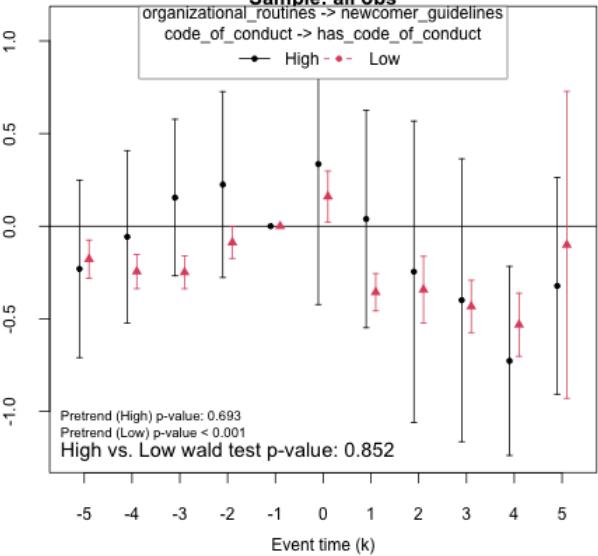


overall_new_release_count rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
code_of_conduct -> has_code_of_conduct

● High ● Low

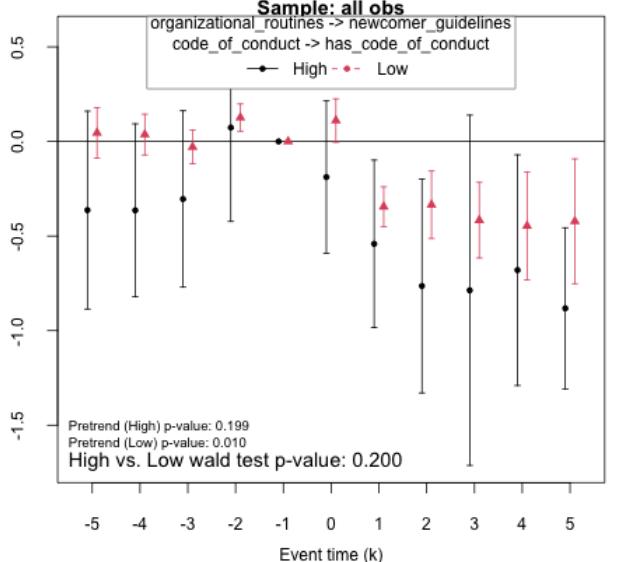


pull_request_merged rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
code_of_conduct -> has_code_of_conduct

● High ● Low

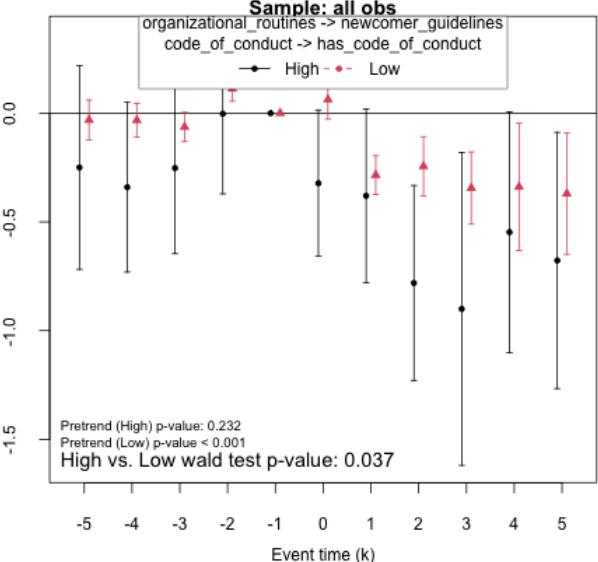


pull_request_opened rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
code_of_conduct -> has_code_of_conduct

● High ● Low

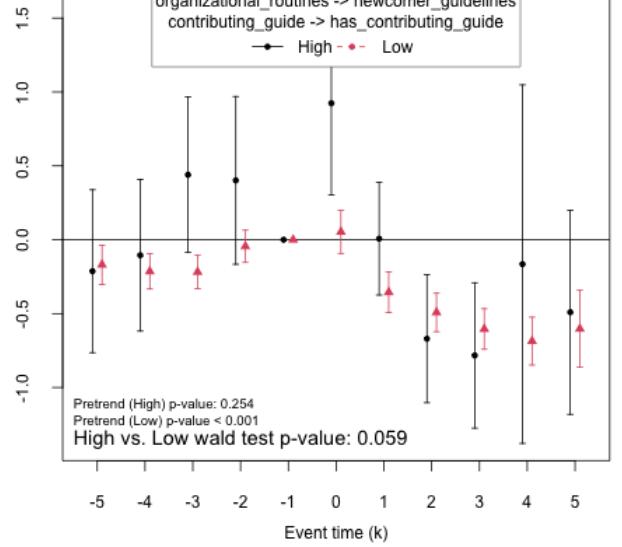


major_minor_release_count rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
contributing_guide -> has_contributing_guide

● High ● Low

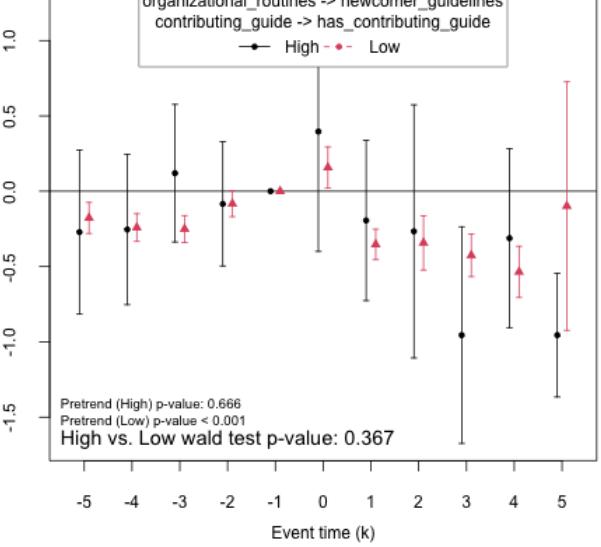


overall_new_release_count rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
contributing_guide -> has_contributing_guide

● High ● Low

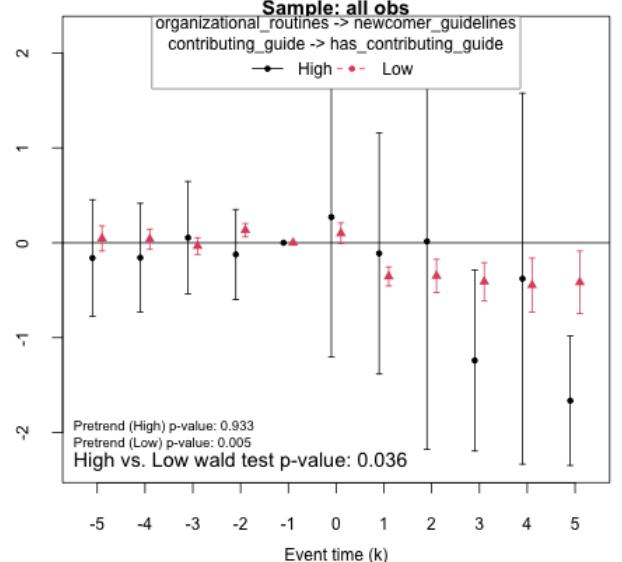


pull_request_merged rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
contributing_guide -> has_contributing_guide

● High ● Low

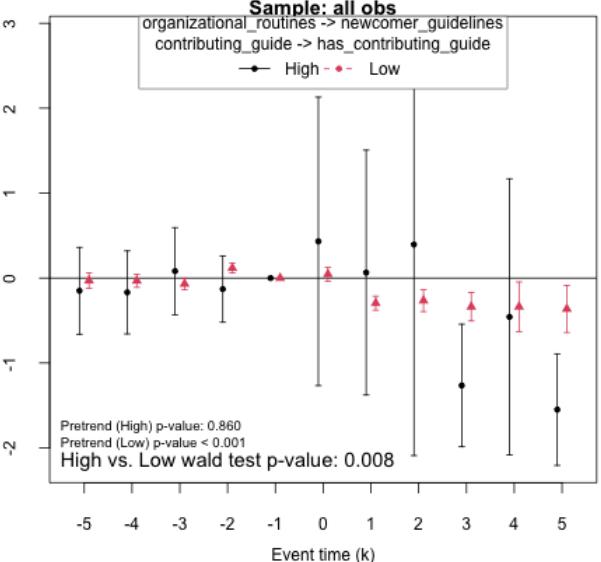


pull_request_opened rolling5

Sample: all obs

organizational_routines -> newcomer_guidelines
contributing_guide -> has_contributing_guide

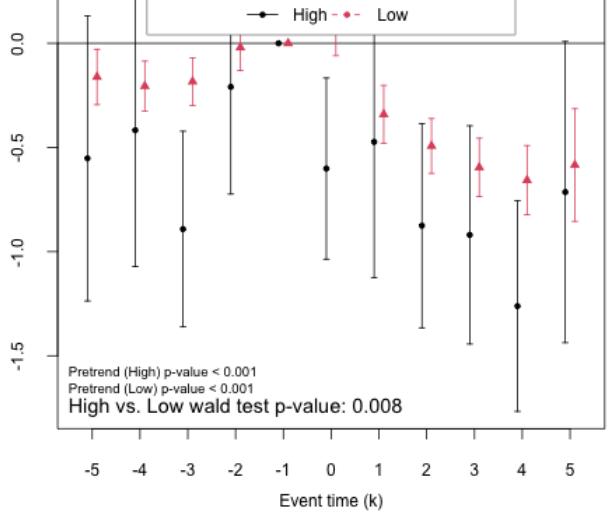
● High ● Low



major_minor_release_count rolling5

Sample: all obs

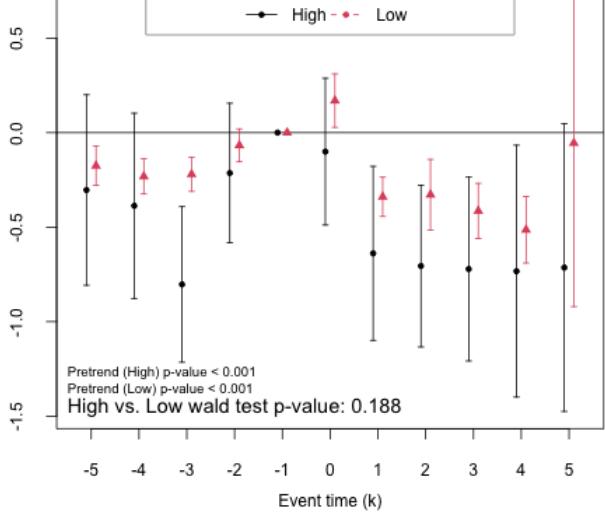
organizational_routines \rightarrow newcomer_guidelines
good_first_issue \rightarrow has_good_first_issue



overall_new_release_count rolling5

Sample: all obs

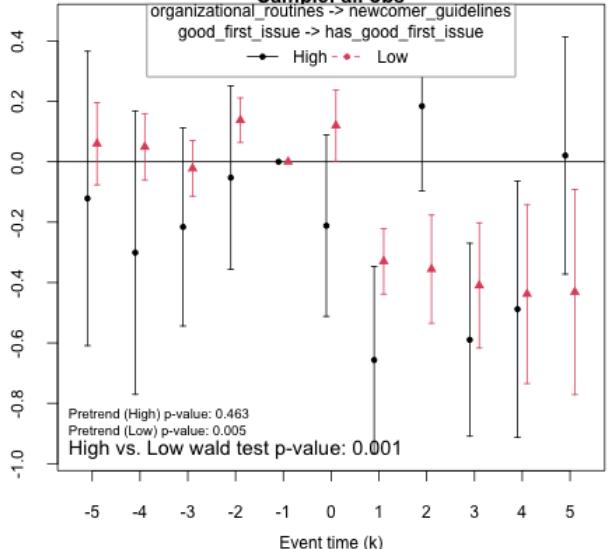
organizational_routines \rightarrow newcomer_guidelines
good_first_issue \rightarrow has_good_first_issue



pull_request_merged rolling5

Sample: all obs

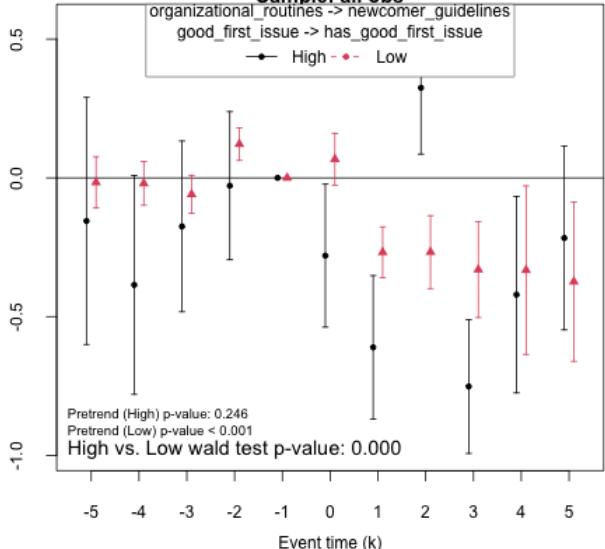
organizational_routines \rightarrow newcomer_guidelines
good_first_issue \rightarrow has_good_first_issue

