DAVIDE SECCHI & STEPHEN J. COWLEY

University of Southern Denmark

IMPROBABLE FAIRNESS

REVIEWING UNDER THE LENSES OF IMPACT FACTOR

MODEL-BASED GOVERNANCE IN A SUSTAINABLE WORLD

ACHIEVING EFFECTIVE IMPACTS THROUGH POLICY MODELLING 2.0

SPECIAL ISSUE

GUEST EDITORS: STEFANO ARMENIA, FEDERICO BARNABÉ AND DAVIDE SECCHI

ALL DECISIONS ARE BIASED

- Limits and biases can be attributed to the **social** and **institutional** environment in which decision makers operate
- Drawing on psychology and cognition we assume that:
  - cognition (rationality) is limited
  - decision makers enact judgement biases

Simon, H.A. (1997). Administrative behavior. New York: The Free Press, 4th edition; Simon, H.A. (1955). A behavioral theory of rational choice. Quarterly Journal of Economics , 69 (1), 99–118; Kahneman, D. (2003). A perspective of judgement and choice. mapping bounded rationality. American Psychologist , 58 (9), 697–721. Kahneman, D. & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. Econometrica , 47 (2), 263–292.

WHAT DO WE WANT TO STUDY?

- How do attitudes toward the impact factor (IF) affect the review process?
- *We answer this question using an agent-based computational simulation model*

Modeling Organizational Cognition: The Case of Impact Factor

Davide Secchi and **Stephen J. Cowley**

University of Southern Denmark Other articles by these authors

Journal of Artificial Societies and Social Simulation **21** (1) 13
<http://jasss.soc.surrey.ac.uk/21/1/13.html>
DOI: 10.18564/jasss.3628 Save citation...

Received: 13-Apr-2017 Accepted: 03-Jan-2018 Published: 31-Jan-2018

This article offers an alternative perspective on organizational cognition based on e-cognition whereby appeal to systemic cognition replaces the traditional computational model of the mind that is still extremely popular in organizational research. It uses information processing, not to explore inner processes, but as the basis for pursuing organizational matters. To develop a theory of organizational cognition, the current work presents an agent-based simulation model based on the case of how individual perception of scientific value is affected by and affects organizational intelligence units' (e.g., research groups', departmental) framing of the notorious impact factor. Results show that organizational cognition cannot be described without an intermediate meso scale – called here social organizing – that both filters and enables the many kinds of socially enabled perception, action and behavior that are so characteristic of human cognition.

Keywords: Organizational Cognition, Distributed Cognition, E-Cognition, Impact Factor, Perceived Scientific Value, Social Organizing, Agent-Based Simulation Modeling Other articles with these keywords

IMPACT FACTOR

WHY?

"The impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years"

Eugene Garfield (1994)

IT IS AN EXTRAORDINARY SOURCE OF BIASES!

- **Unreliability**: no clear path between citations and IF
- **Disciplinary specificity**: the chosen time horizon is a one size fits all solution for extremely different needs
- **Distribution**: few articles determine high IF for any given journal

Seglen PO (1997). Why the impact factor of journals should not be used for evaluating research. British Medical Journal 314 , 498-502; Curry S. (2012). Sick of Impact Factors. Blog Post: Occam's Typewriter, 13 August. Retrieved online at http://occamstypewriter.org/scurry/2012/08/13/sick-of-impact-factors/; Colquhoun D (2003). Challenging the tyranny of impact factors. Nature 423, 479.

TAKING AN ORGANIZATIONAL PERSPECTIVE

- perceptions of IF characteristics may derive from:
  - **institutionalized** beliefs in various forms of lists
  - pressure from peers in **academic communities**, departments, associations, else
  - pressure to **conform** or adapt (being too 'docile' as opposed to 'inquisitive')

Woods, J. 2004. The death of argument. Dordrecht: Kluwer; Gabbay, D.M., and J. Woods. 2007. Seductions and Shortcuts: Fallacies in the cognitive economy. Elsevier; Secchi, D. 2011. Extendable Rationality. New York: Springer; Secchi, D., & Cowley, S.J. 2018. Modeling Organizational Cognition: The Case of Impact Factor. Journal of Artificial Societies and Social Simulation 21 (1) 13; Bardone, E. & Secchi, D. (2017). Inquisitiveness: Distributing rational thinking. Team Performance Management , 23 (1/2), 66–81.

SUMMARY

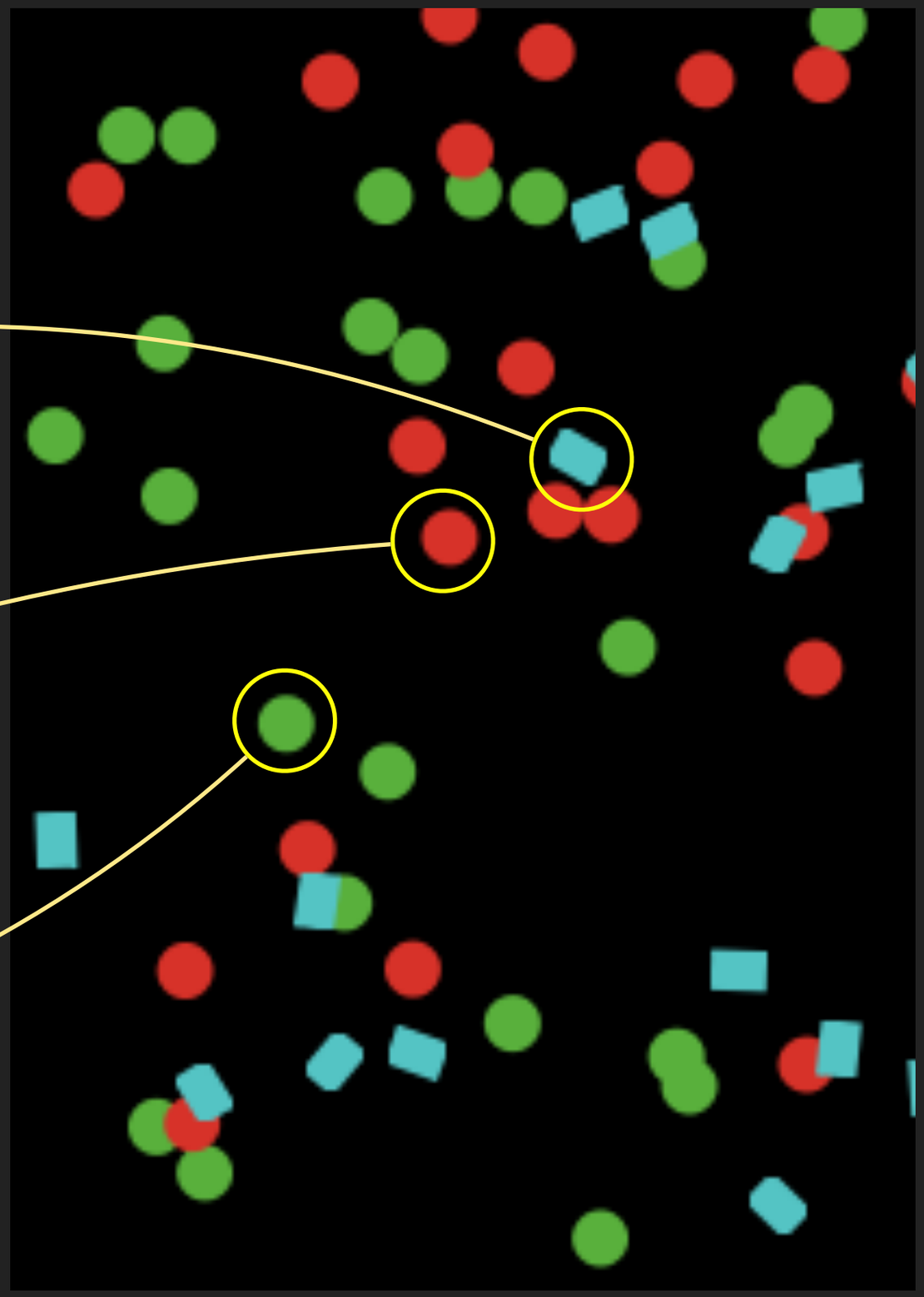
THE MODEL

TWO TYPES OF AGENTS: (A) PAPERS, AND (B) REVIEWERS

PAPERS

REVIEWER IU2:
IF LOVERS

REVIEWER IU1:
IF AGNOSTICS



PAPERS

- associated to a journal's IF [0, 5]
- all have an inherent "value"
- are randomly attributed to reviewers (up to three)

REVIEWERS

- attitudes towards IF (high vs low)
- general perception of scientific value (PSV)
- they are docile (…to some extent)

THE END PROCESS

- End result:
  - accept (exit)
  - revisions (remain)
  - reject (remain)
- New papers enter the system at every step following a random algorithm

PROCEDURES

- All papers are evaluated by reviewers as a function of the inherent value of the paper “discounted” by the **perception of scientific value** (PSV) of the reviewer

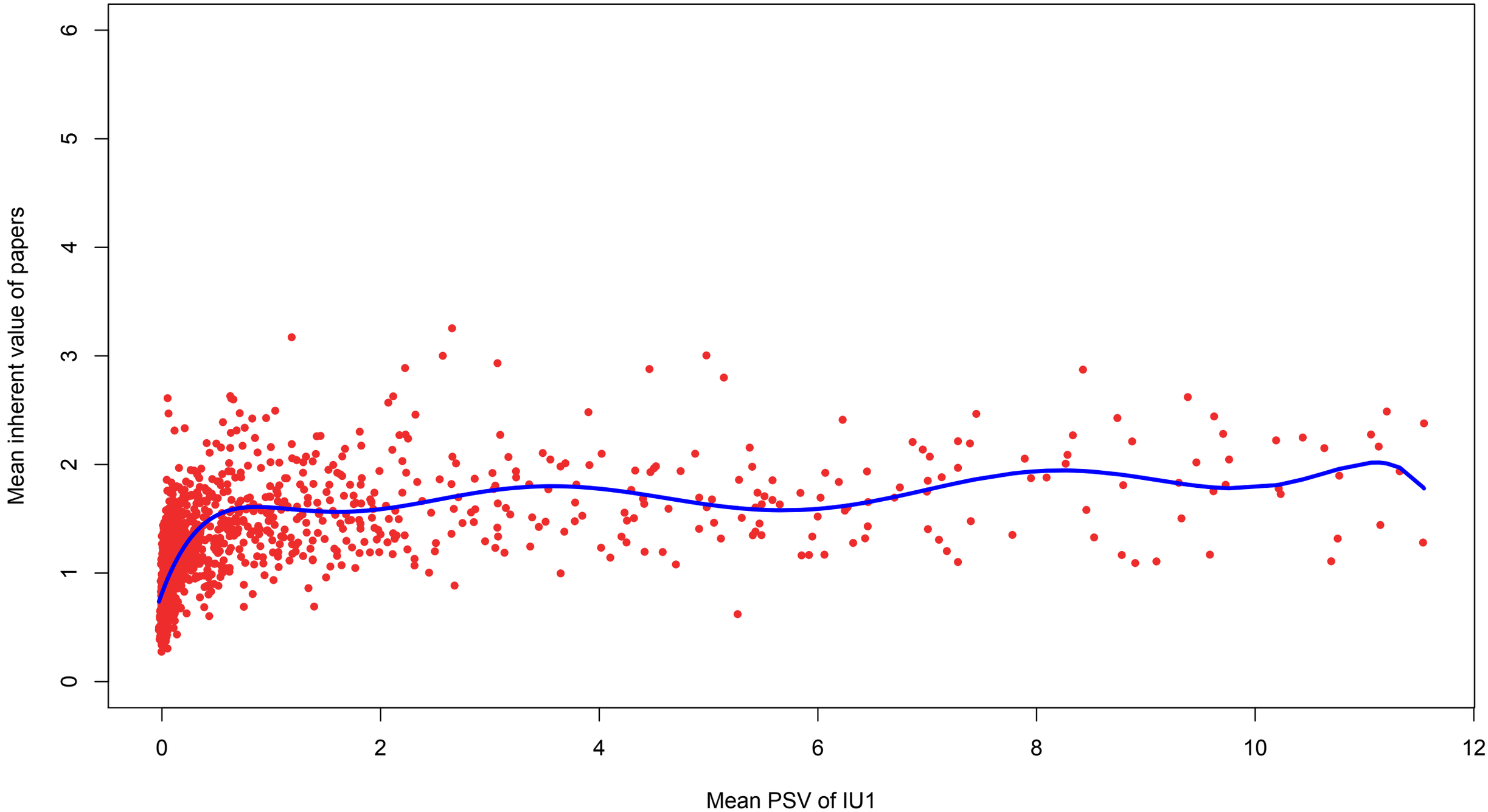
- Papers are either **accepted**, **rejected**, or **revised & resubmitted** depending on reviewers’ inter-agreement rate

- ***group affiliation*** (IU1: IF agnostics) or (IU2: IF lovers) affect reviewers’ judgement

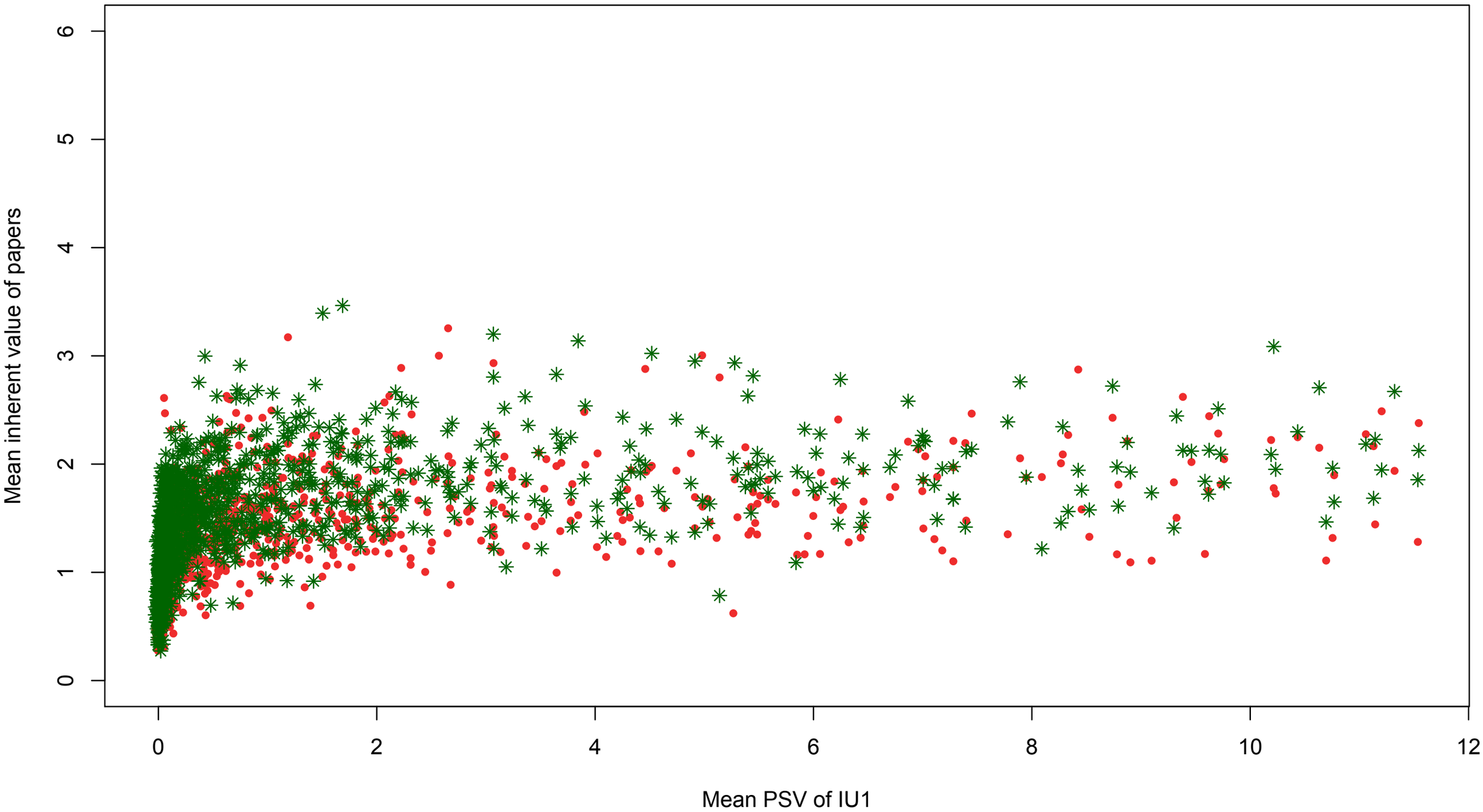
SELECTED RESULTS

FINDINGS

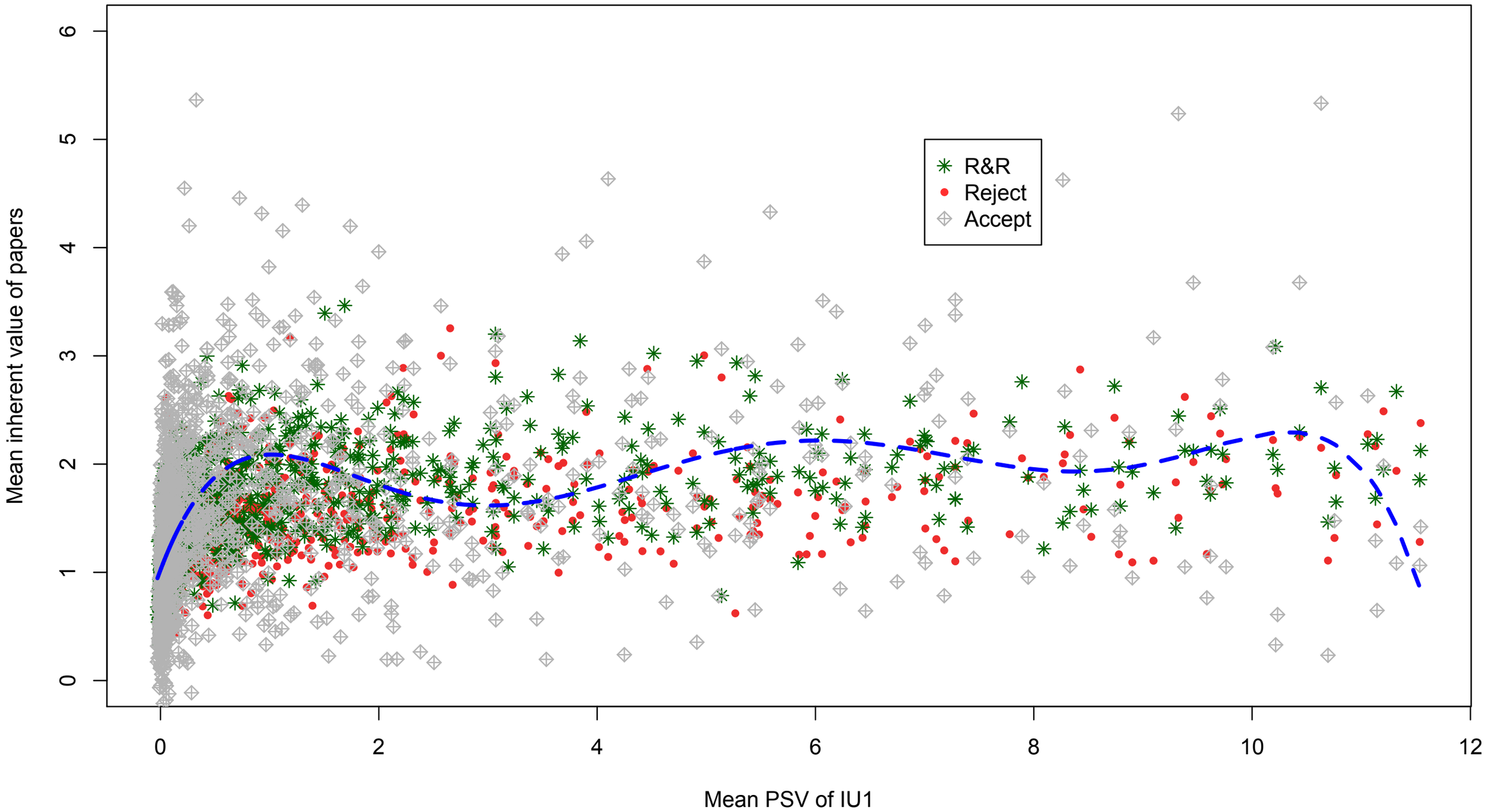
VALUE VS PSV



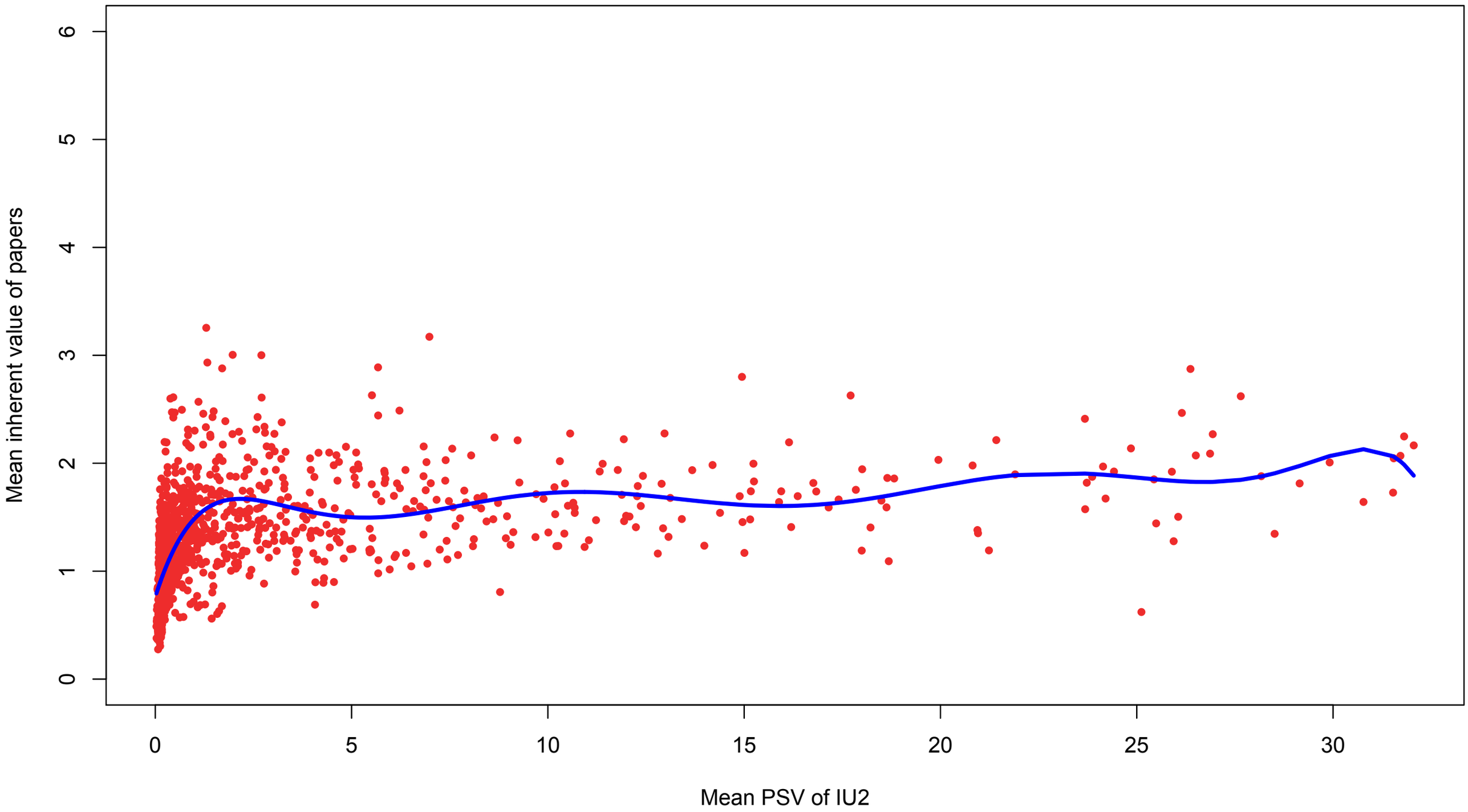
Mean inherent value of rejected papers as predicted by the mean perceived scientific value (PSV) of IU1 (IF agnostics)



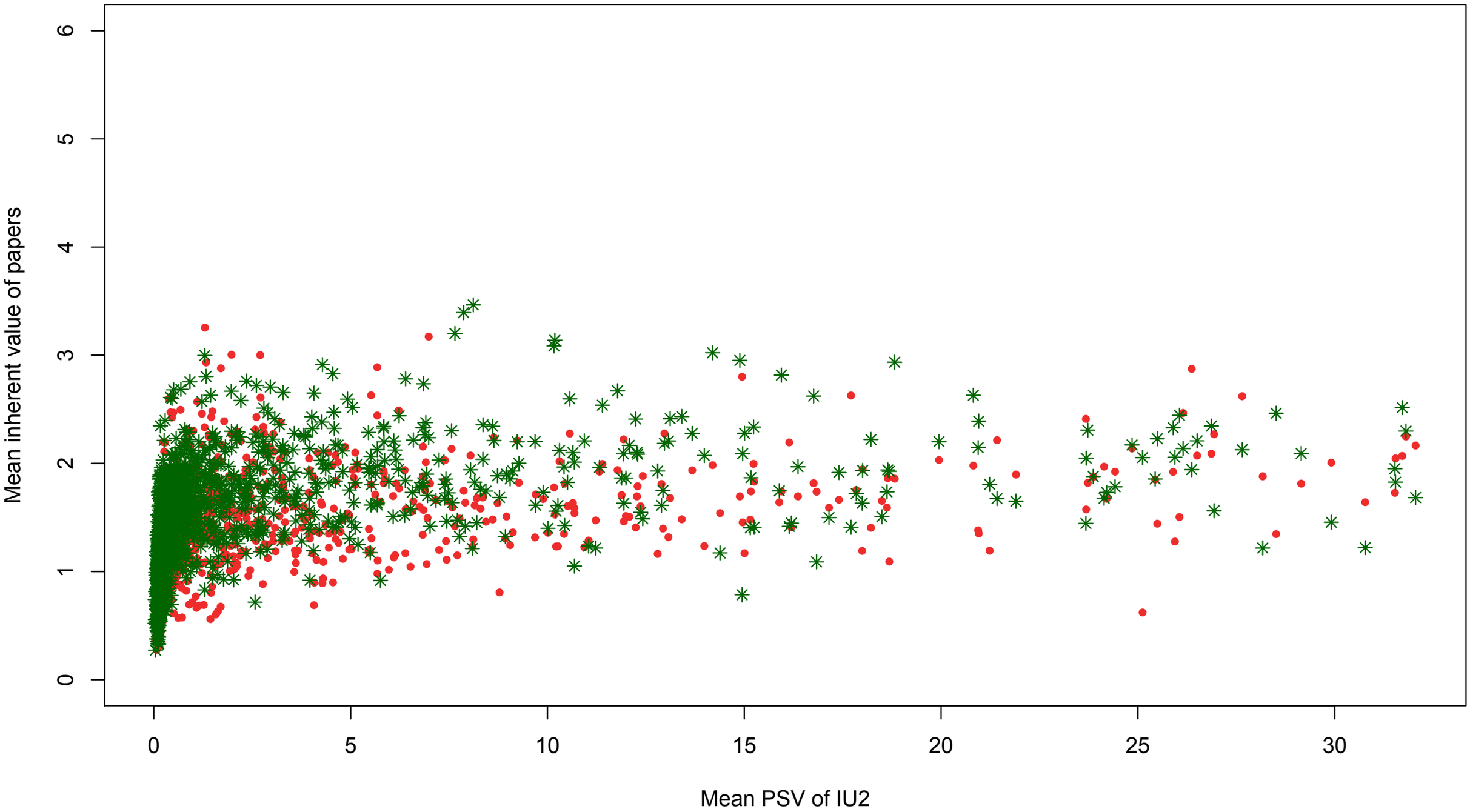
Mean inherent value of rejected and R&R papers as predicted by the mean perceived scientific value (PSV) of IU1 (IF agnostics)