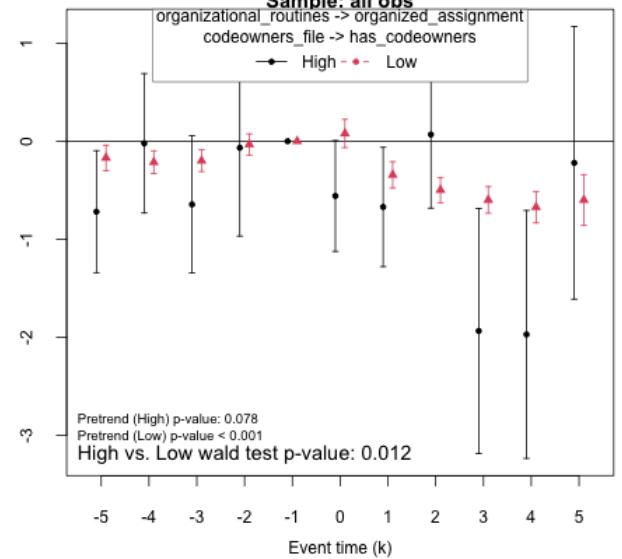
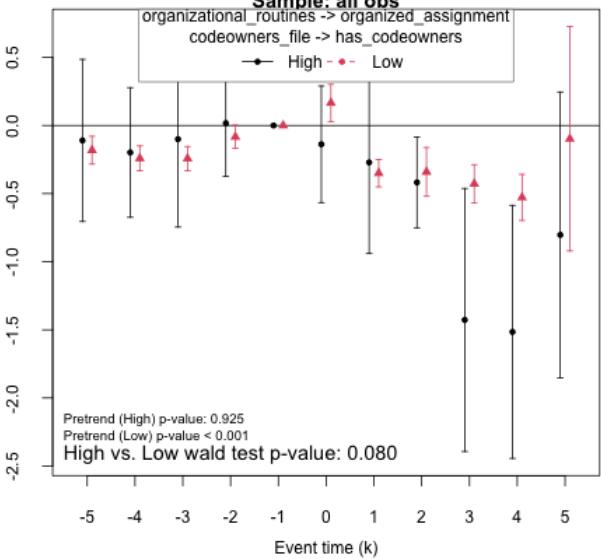
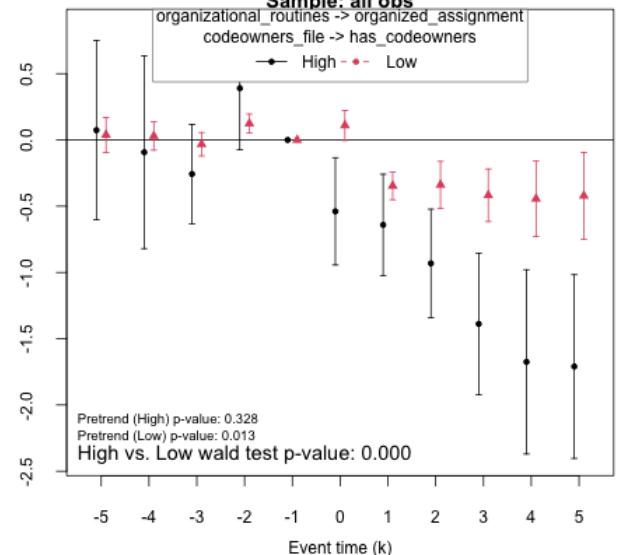
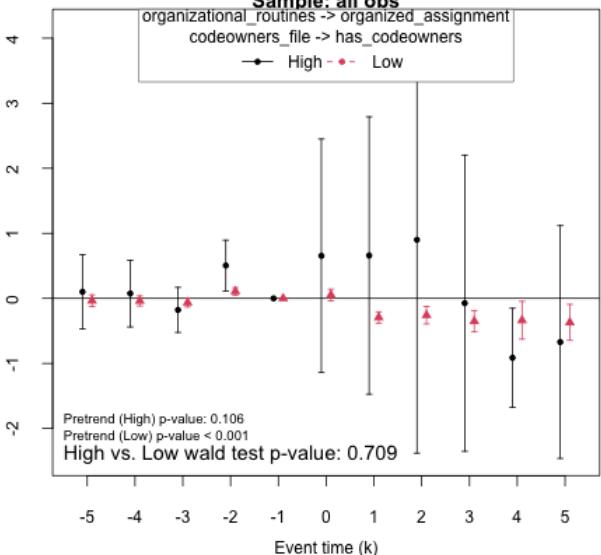


pull_request_opened rolling5

Sample: all obs

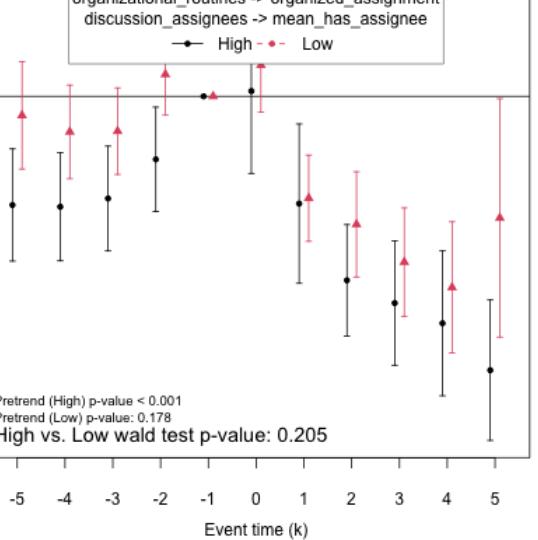
organizational_routines \rightarrow newcomer_guidelines
good_first_issue \rightarrow has_good_first_issue



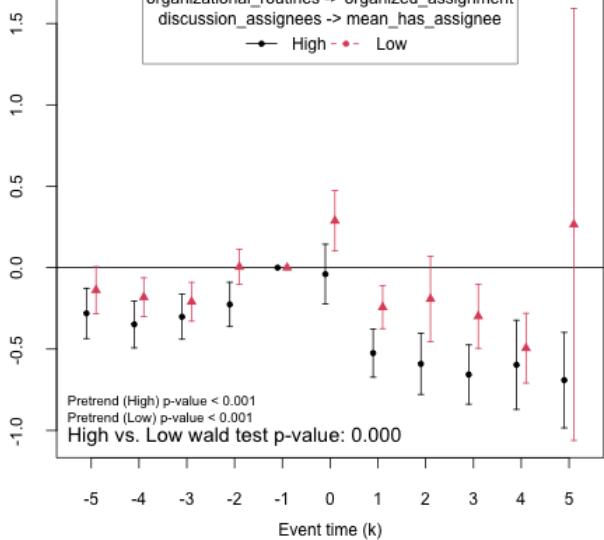
major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

major_minor_release_count rolling5**Sample: all obs**

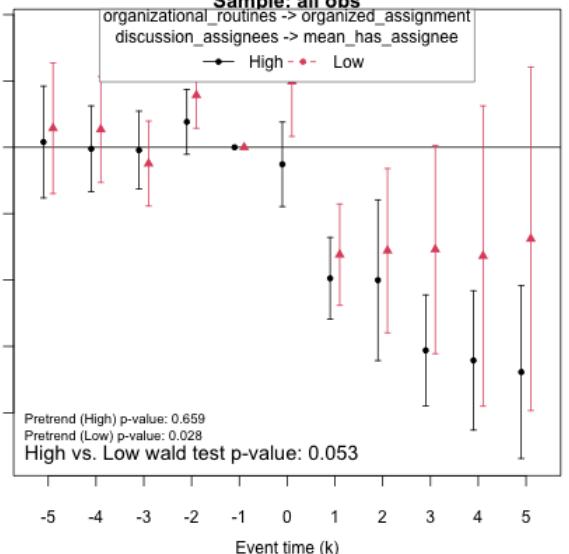
organizational_routines -> organized_assignment
 discussion_assignees -> mean_has_assignee

0.0
-0.5
-1.0**overall_new_release_count rolling5****Sample: all obs**

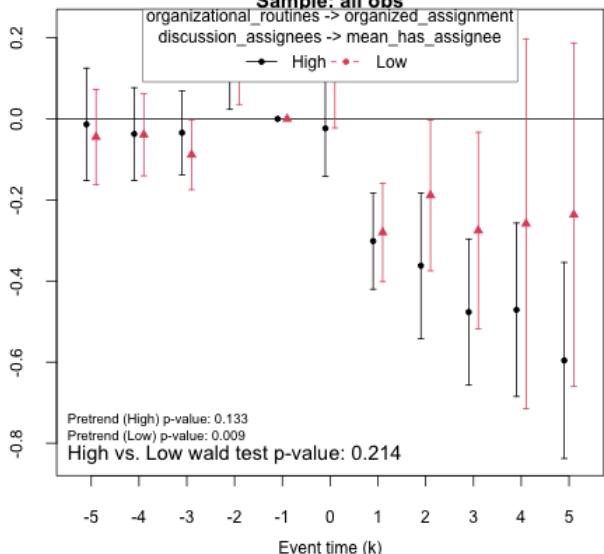
organizational_routines -> organized_assignment
 discussion_assignees -> mean_has_assignee

1.5
1.0
0.5
0.0
-0.5
-1.0**pull_request_merged rolling5****Sample: all obs**

organizational_routines -> organized_assignment
 discussion_assignees -> mean_has_assignee

0.4
0.2
0.0
-0.2
-0.4
-0.6
-0.8**pull_request_opened rolling5****Sample: all obs**

organizational_routines -> organized_assignment
 discussion_assignees -> mean_has_assignee