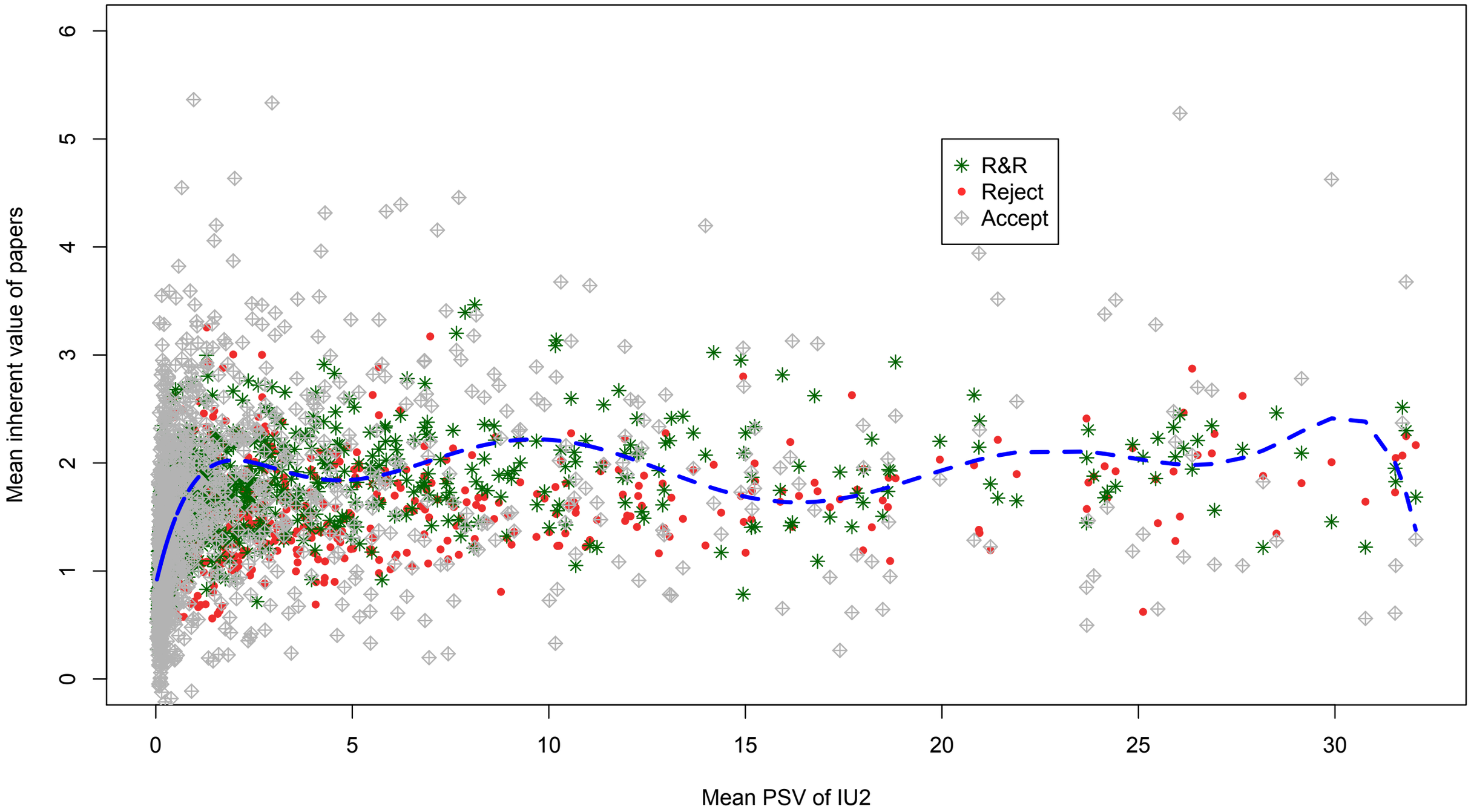
Mean **inherent value** of **rejected**, **R&R**, and **accepted** papers as predicted by the mean **perceived scientific value** (PSV) of **IU1** (IF agnostics)



Mean **inherent value** of **rejected** papers as predicted by the mean **perceived scientific value** (PSV) of **IU2** (IF lovers)

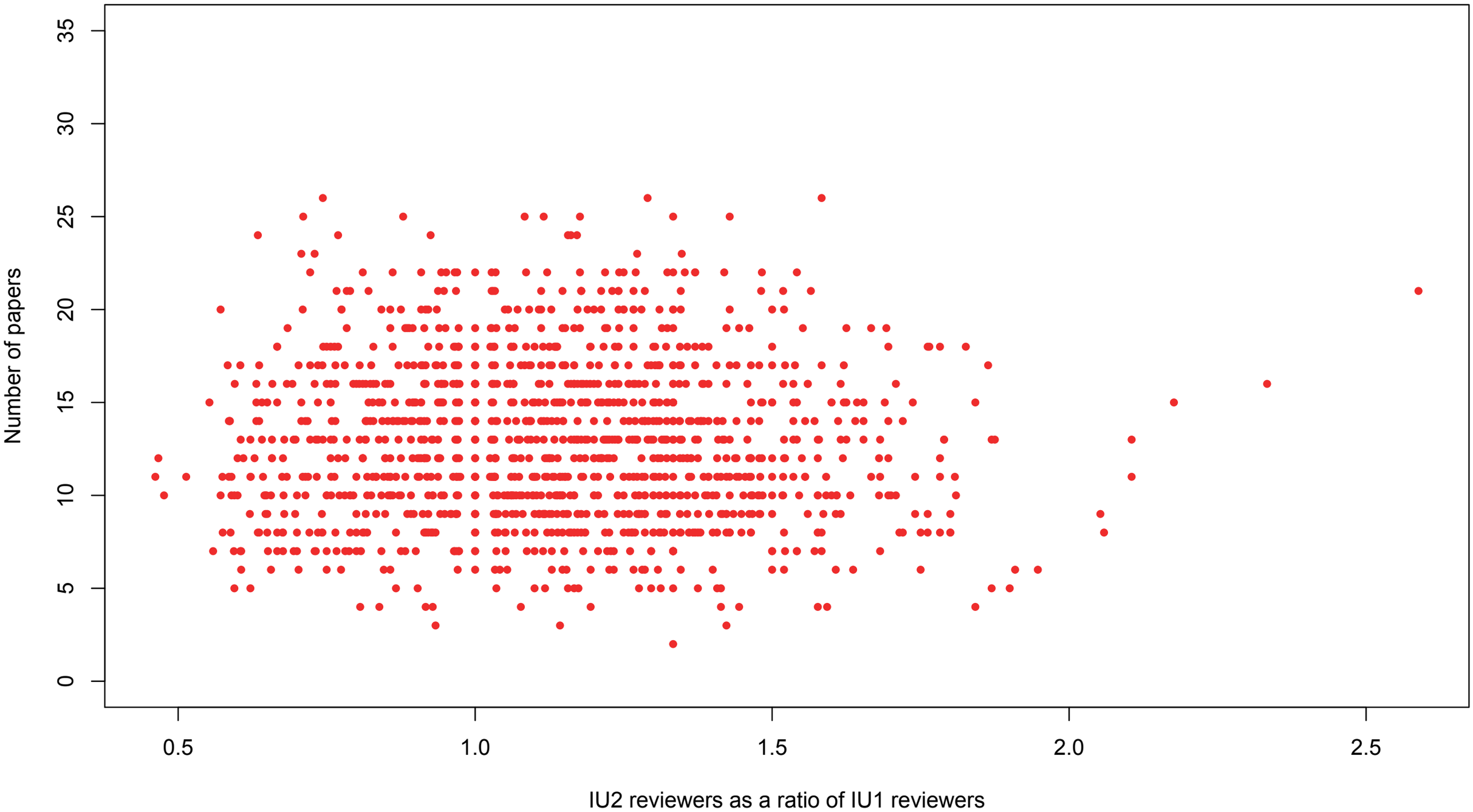


Mean **inherent value** of **rejected** and **R&R** papers as predicted by the mean **perceived scientific value** (PSV) of **IU2** (IF lovers)

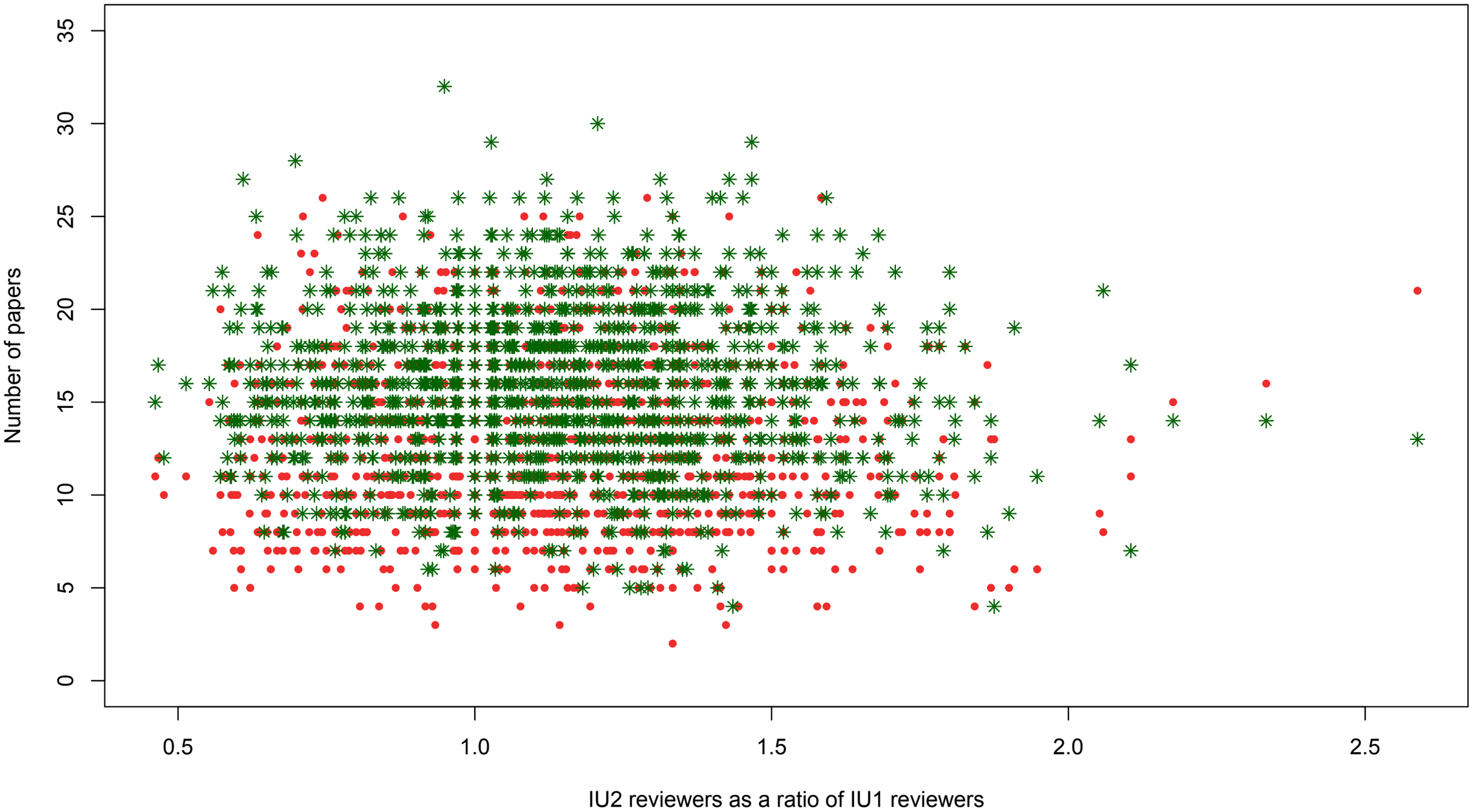


Mean **inherent value** of **rejected**, **R&R**, and **accepted** papers as predicted by the mean **perceived scientific value** (PSV) of **IU2** (IF lovers)