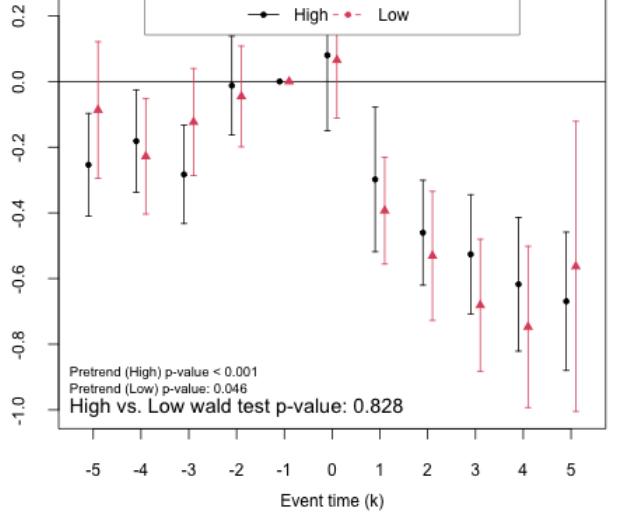
0.2
0.0
-0.2
-0.4
-0.6
-0.8

major_minor_release_count rolling5

Sample: all obs

organizational_routines -> organized_assignment
discussion_labels -> mean_has_tag

● High ▲ Low

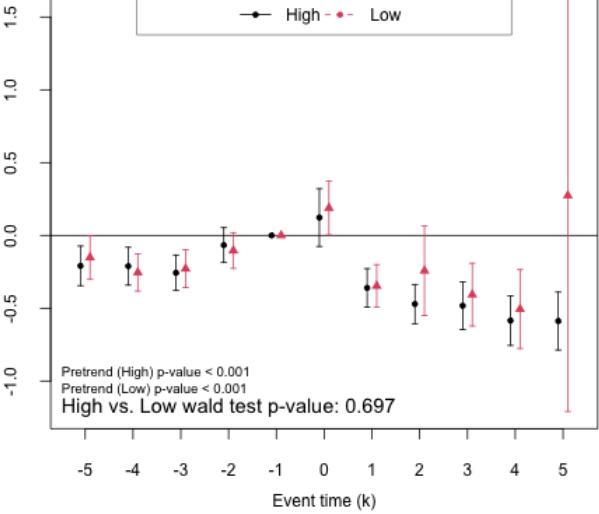


overall_new_release_count rolling5

Sample: all obs

organizational_routines -> organized_assignment
discussion_labels -> mean_has_tag

● High ▲ Low

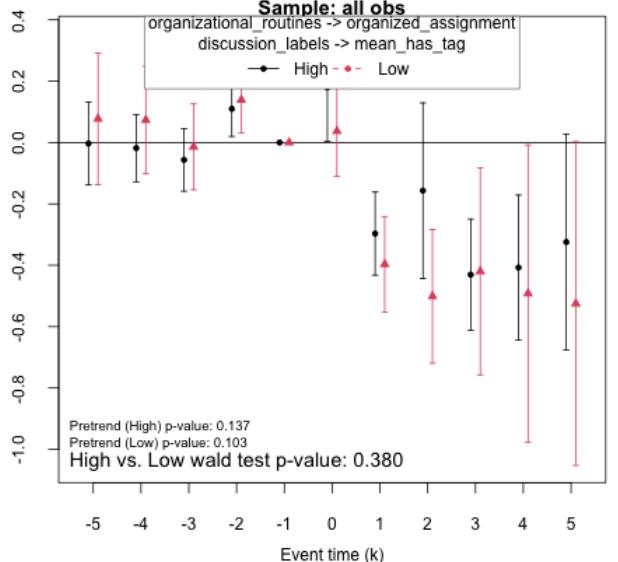


pull_request_merged rolling5

Sample: all obs

organizational_routines -> organized_assignment
discussion_labels -> mean_has_tag

● High ▲ Low

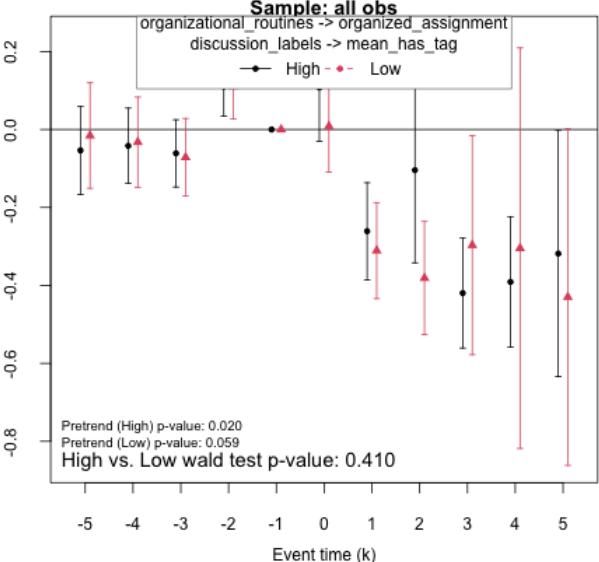


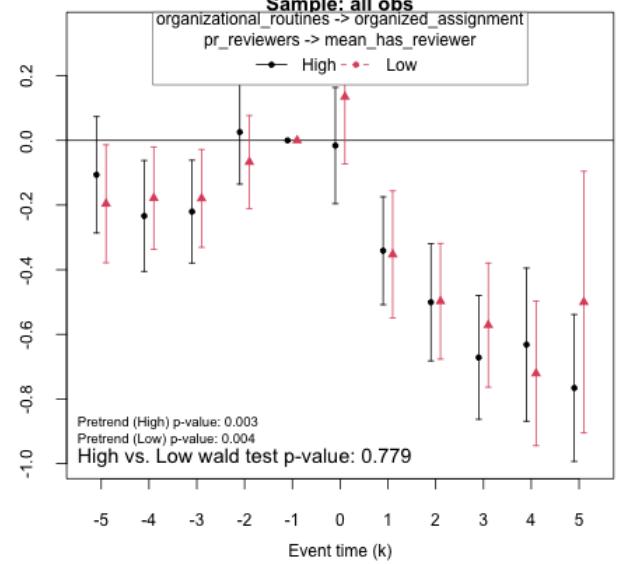
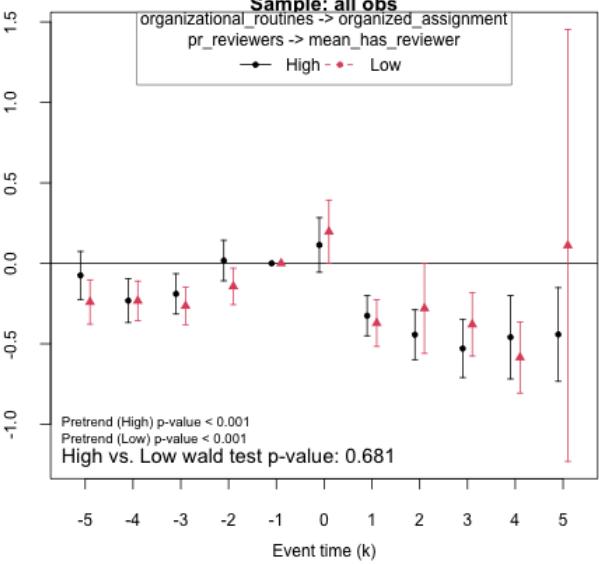
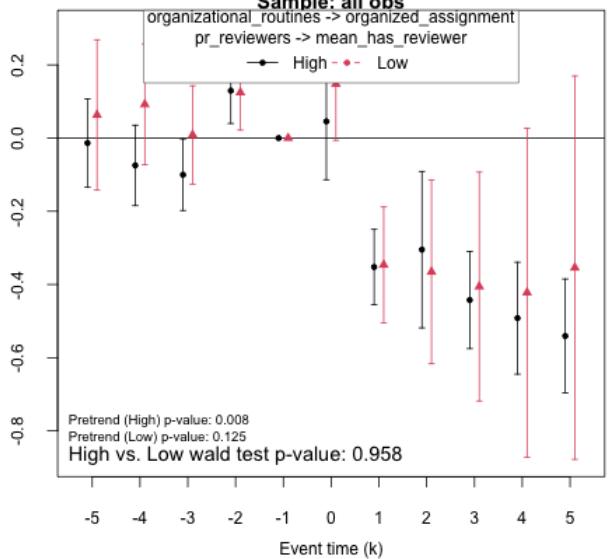
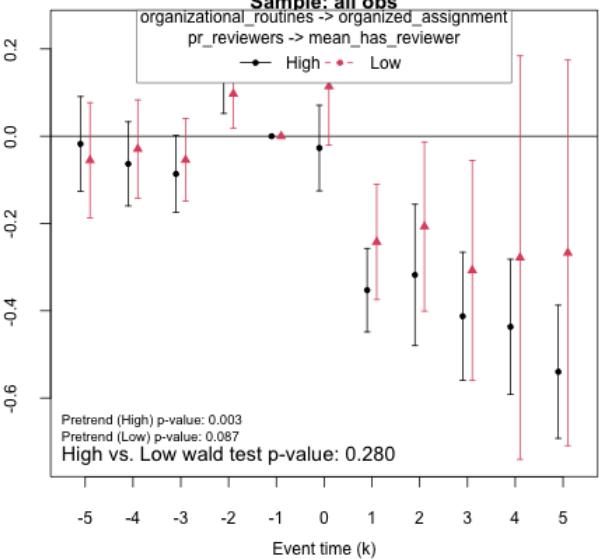
pull_request_opened rolling5

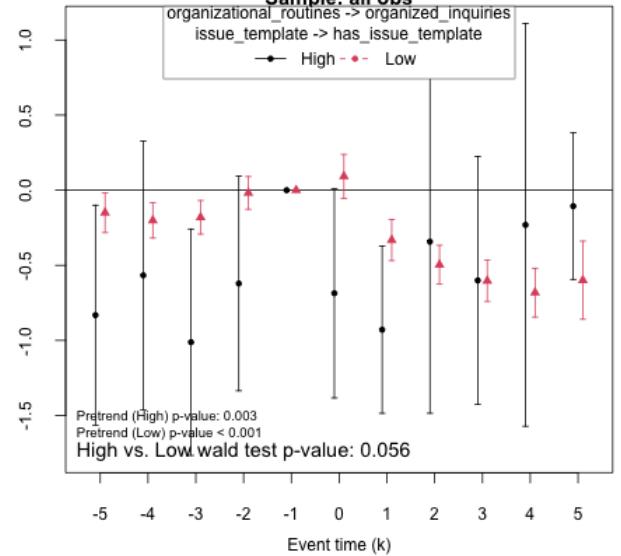
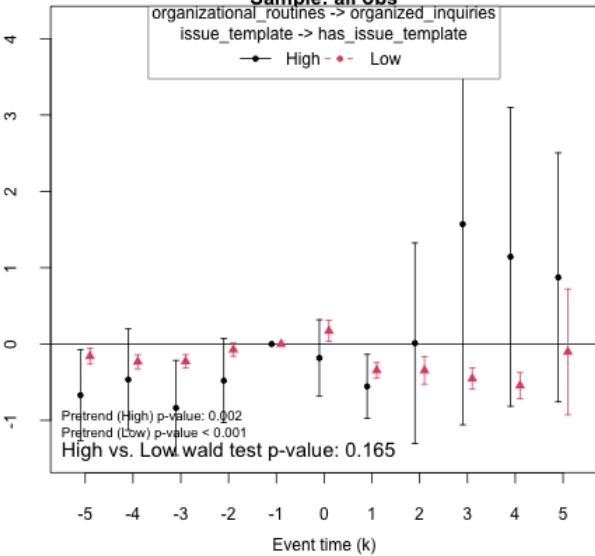
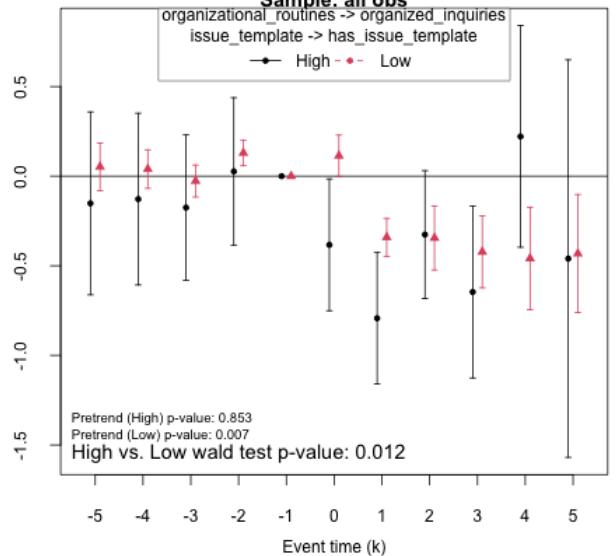
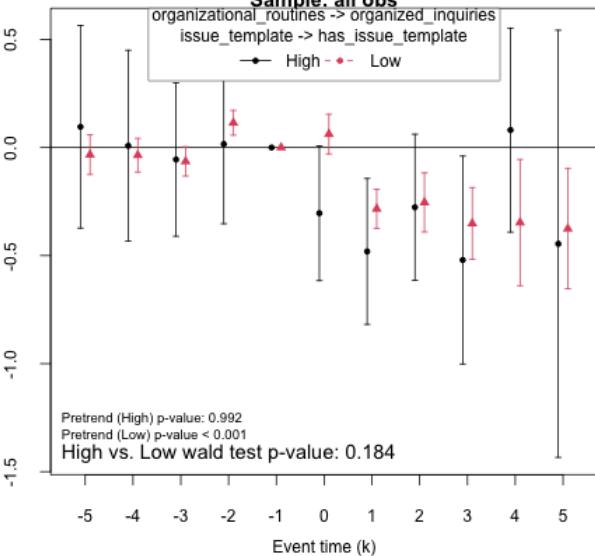
Sample: all obs

organizational_routines -> organized_assignment
discussion_labels -> mean_has_tag