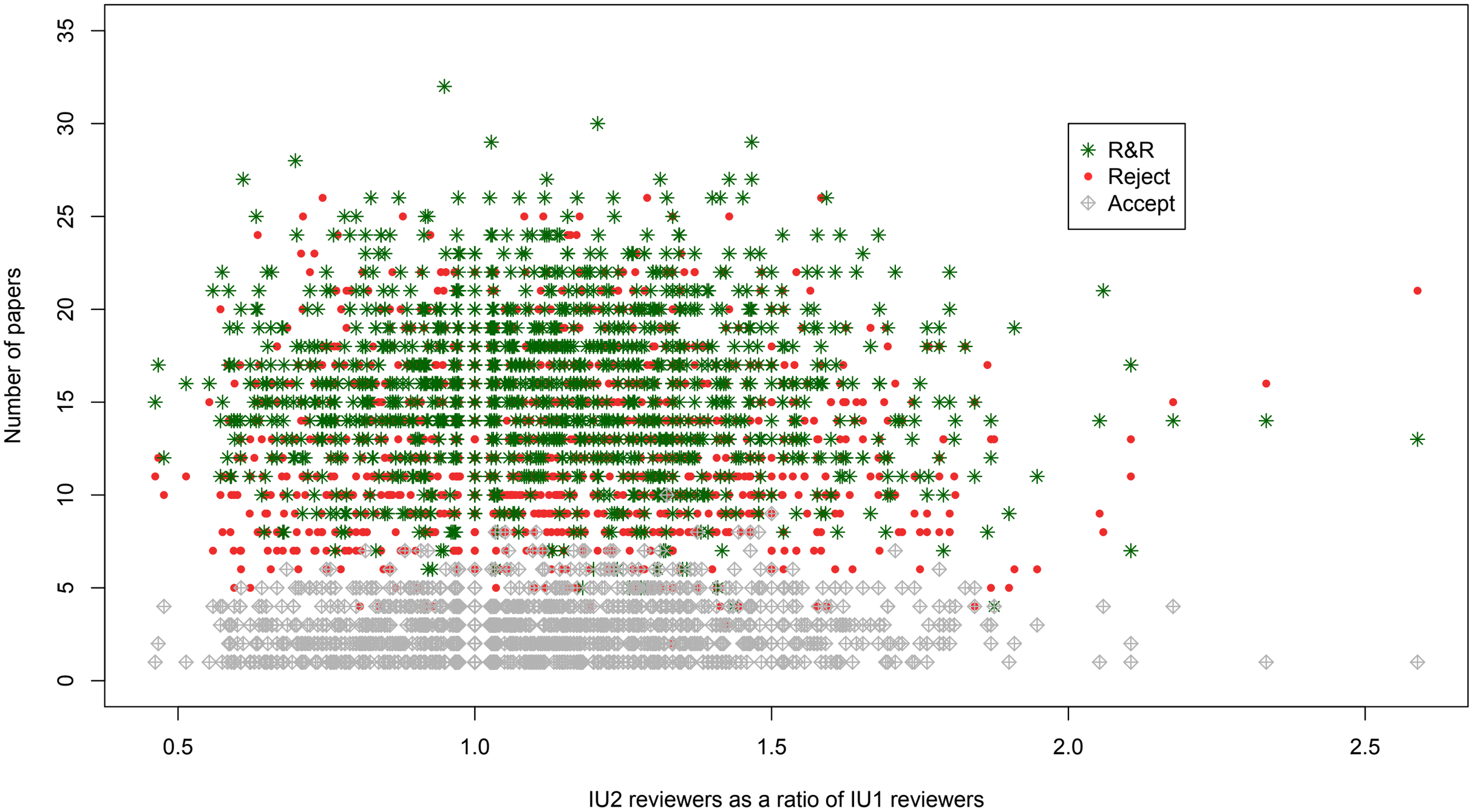
RESULTS AS A FUNCTION OF INVOLVEMENT



Number of papers rejected compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer

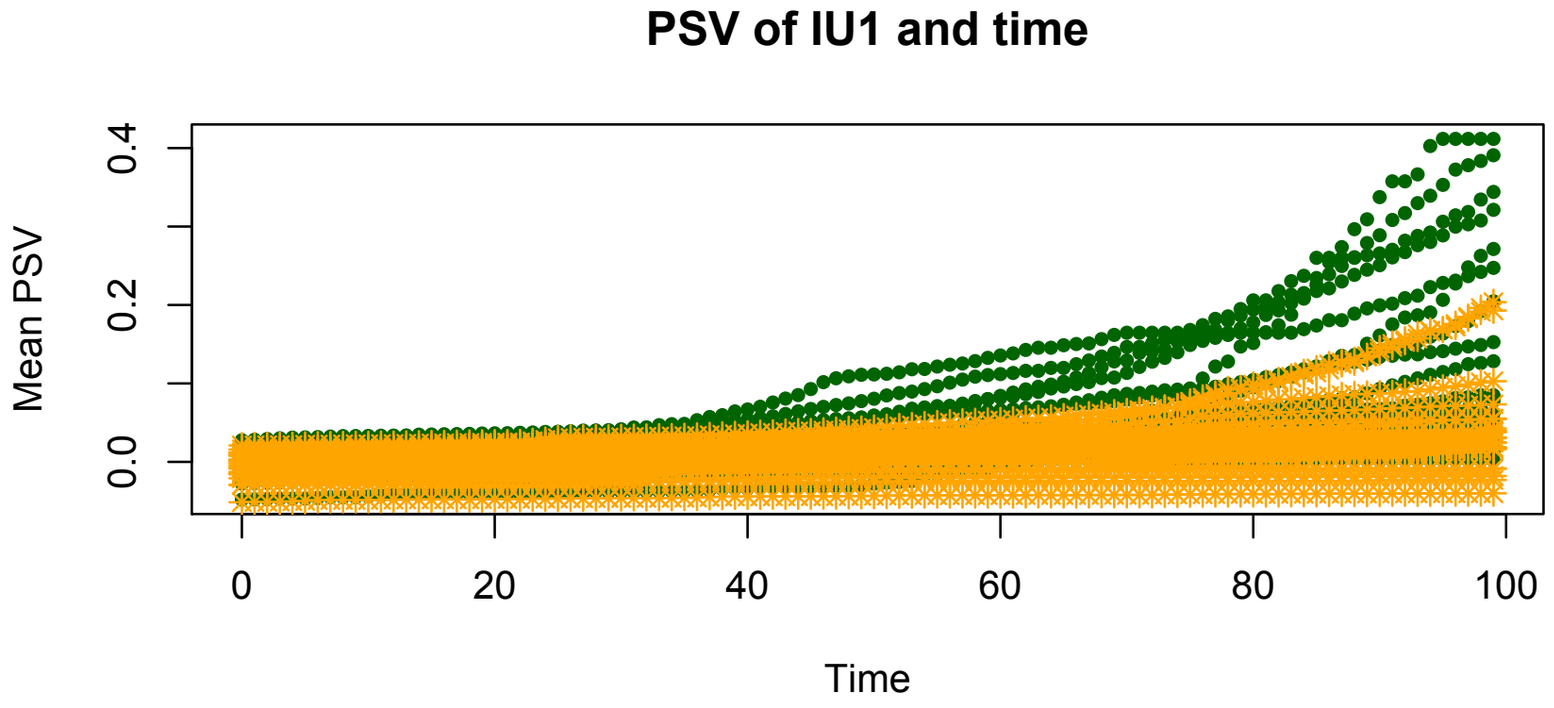


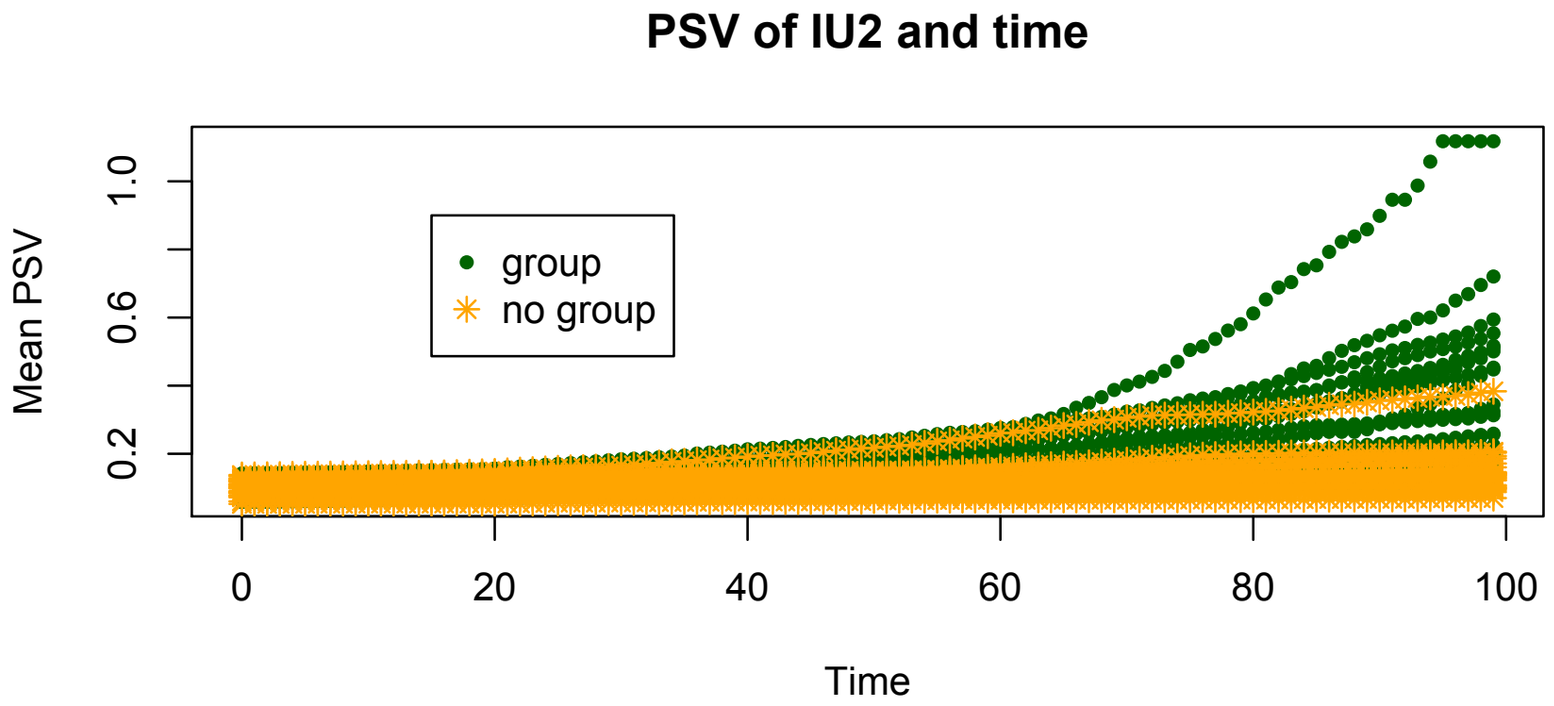
Number of papers rejected and R&R compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer



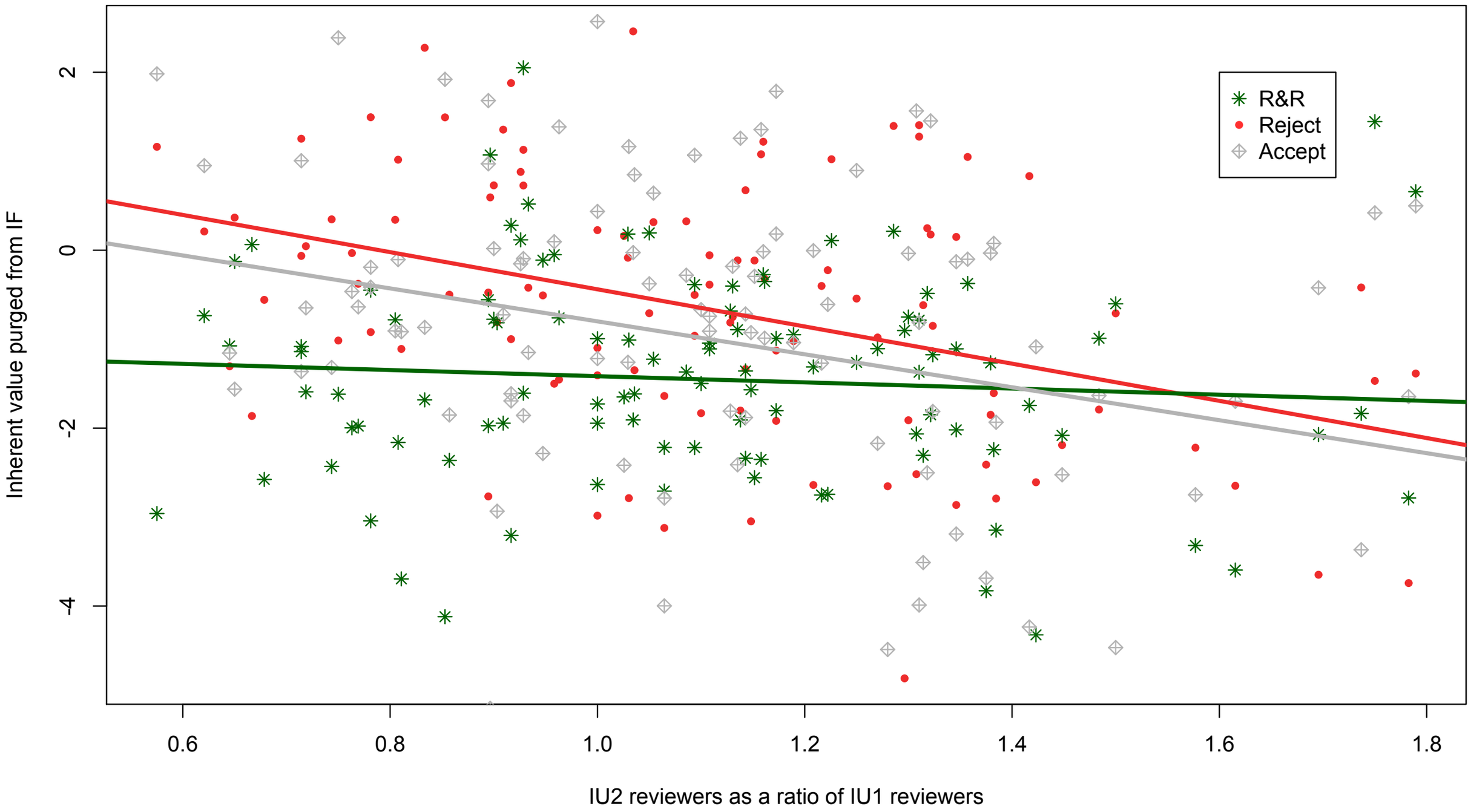
Number of papers rejected, R&R and accepted compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer

PSV AND TIME





Perceived scientific value (PSV) increase as **time** goes by for the two groups when they refer to a community and when they do not



Inherent value (value – IF) compared to the number of IU2 reviewers involved calculated as a ratio of IU1 reviewer (in the last 20% of time—when PSV increases)

A FEW POINTS AND TENTATIVE CONCLUSIONS

IMPLICATIONS

TURBULENT TIMES

- overall, it seems that there is an impact of IF on publications:
  - IF lovers develop higher PSV and show some problems in the interpretation of inherent value
  - Prevalence of IF lovers in the review process show impact on the number of rejections and on that of revisions
  - We could detect an organizational/community impact on the distortion that both groups show in the evaluation of papers

A FEW FINAL POINTS

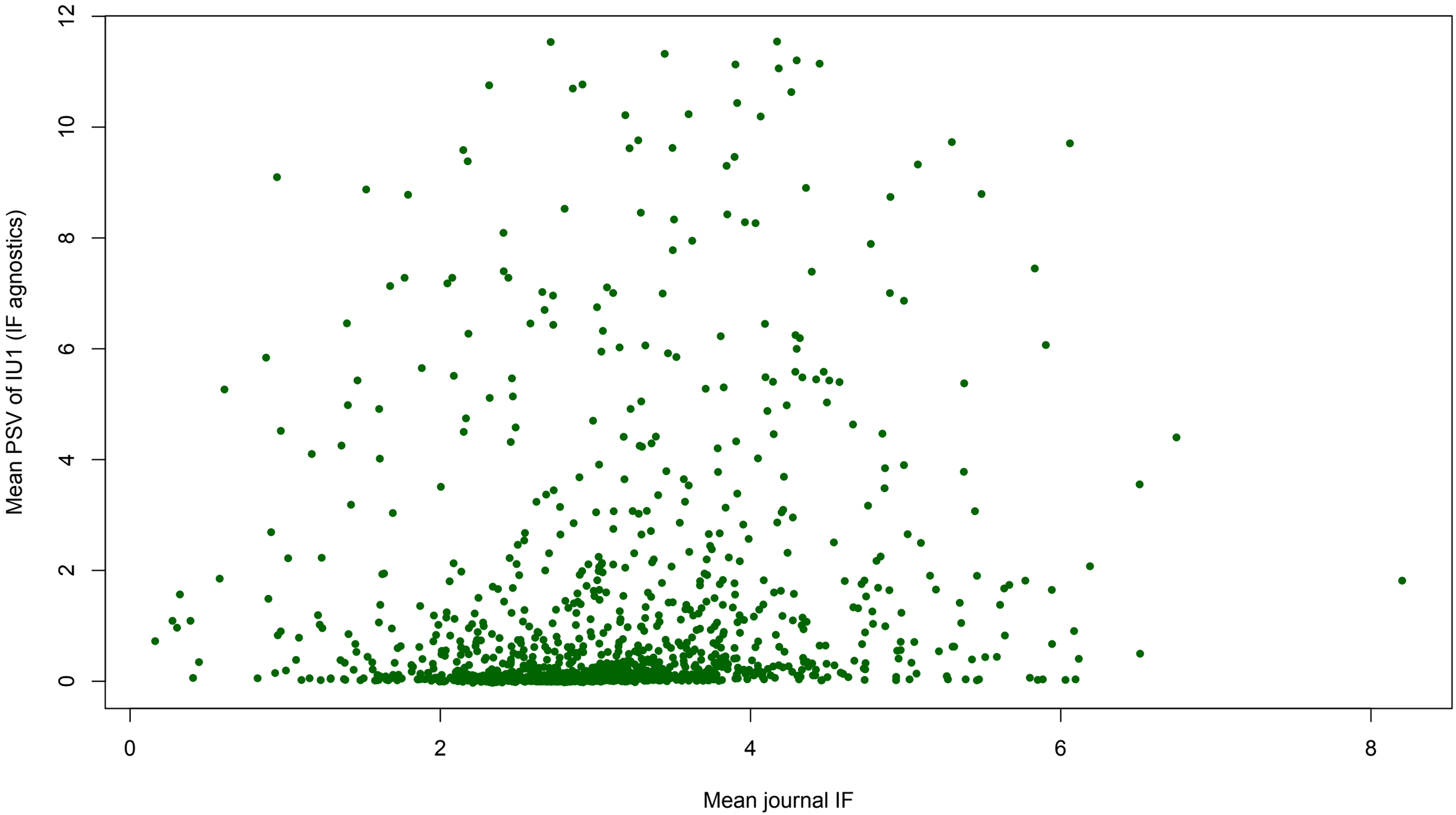
- additional results may become available with more/ different configurations of parameters
- group to be analyzed at the micro level (network)
- refine the model through empirical data

THANK YOU VERY MUCH

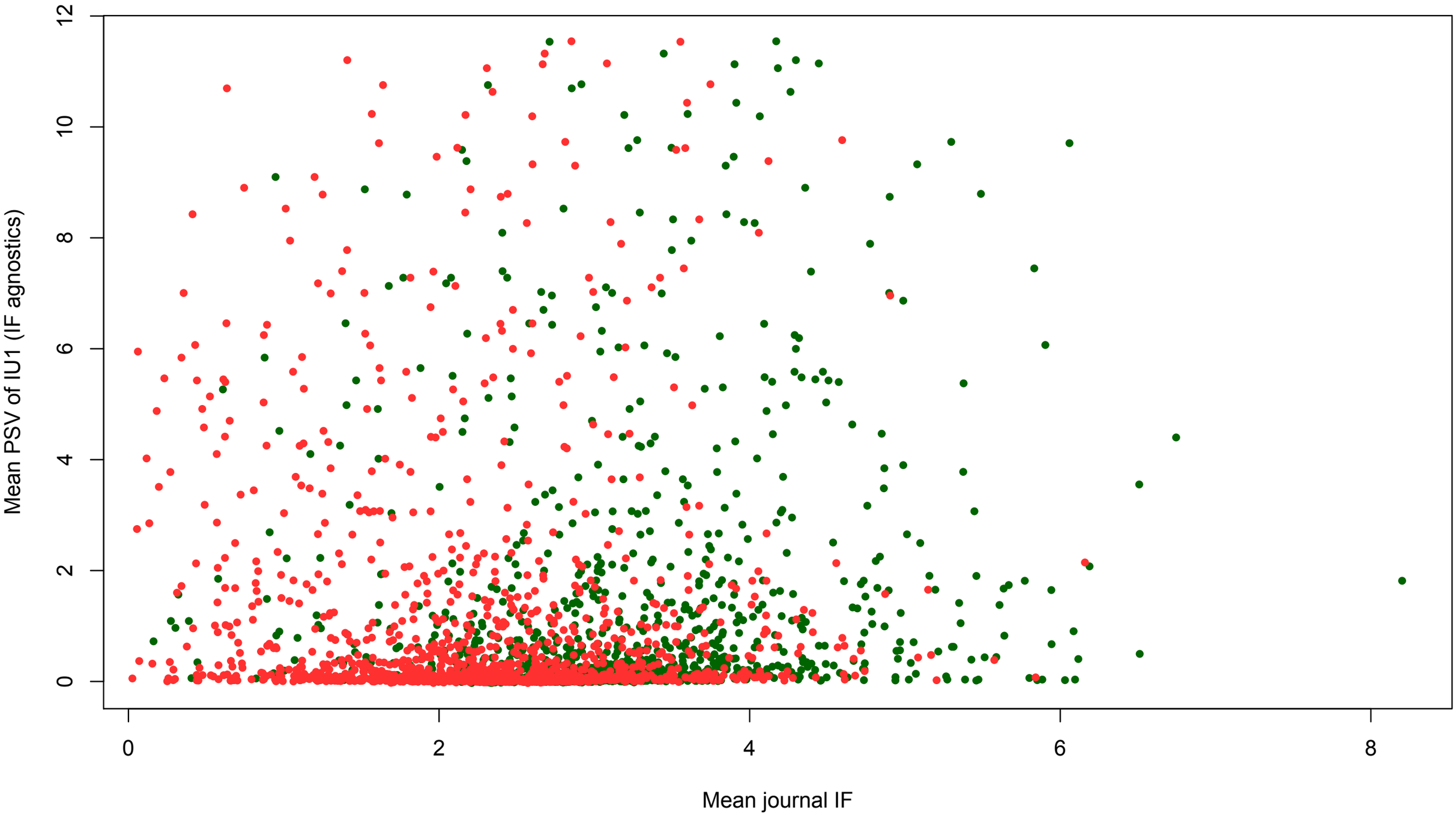
A FEW MORE SLIDES JUST IN CASE

ADDENDUM

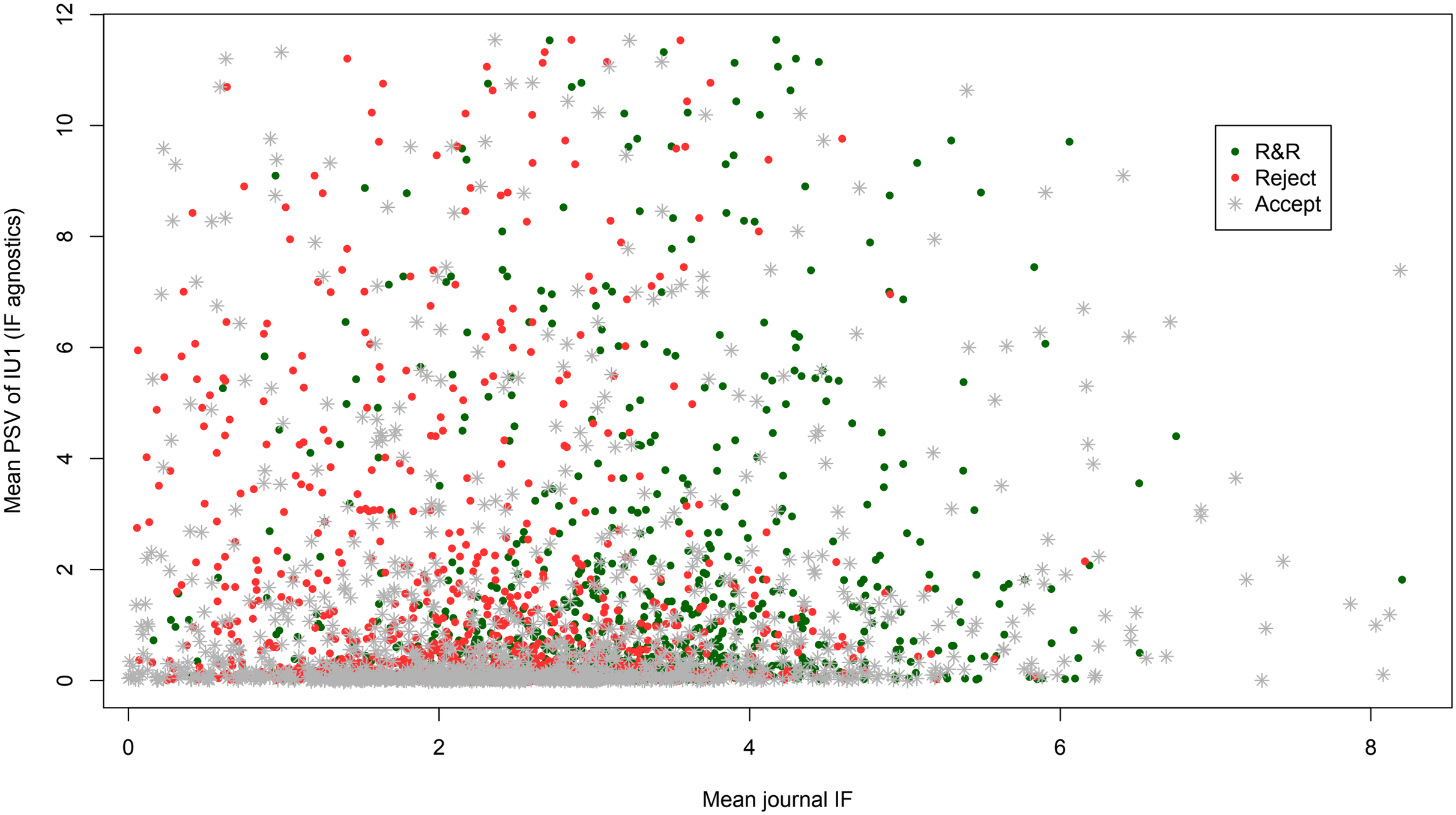
IF-AGNOSTICS AND REVIEWING



Mean perceived scientific value of IU1 (IF agnostics) and mean IF of journals where R&R papers were submitted