● High ▲ Low

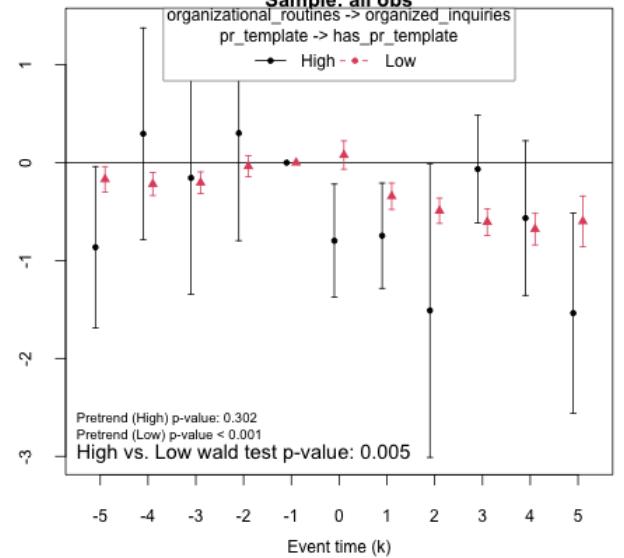


major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

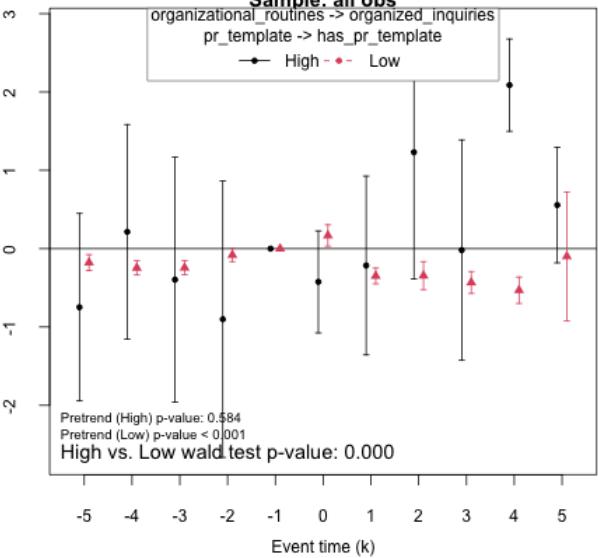
major_minor_release_count rolling5

Sample: all obs



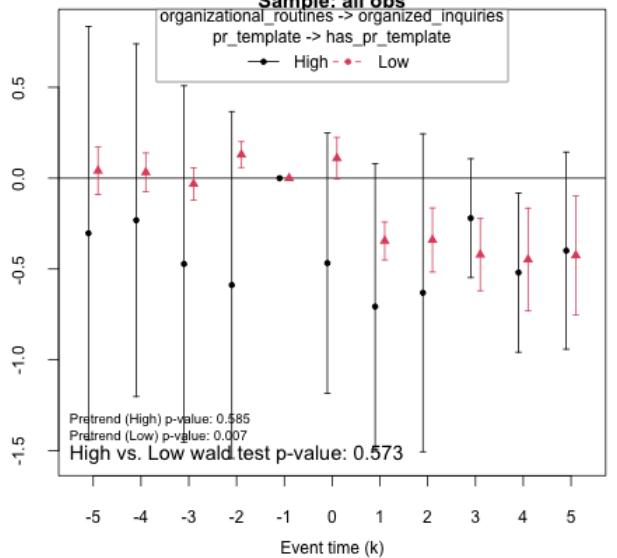
overall_new_release_count rolling5

Sample: all obs



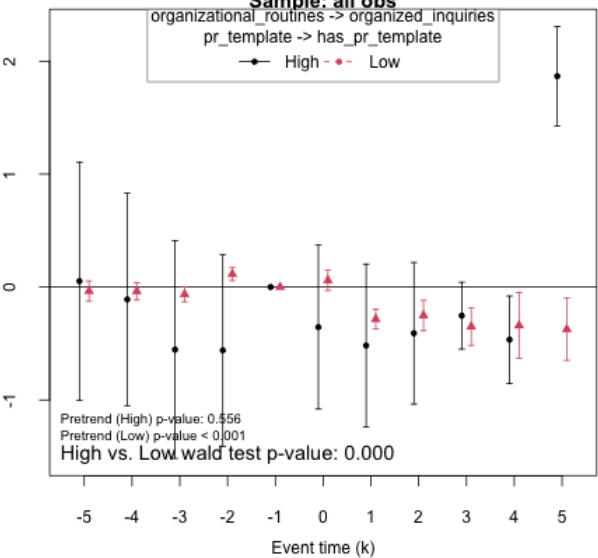
pull_request_merged rolling5

Sample: all obs



pull_request_opened rolling5

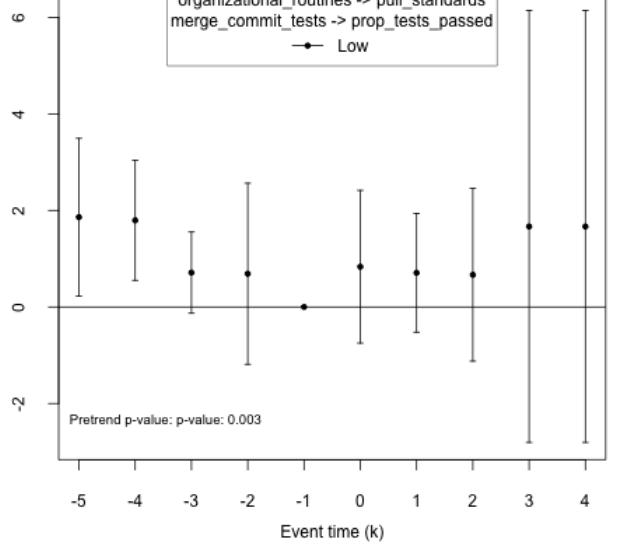
Sample: all obs



major_minor_release_count rolling5

Sample: all obs

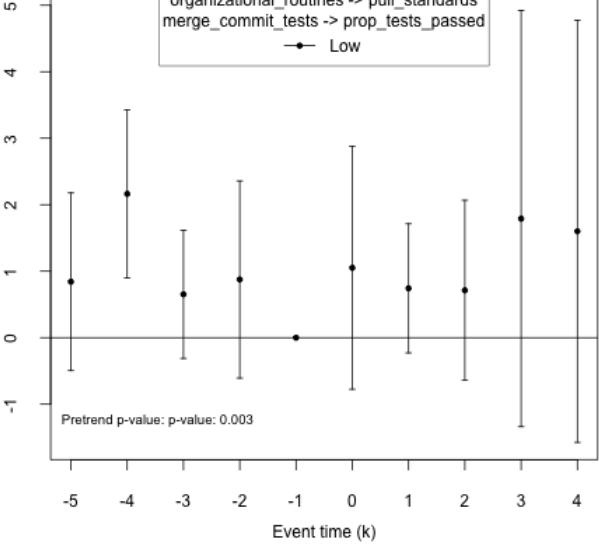
organizational_routines -> pull_standards
merge_commit_tests -> prop_tests_passed
● Low



overall_new_release_count rolling5

Sample: all obs

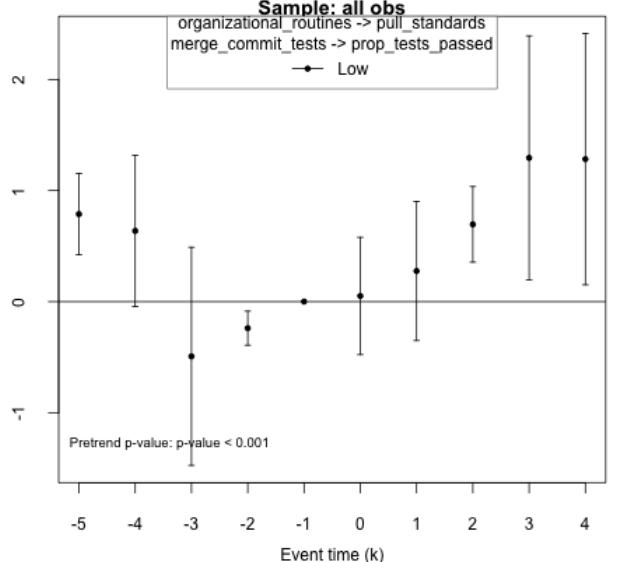
organizational_routines -> pull_standards
merge_commit_tests -> prop_tests_passed
● Low



pull_request_merged rolling5

Sample: all obs

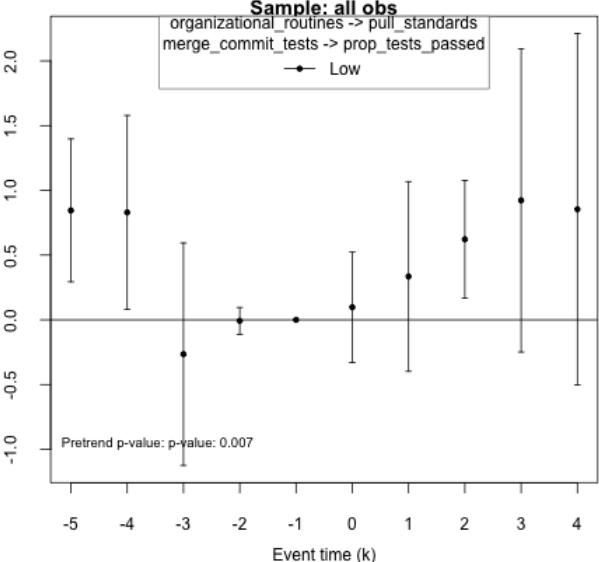
organizational_routines -> pull_standards
merge_commit_tests -> prop_tests_passed
● Low



pull_request_opened rolling5

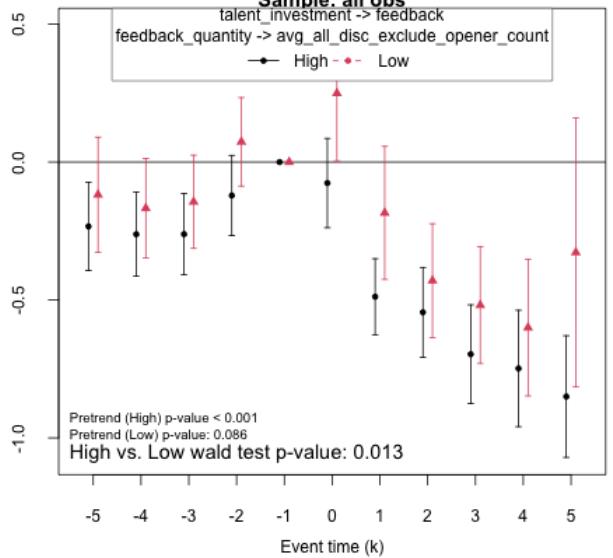
Sample: all obs

organizational_routines -> pull_standards
merge_commit_tests -> prop_tests_passed
● Low