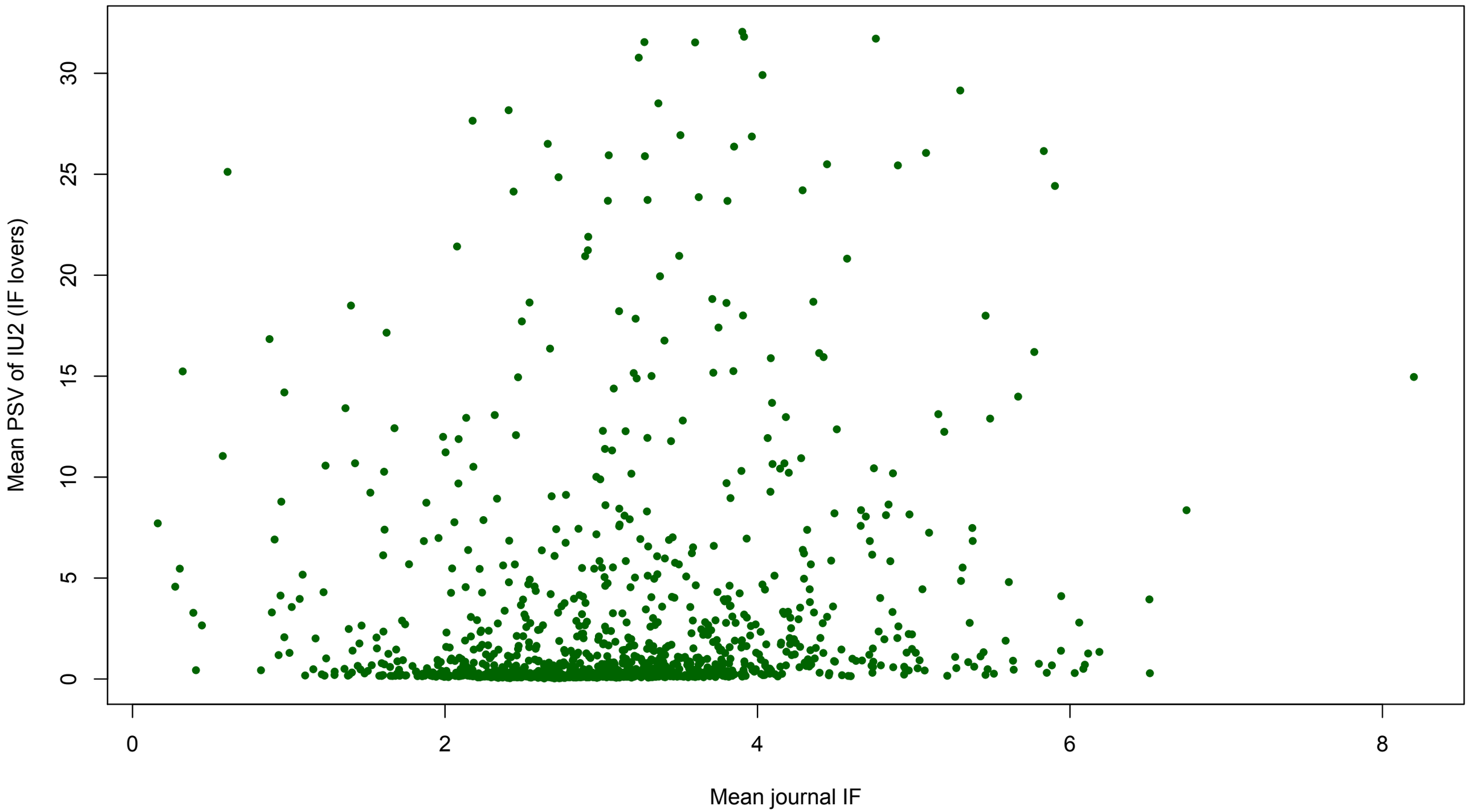


Mean perceived scientific value of IU1 (IF agnostics) and mean IF of journals where R&R and rejected papers were submitted

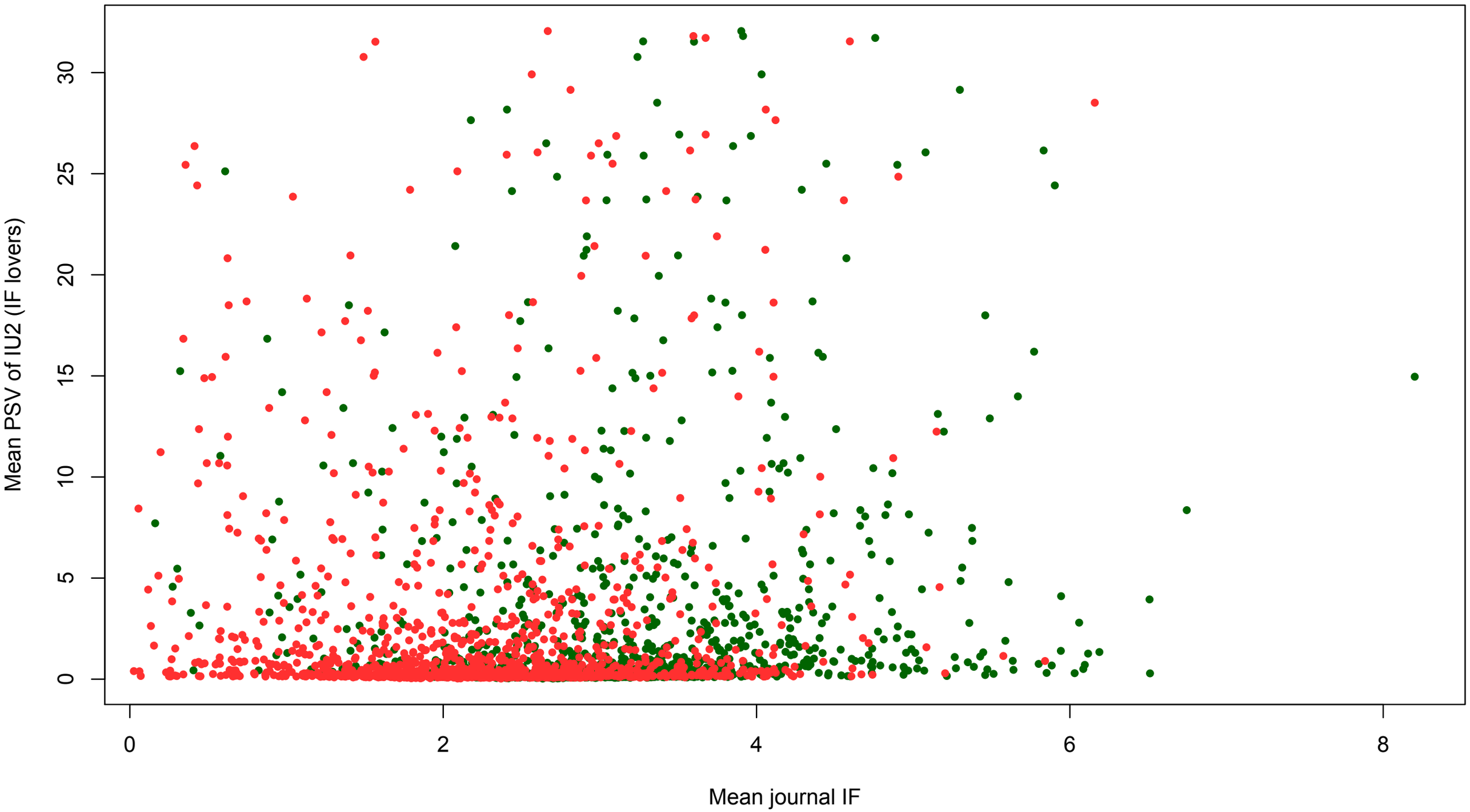


Mean perceived scientific value of IU1 (IF agnostics) and mean IF of journals where R&R, rejected, and accepted papers were submitted

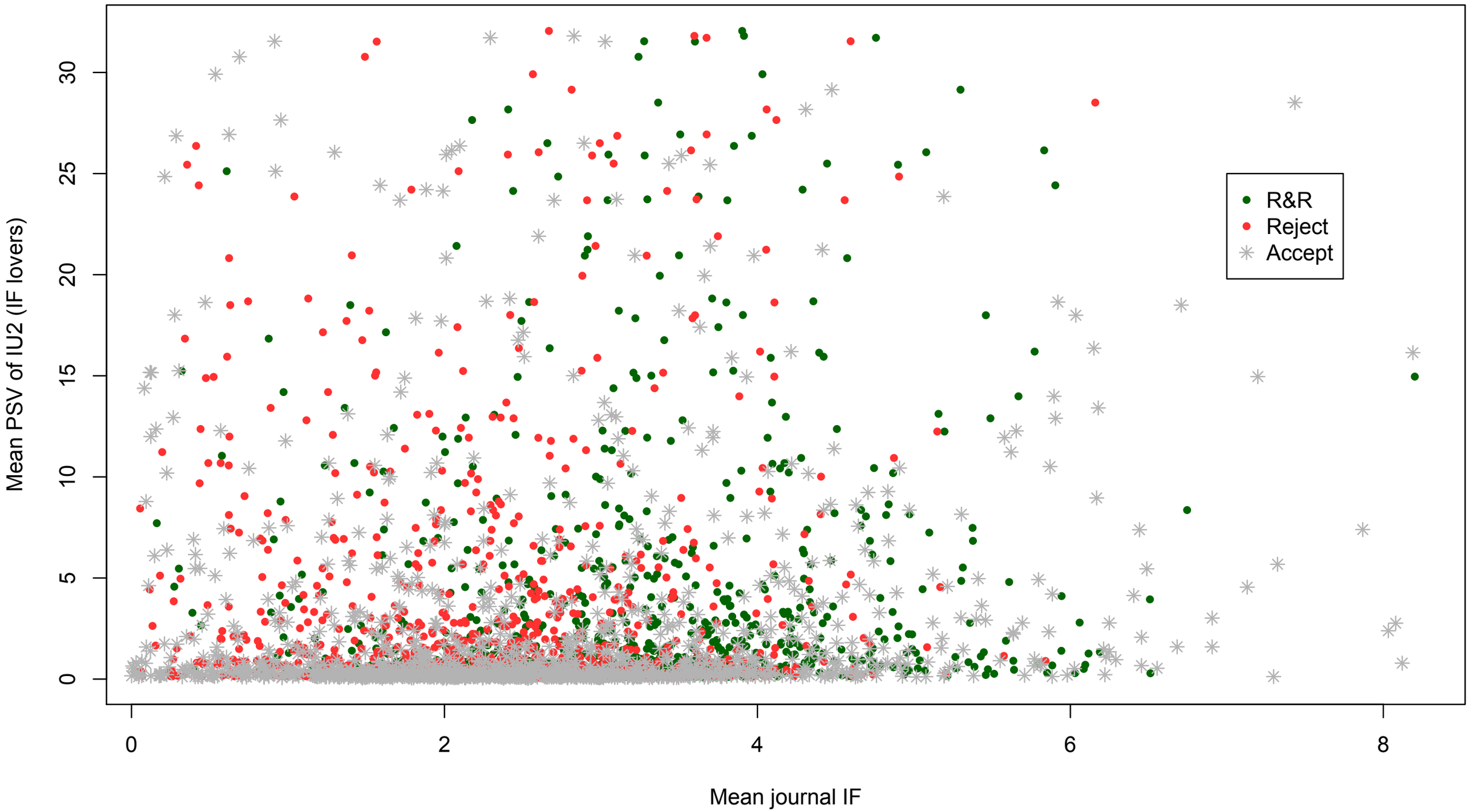
IF-LOVERS AND REVIEWING



Mean perceived scientific value of IU2 (IF lovers) and mean IF of journals where R&R papers were submitted



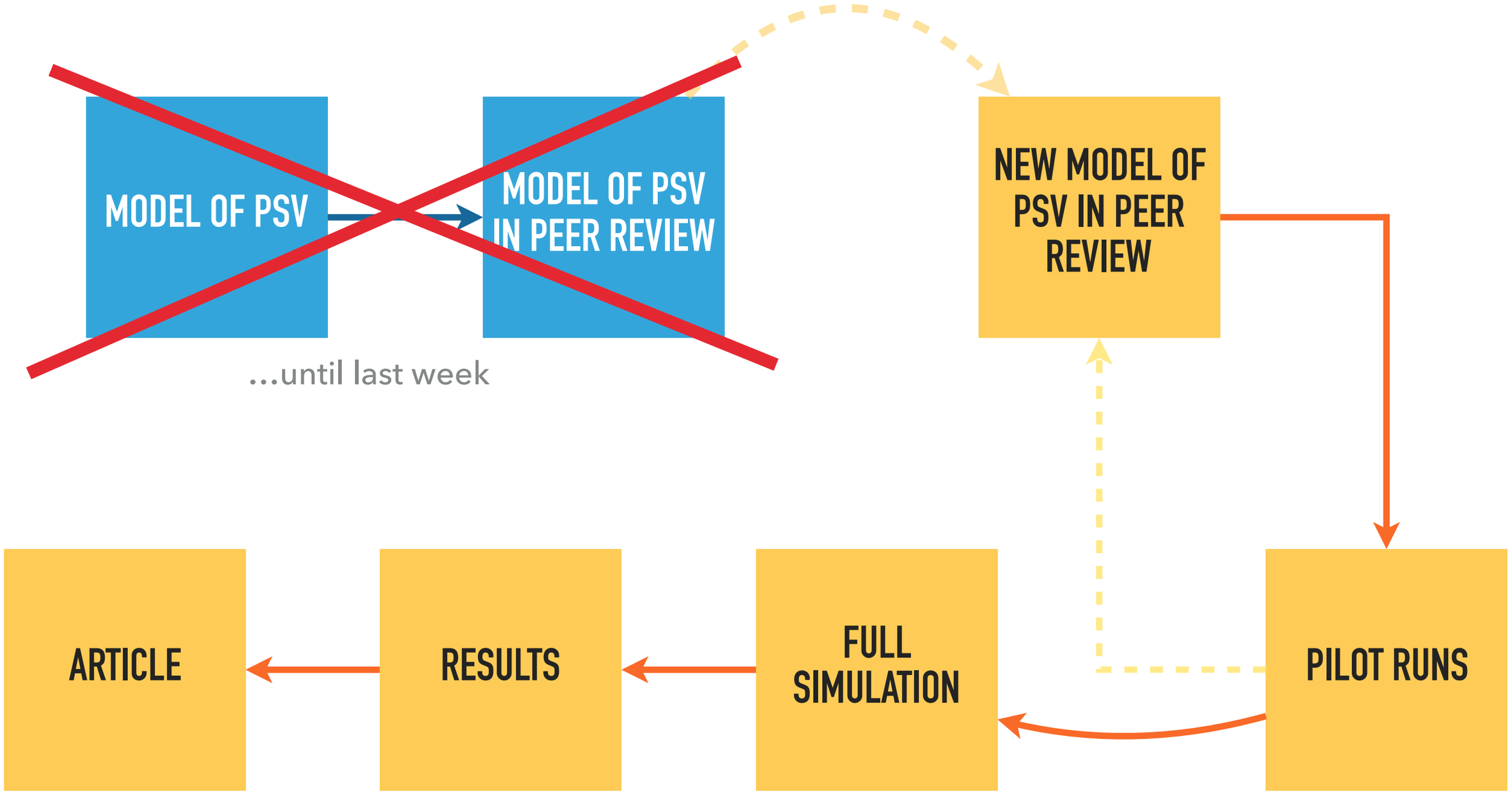
Mean perceived scientific value of IU2 (IF lovers) and mean IF of journals where R&R and rejected papers were submitted



Mean perceived scientific value of IU2 (IF lovers) and mean IF of journals where R&R, rejected, and accepted papers were submitted

CONTENTS

DECISION MAKING MODEL

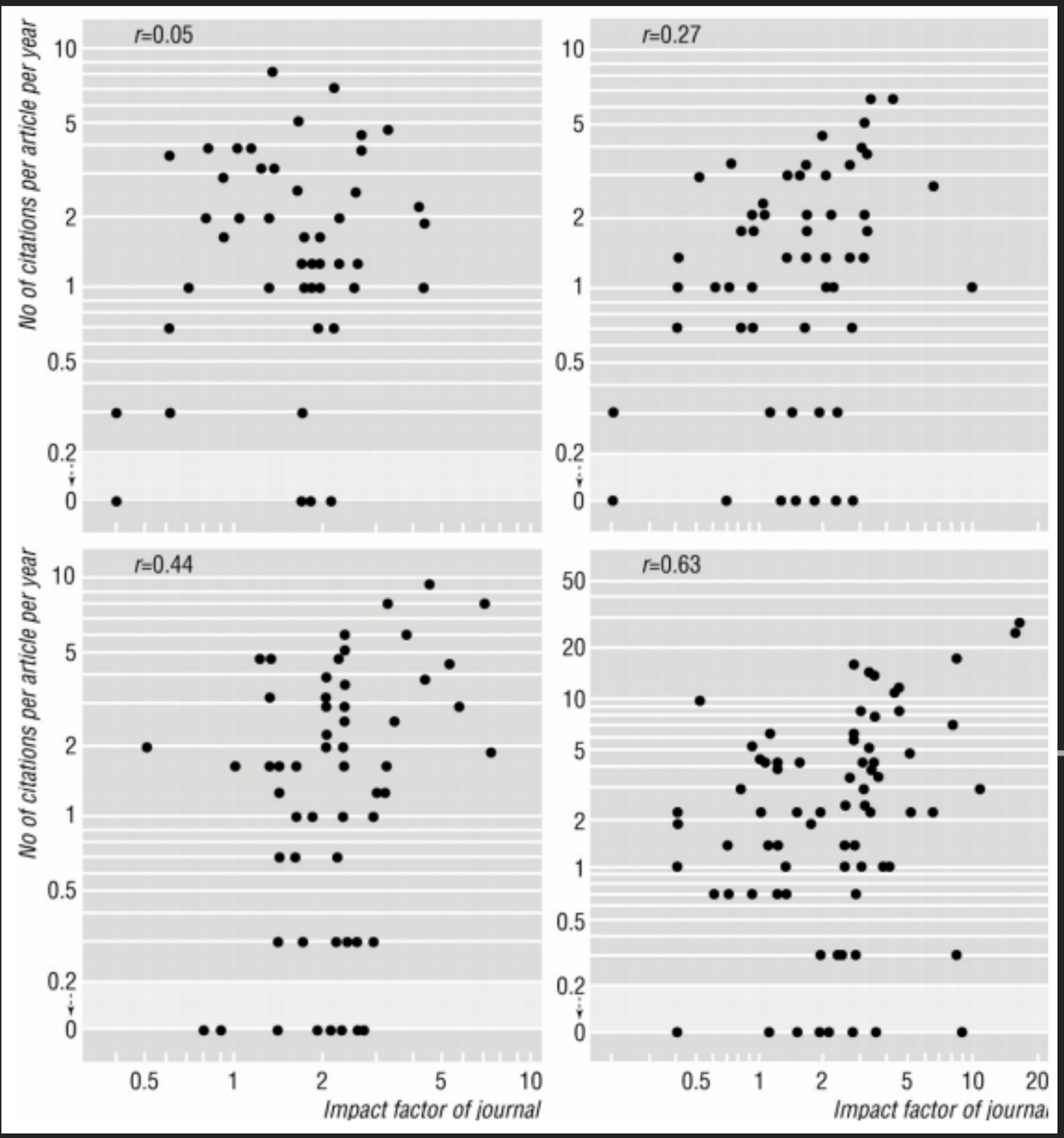


IMPACT FACTOR: WHAT'S IT FOR?

0.992

AIM OF THIS STUDY

RESEARCH OBJECTIVES



IT MAY BE DIFFICULT TO FIND CONSISTENT CORRELATION BETWEEN IF AND ARTICLE CITATION

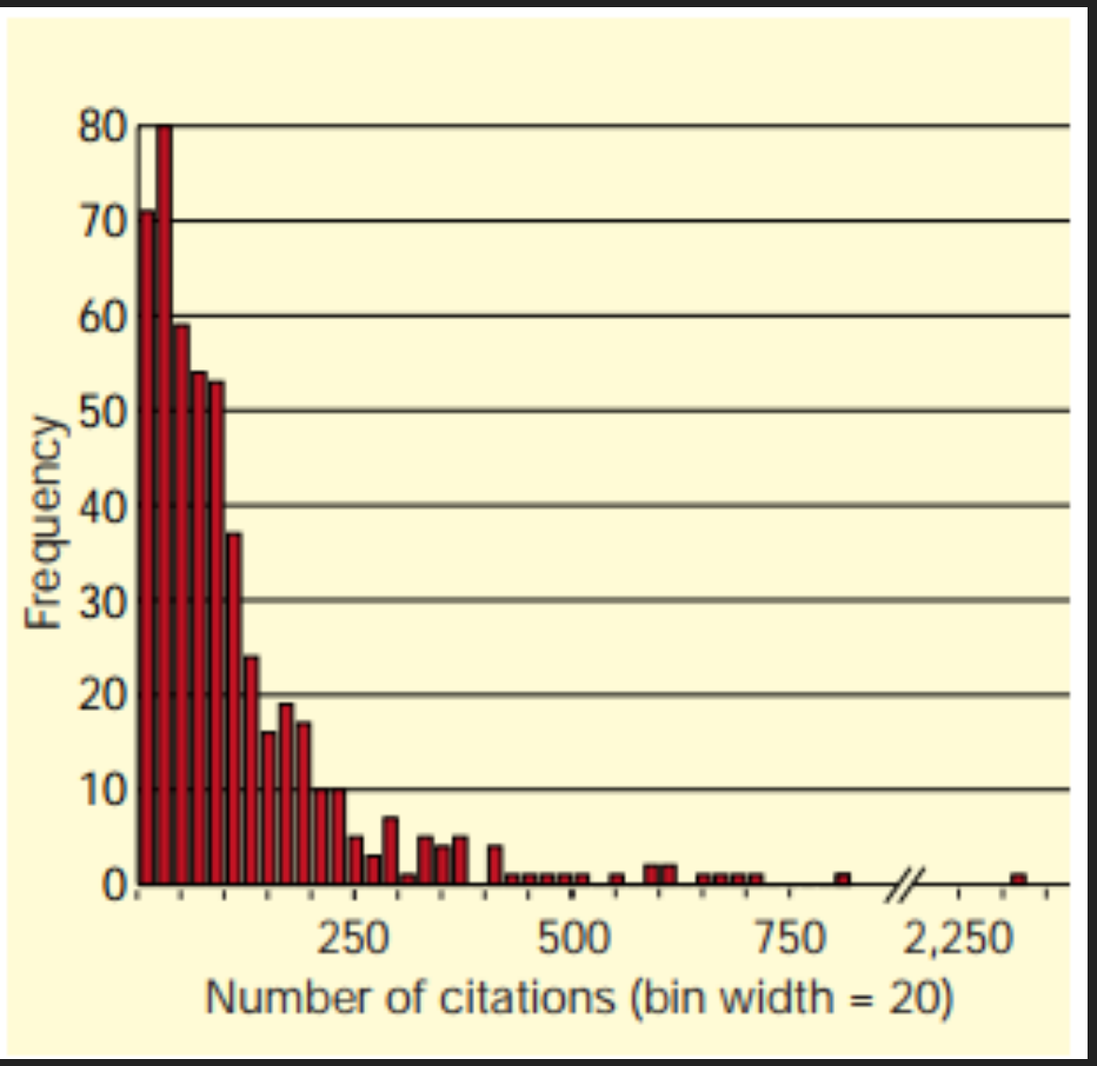
THE IMPACT FACTOR: RELIABILITY

Seglen PO (1997). Why the impact factor of journals should not be used for evaluating research. British Medical Journal 314 , 498-502.

TWO-YEAR TIME IS AN APPROPRIATE TIME SPAN FOR SOME DISCIPLINES BUT NOT FOR OTHERS

THE IMPACT FACTOR: BIASES

Curry S. (2012). Sick Of Impact Factors. Blog Post: Occam's Typewriter, 13 August. Retrieved Online At Http://Occamstypewriter.Org/Scurry/2012/08/13/Sick-Of-Impact-Factors/



THE NUMBER OF PAPERS WITH VERY HIGH CITATIONS ARE (ASTONISHINGLY) FEW EVEN IN HIGH-IF JOURNALS

(NATURE ARTICLES IN THE PICTURE: SELECTED YEARS AND ARTICLES)

THE IMPACT FACTOR: DISTRIBUTION

Colquhoun D (2003). Challenging The Tyranny Of Impact Factors. Nature 423, 479

MORE PRAGMATICALLY…

- …the IF is a number, and this gives the impression of some sort of ‘objective’ value (*anchor*)
- …most academics know what this metric is and relate to it either by loving or hating it

Kahneman, D., and A. Tversky. 1979. Prospect theory: An analysis of decision under risk. Econometrica 47(2):263–292.