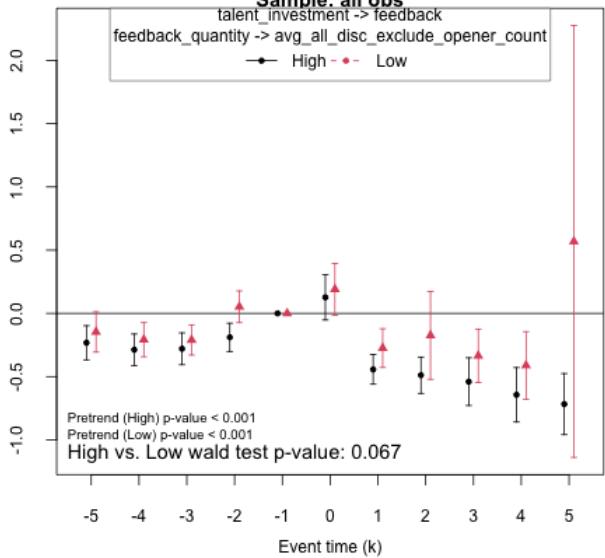
major_minor_release_count rolling5

Sample: all obs



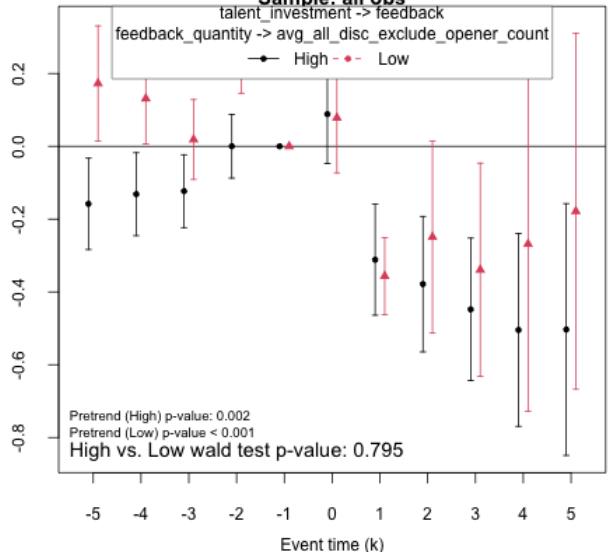
overall_new_release_count rolling5

Sample: all obs



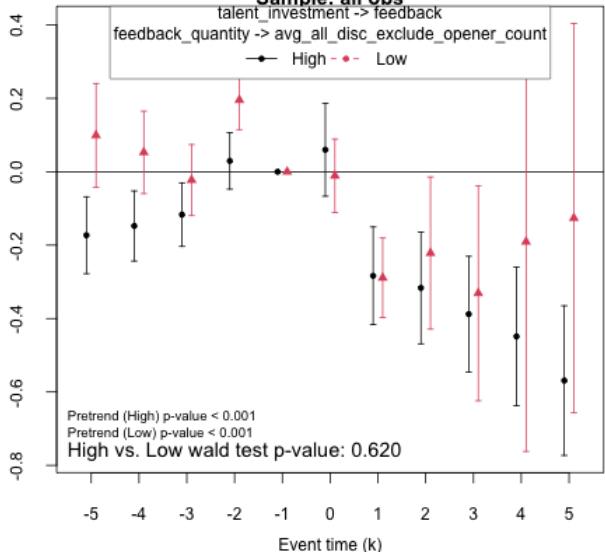
pull_request_merged rolling5

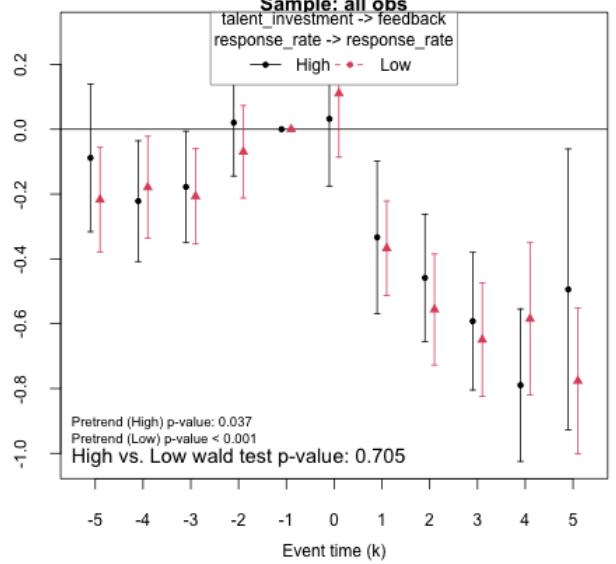
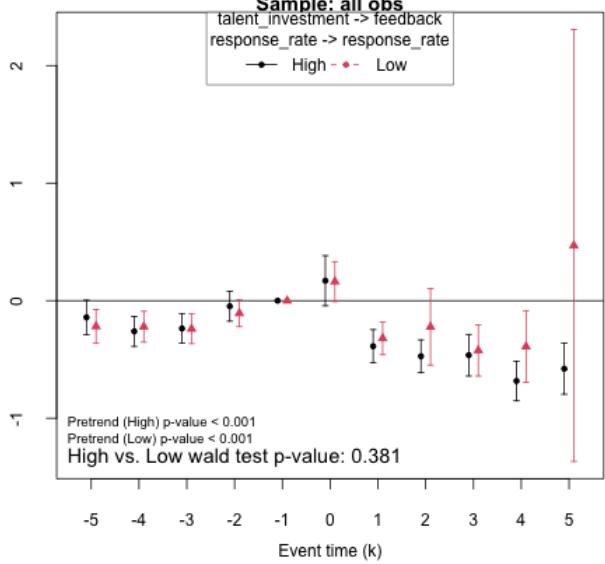
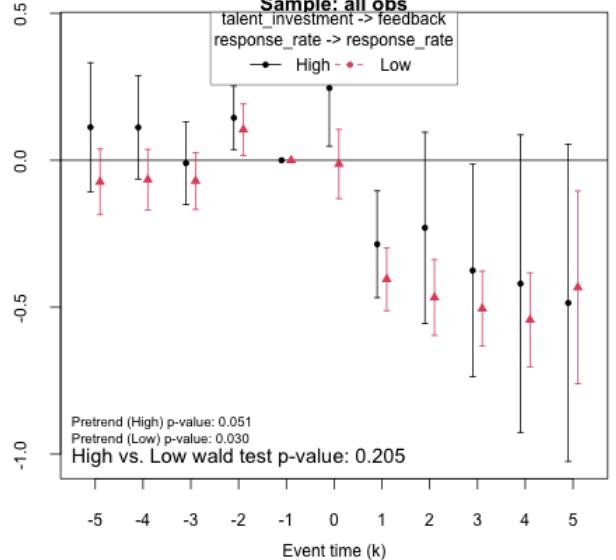
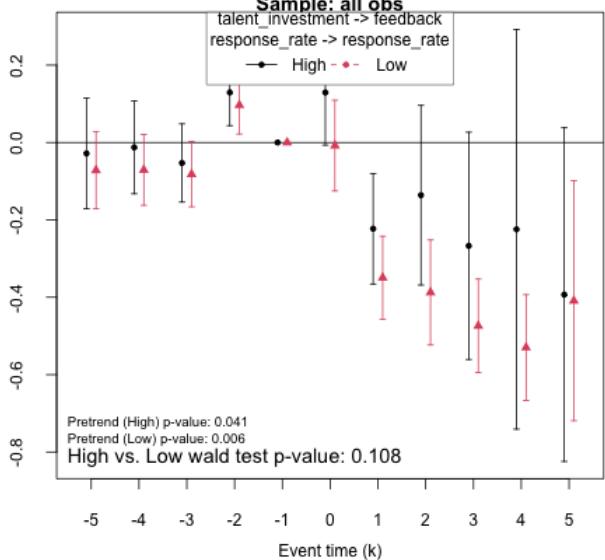
Sample: all obs



pull_request_opened rolling5

Sample: all obs

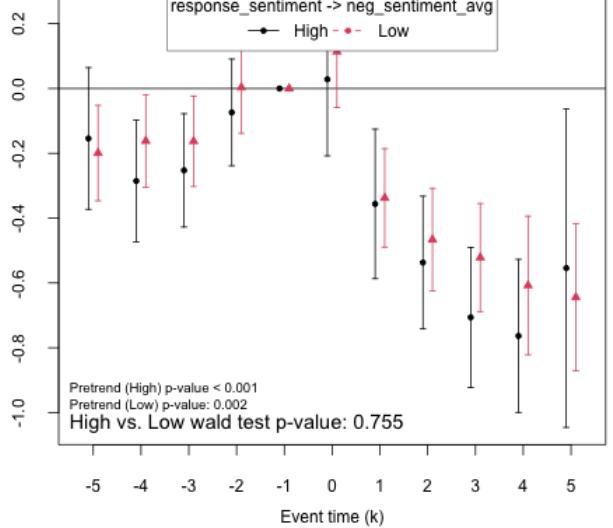


major_minor_release_count rolling5**Sample: all obs****overall_new_release_count rolling5****Sample: all obs****pull_request_merged rolling5****Sample: all obs****pull_request_opened rolling5****Sample: all obs**

major_minor_release_count rolling5

Sample: all obs

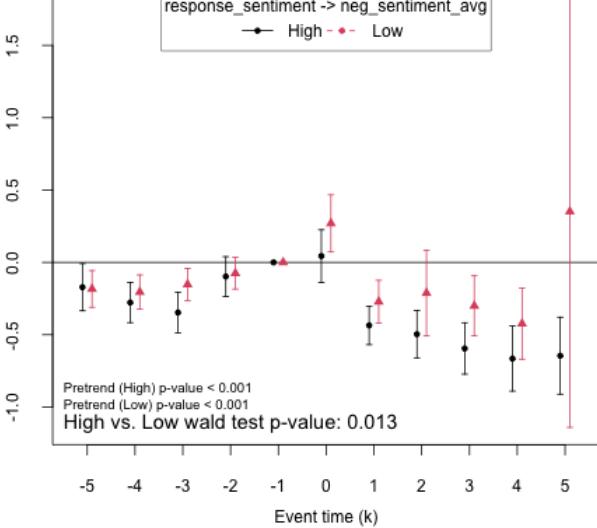
talent_investment -> feedback
 response_sentiment -> neg_sentiment_avg
 ● High ▲ Low



overall_new_release_count rolling5

Sample: all obs

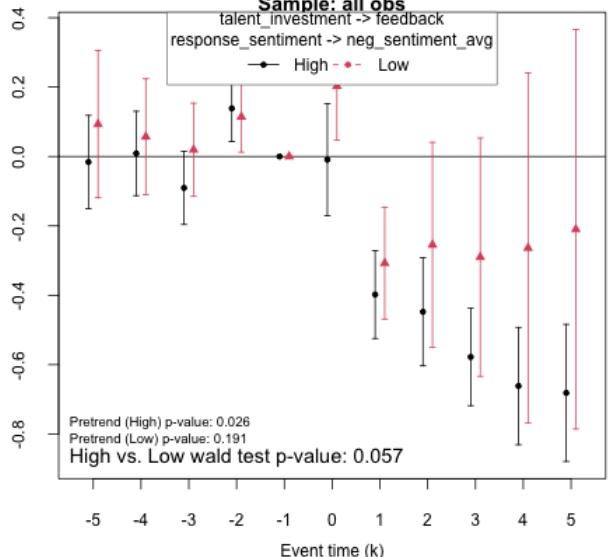
talent_investment -> feedback
 response_sentiment -> neg_sentiment_avg
 ● High ▲ Low



pull_request_merged rolling5

Sample: all obs

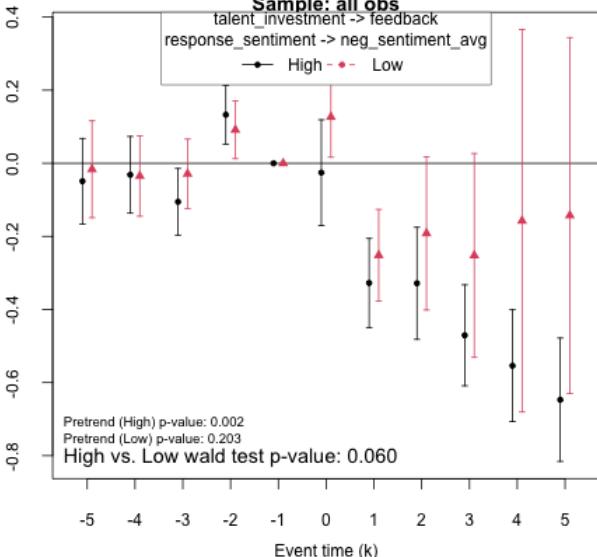
talent_investment -> feedback
 response_sentiment -> neg_sentiment_avg
 ● High ▲ Low



pull_request_opened rolling5

Sample: all obs

talent_investment -> feedback
 response_sentiment -> neg_sentiment_avg
 ● High ▲ Low

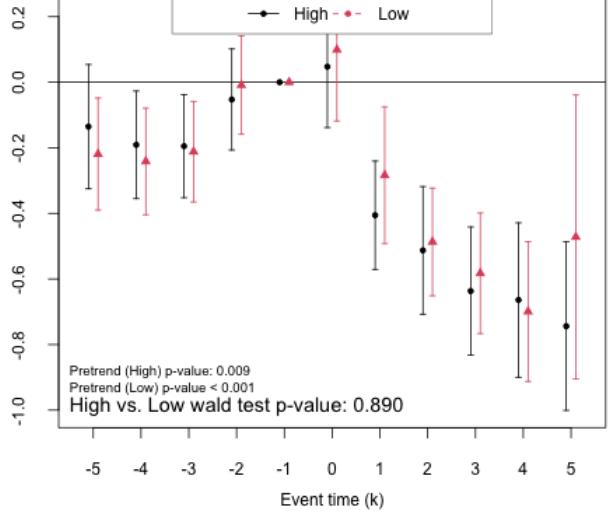


major_minor_release_count rolling5

Sample: all obs

talent_investment -> feedback
 response_sentiment -> ov_sentiment_avg

● High ▲ Low

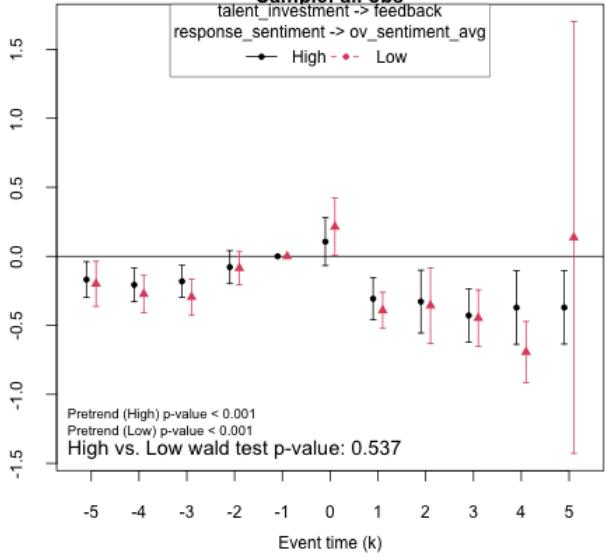


overall_new_release_count rolling5

Sample: all obs

talent_investment -> feedback
 response_sentiment -> ov_sentiment_avg

● High ▲ Low

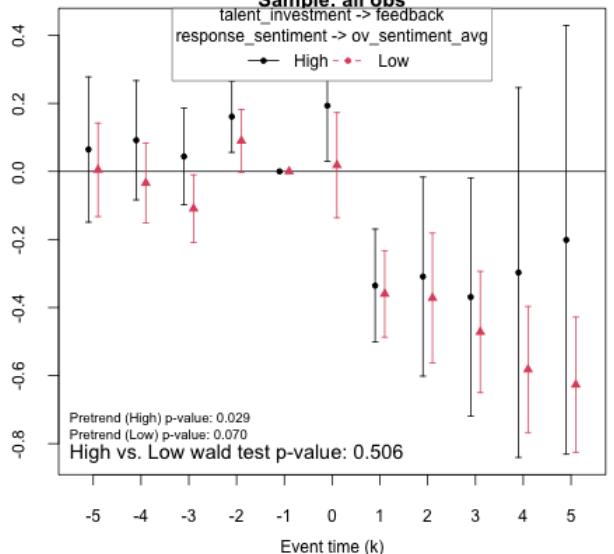


pull_request_merged rolling5

Sample: all obs

talent_investment -> feedback
 response_sentiment -> ov_sentiment_avg

● High ▲ Low

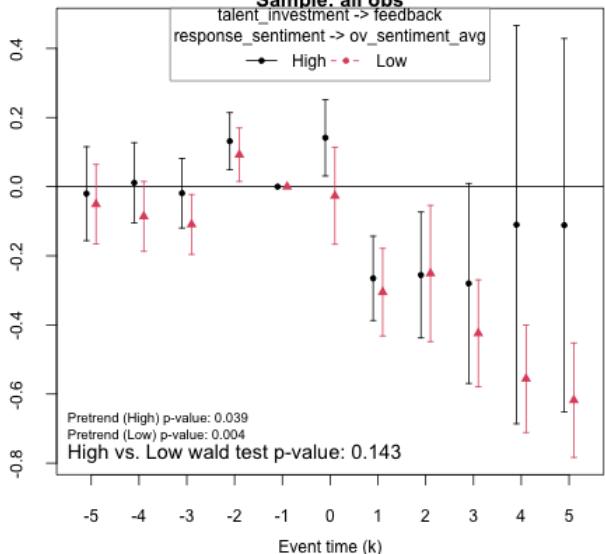


pull_request_opened rolling5

Sample: all obs

talent_investment -> feedback
 response_sentiment -> ov_sentiment_avg

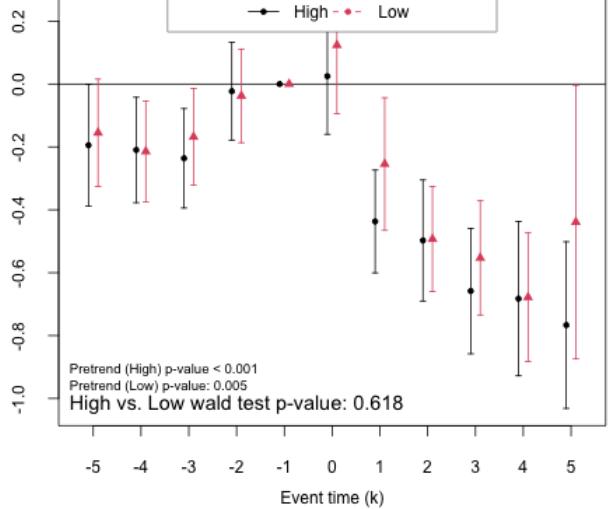
● High ▲ Low



major_minor_release_count rolling5

Sample: all obs

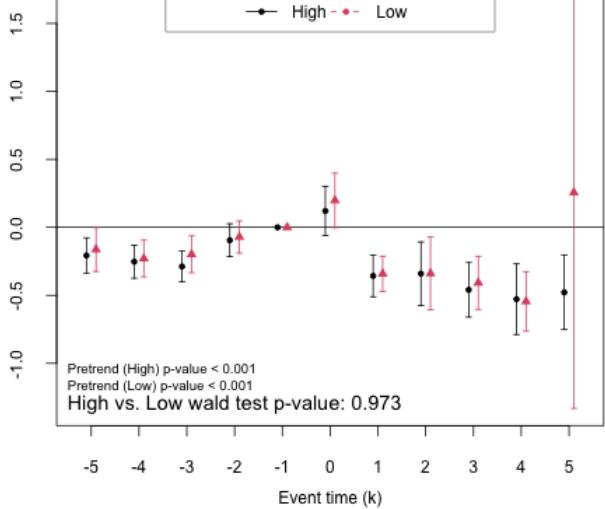
talent_investment -> feedback
 response_sentiment -> pos_sentiment_avg
 ● High ▲ Low



overall_new_release_count rolling5

Sample: all obs

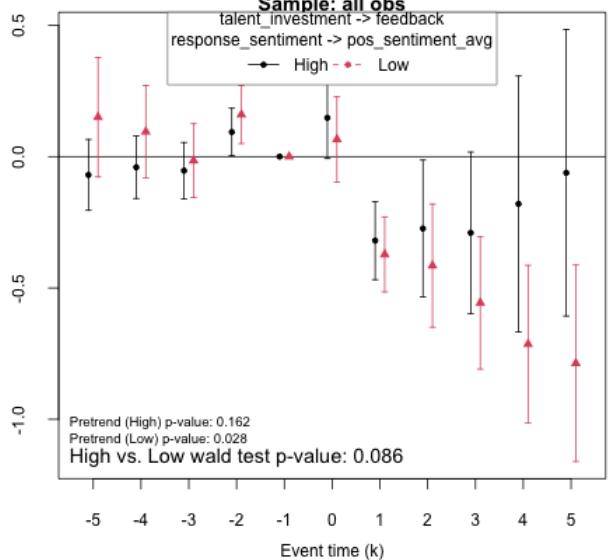
talent_investment -> feedback
 response_sentiment -> pos_sentiment_avg
 ● High ▲ Low



pull_request_merged rolling5

Sample: all obs

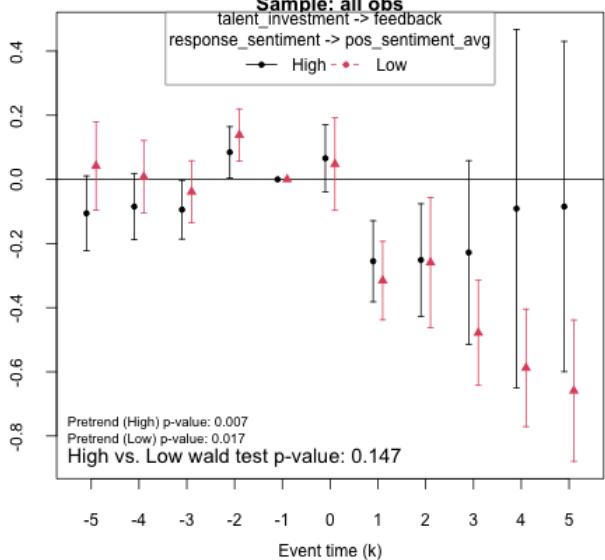
talent_investment -> feedback
 response_sentiment -> pos_sentiment_avg
 ● High ▲ Low



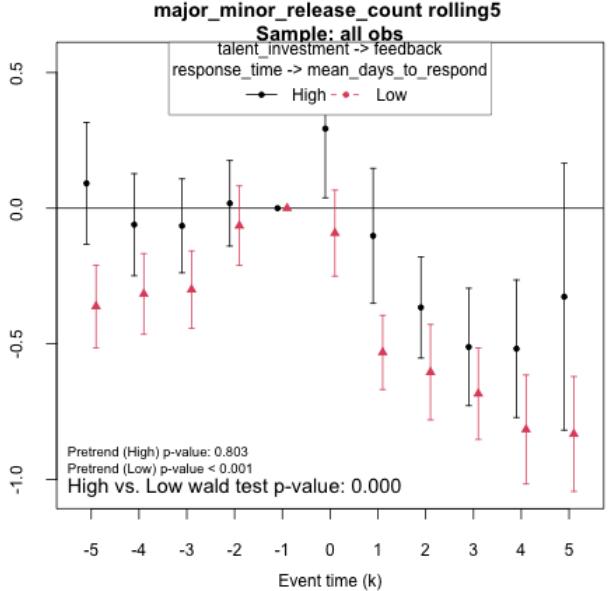
pull_request_opened rolling5

Sample: all obs

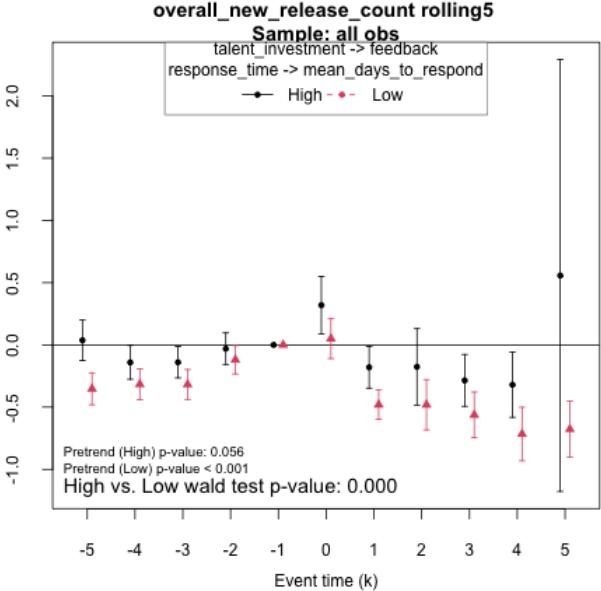
talent_investment -> feedback
 response_sentiment -> pos_sentiment_avg
 ● High ▲ Low



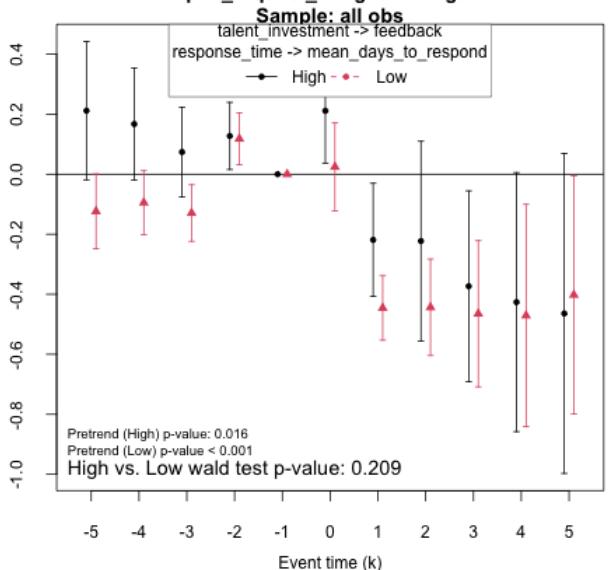
major_minor_release_count rolling5



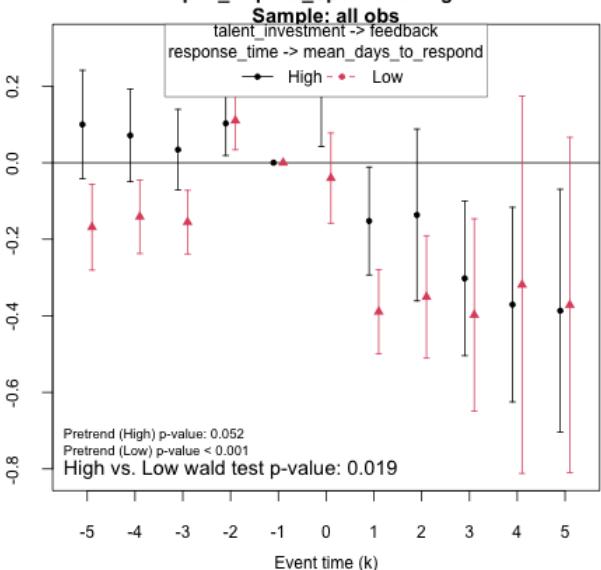
overall_new_release_count rolling5



pull_request_merged rolling5

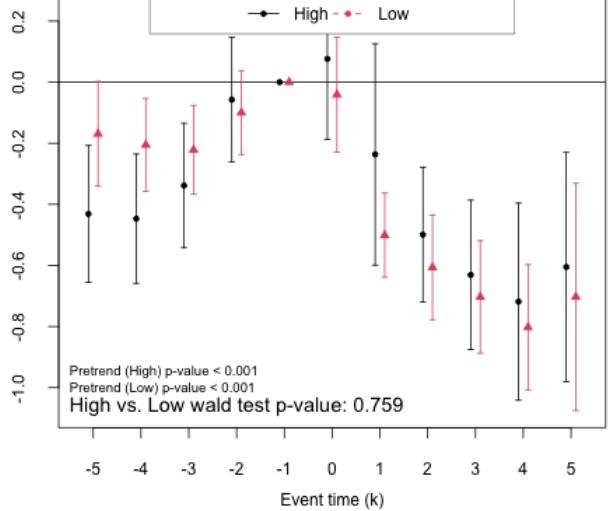


pull_request_opened rolling5

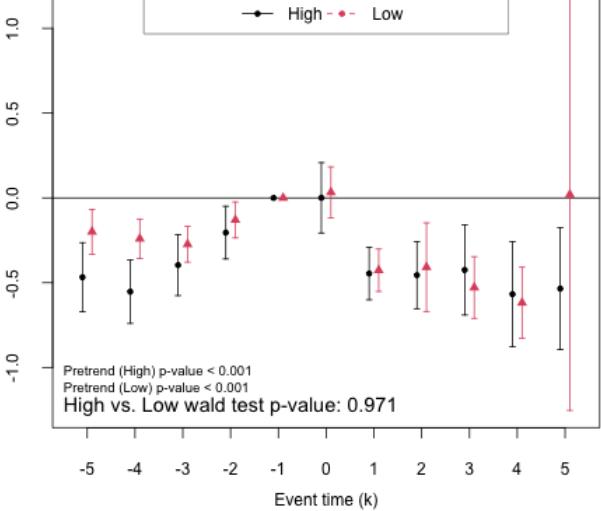


major_minor_release_count rolling5**Sample: all obs**talent_investment->growth_opportunity
merge_review_pr -> any_activity_rate_weighted

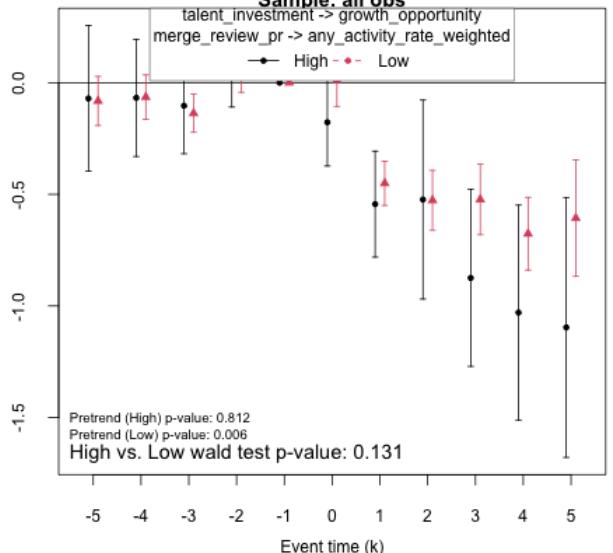
● High ▲ Low

**overall_new_release_count rolling5****Sample: all obs**talent_investment->growth_opportunity
merge_review_pr -> any_activity_rate_weighted

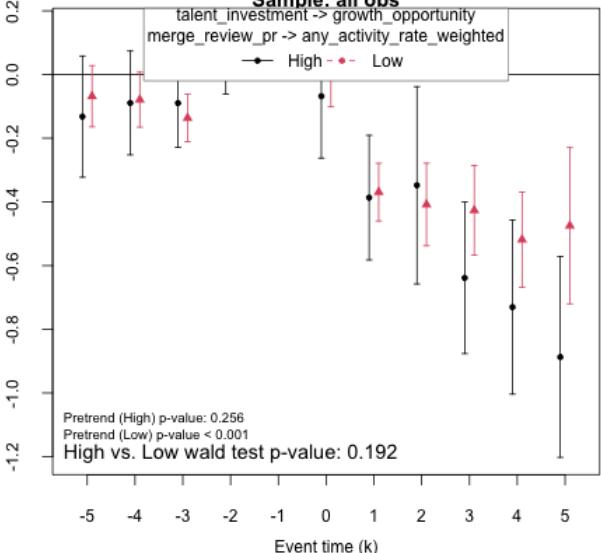
● High ▲ Low

**pull_request_merged rolling5****Sample: all obs**talent_investment->growth_opportunity
merge_review_pr -> any_activity_rate_weighted

● High ▲ Low

**pull_request_opened rolling5****Sample: all obs**talent_investment->growth_opportunity
merge_review_pr -> any_activity_rate_weighted

● High ▲ Low

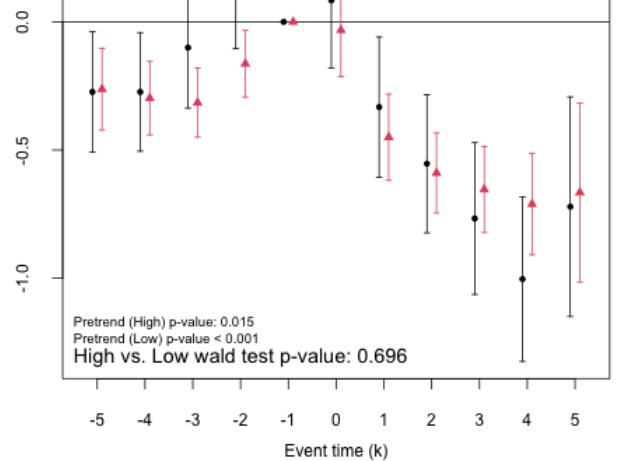


major_minor_release_count rolling5

Sample: all obs

talent_investment -> growth_opportunity
merge_review_pr -> pull_request_merged_rate_weighted

● High ● Low

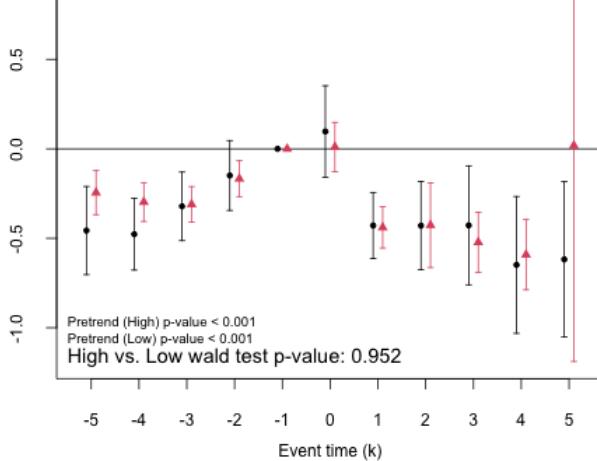


overall_new_release_count rolling5

Sample: all obs

talent_investment -> growth_opportunity
merge_review_pr -> pull_request_merged_rate_weighted

● High ● Low

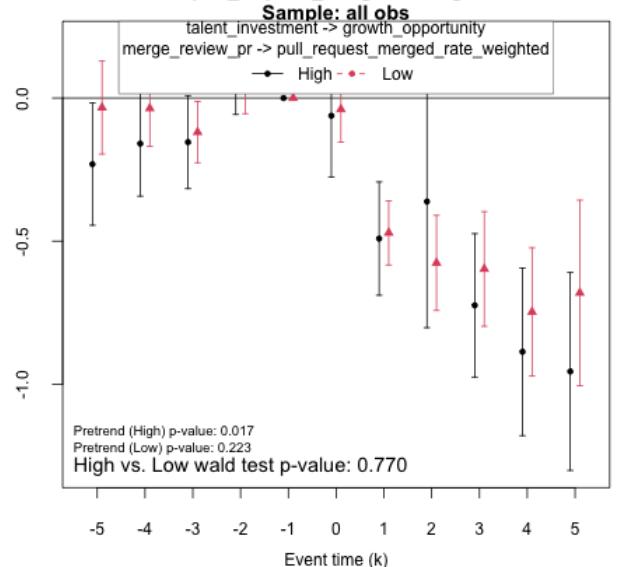


pull_request_merged rolling5

Sample: all obs

talent_investment -> growth_opportunity
merge_review_pr -> pull_request_merged_rate_weighted

● High ● Low

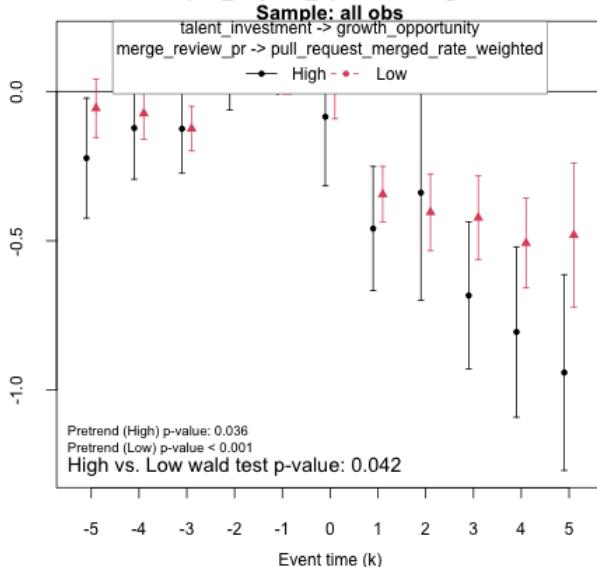


pull_request_opened rolling5

Sample: all obs

talent_investment -> growth_opportunity
merge_review_pr -> pull_request_merged_rate_weighted

● High ● Low

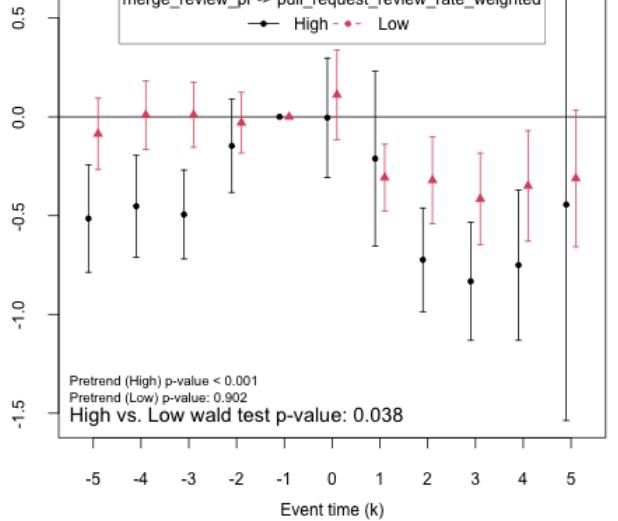


major_minor_release_count rolling5

Sample: all obs

talent_investment-> growth_opportunity
merge_review_pr -> pull_request_review_rate_weighted

● High ▲ Low

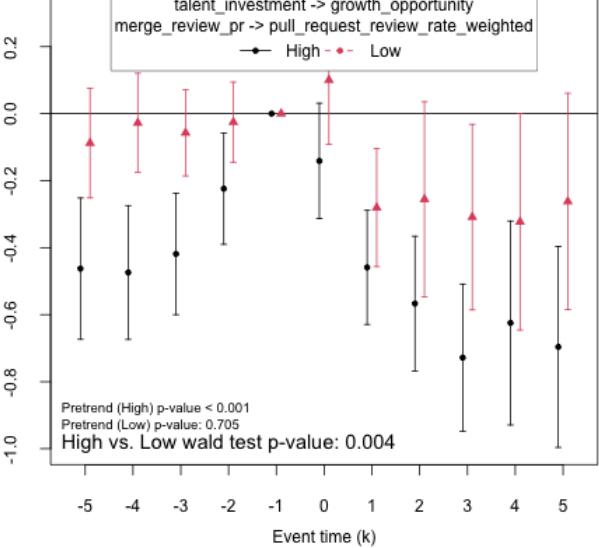


overall_new_release_count rolling5

Sample: all obs

talent_investment-> growth_opportunity
merge_review_pr -> pull_request_review_rate_weighted

● High ▲ Low

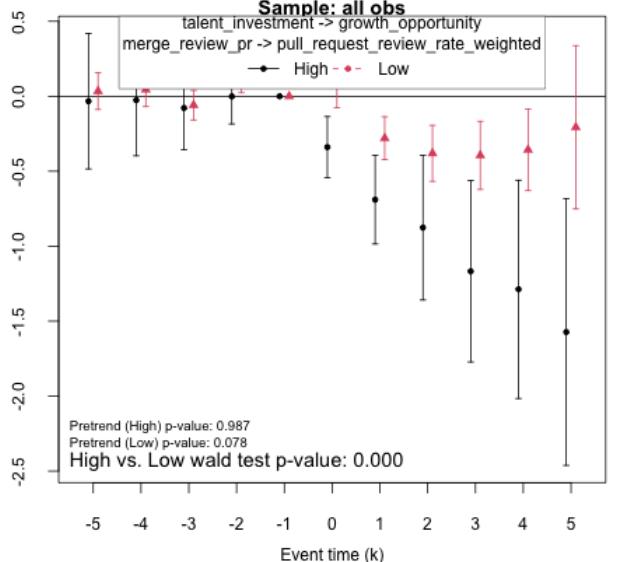


pull_request_merged rolling5

Sample: all obs

talent_investment-> growth_opportunity
merge_review_pr -> pull_request_review_rate_weighted

● High ▲ Low

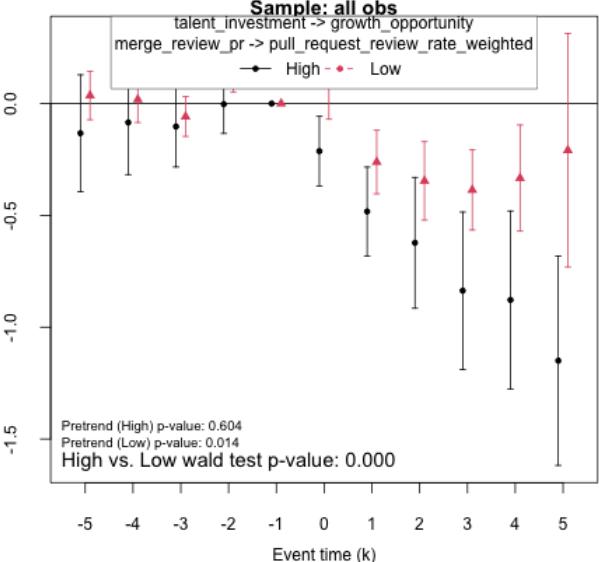


pull_request_opened rolling5

Sample: all obs

talent_investment-> growth_opportunity
merge_review_pr -> pull_request_review_rate_weighted

● High ▲ Low

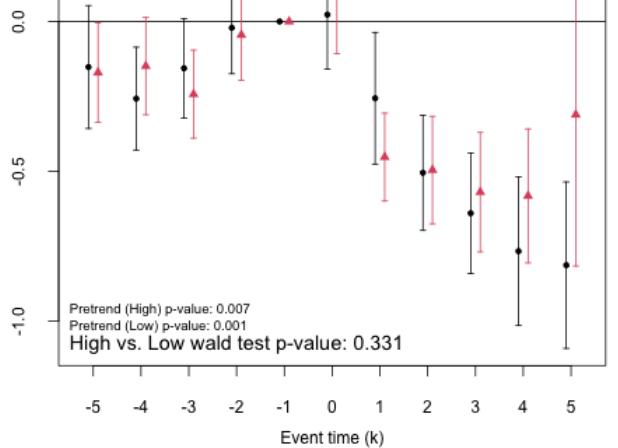


major_minor_release_count rolling5

Sample: all obs

talent_investment -> organizational_closeness
network_clustering_coefficient -> clustering_coefficient

● High ▲ Low

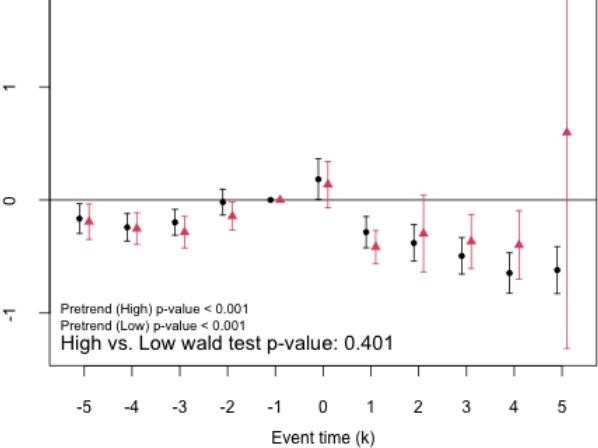


overall_new_release_count rolling5

Sample: all obs

talent_investment -> organizational_closeness
network_clustering_coefficient -> clustering_coefficient

● High ▲ Low

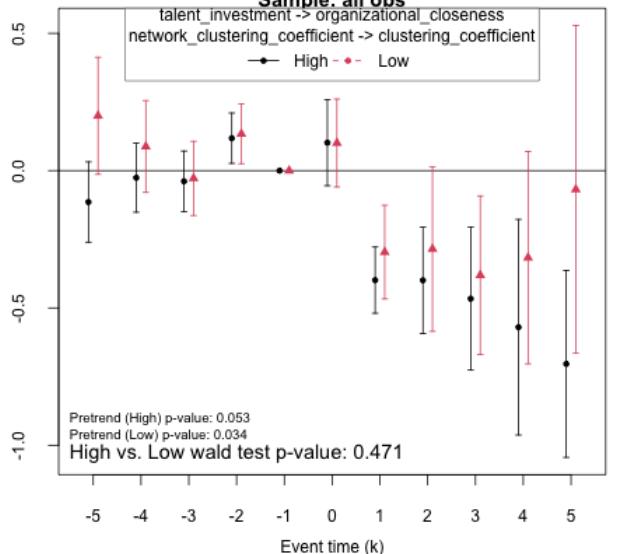


pull_request_merged rolling5

Sample: all obs

talent_investment -> organizational_closeness
network_clustering_coefficient -> clustering_coefficient

● High ▲ Low



pull_request_opened rolling5

Sample: all obs

talent_investment -> organizational_closeness
network_clustering_coefficient -> clustering_coefficient

● High ▲ Low