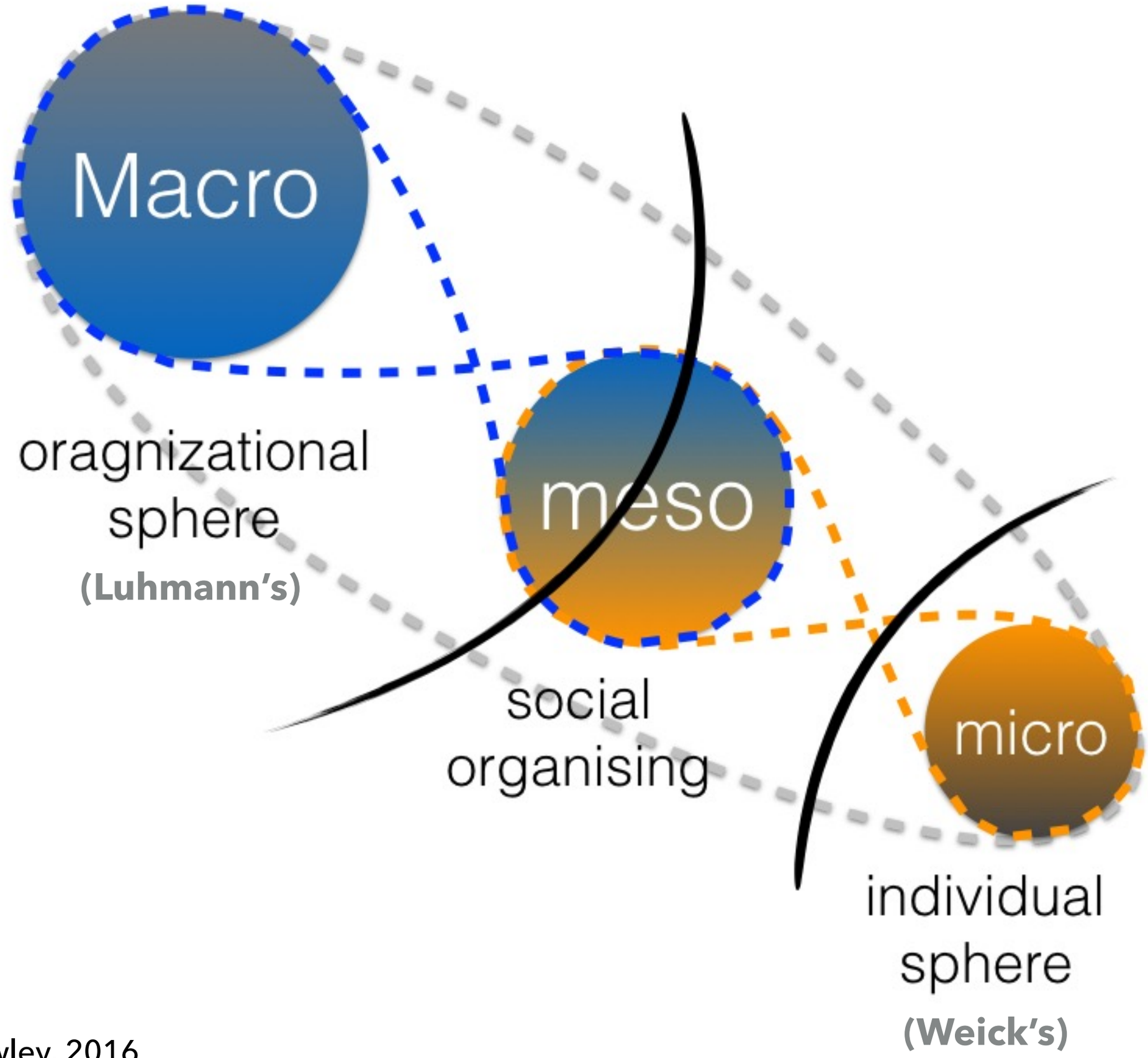
FROM A PSYCHO-COGNITIVE PERSPECTIVE

- Some academics use IF as an assessment/evaluation bias that plagues their judgement
- The underlying assumption is that there is an abstract idea of what scientific value is and how it is assessed, coming from either:
  - professional associations
  - editorials/structure/format of high IF journals
- Scientific value for IF “lovers” is (probably) more static or inflexible than for those who are IF “agnostics"

WE ASSUME INDIVIDUALS ADAPT

- Human beings have the tendency to lean on recommendations, advice, suggestions to make decisions
- The strength of this tendency is called *socially-oriented decision making* (or 'docility')
  - Highly docile individuals tend to listen and adapt more due to information coming from their reference group (or peers)

Knudsen, T. 2003. Simon's selection theory: Why docility evolves to breed successful altruism. Journal of Economic Psychology 24:229–244; Secchi, D., and E. Bardone. 2009. Super-docility in organizations. International Journal of Organization Theory and Behavior 12(3):339–379; Simon, H.A. 1993. Altruism and economics. American Economic Review 83(2):156–161.



Secchi & Cowley, 2016

OVERVIEW

MODEL ASSUMPTIONS

PEER REVIEW

- The process assigns reviewers to papers
  - association is random
  - the number of reviewers ≤ 3
  - reviewer reports are immediately available

DECISION

- Each paper under review gets
  - a *mean evaluation* score (derived from the reports)
  - a *standard deviation* score (derived from the reports)
- When reviewers agree (sd ≤ 0.01) the verdict is "**accept**"
- When reviewers disagree slightly (0.01 < sd ≤ *mean sd evaluation*) the verdict is "**revisions**"
- When reviewers disagree completely (sd ≥ *mean sd evaluation*) the verdict is "**reject**"

JUDGMENT UPDATES

- When a reviewer's "**docility**" is higher than the mean of the population times one st-dev then:
  - the agent-reviewer is **more critical** of its own evaluations
  - leans on the **other reviewers** to learn whether to update its beliefs on science or not

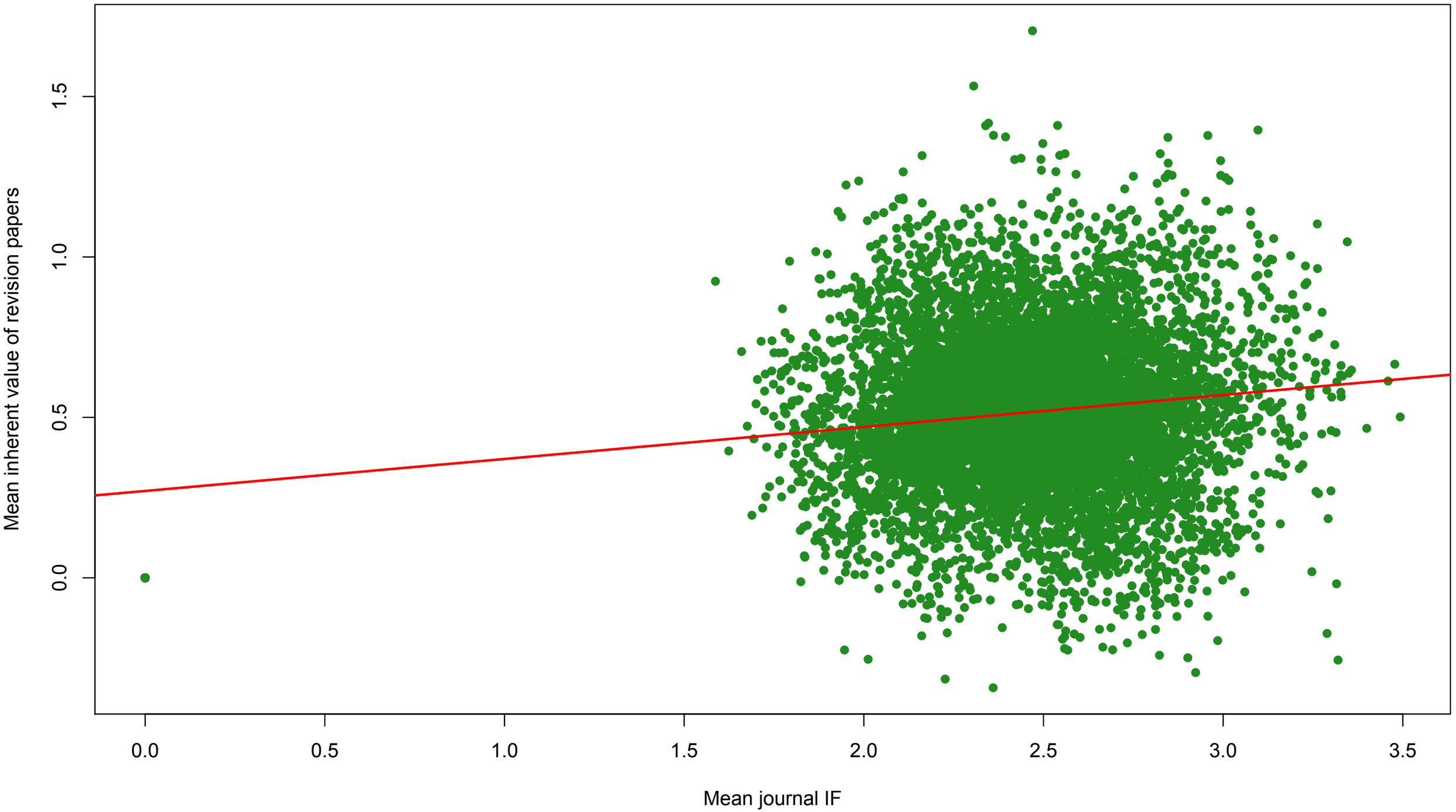
- **Group effects**: the update is performed in relation to 'peers' – i.e. other reviewers with similar IF attitudes

LEARNING FROM PILOT RUNS

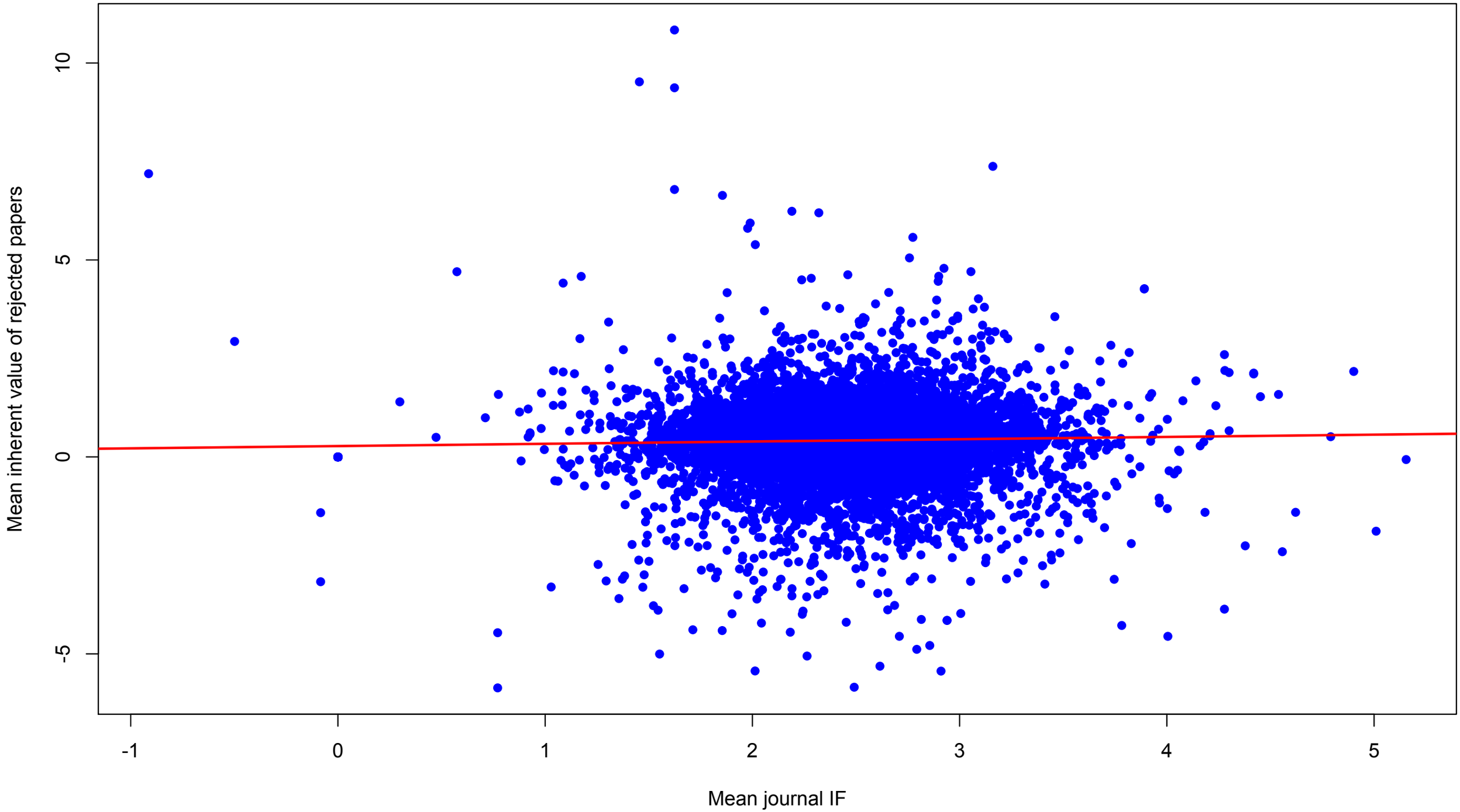
- we performed a few pilot runs to test code and conditions
- we settled on a limited number of conditions framed as a factorial design of 2^4 x 3^3
- we used statistical power to determine the number of runs
  - 25 runs per configuration of parameters

Secchi, D., & Seri, R. `How many times should my simulation run?' Power analysis for agent-based modeling. Working paper; Secchi, D. & Seri, R. (2017). Controlling for `false negatives' in agent-based models: A review of power analysis in organizational research. Computational and Mathematical Organization Theory, 23(1), 94-121; Seri, R. & Secchi, D. (2017). How many times should one run a computational simulation? In B. Edmonds & R. Meyer (Eds.), Simulating Social Complexity. A Handbook (pp. forthcoming). Heidelberg: Springer, 2nd edition.

INHERENT VALUE VS IF

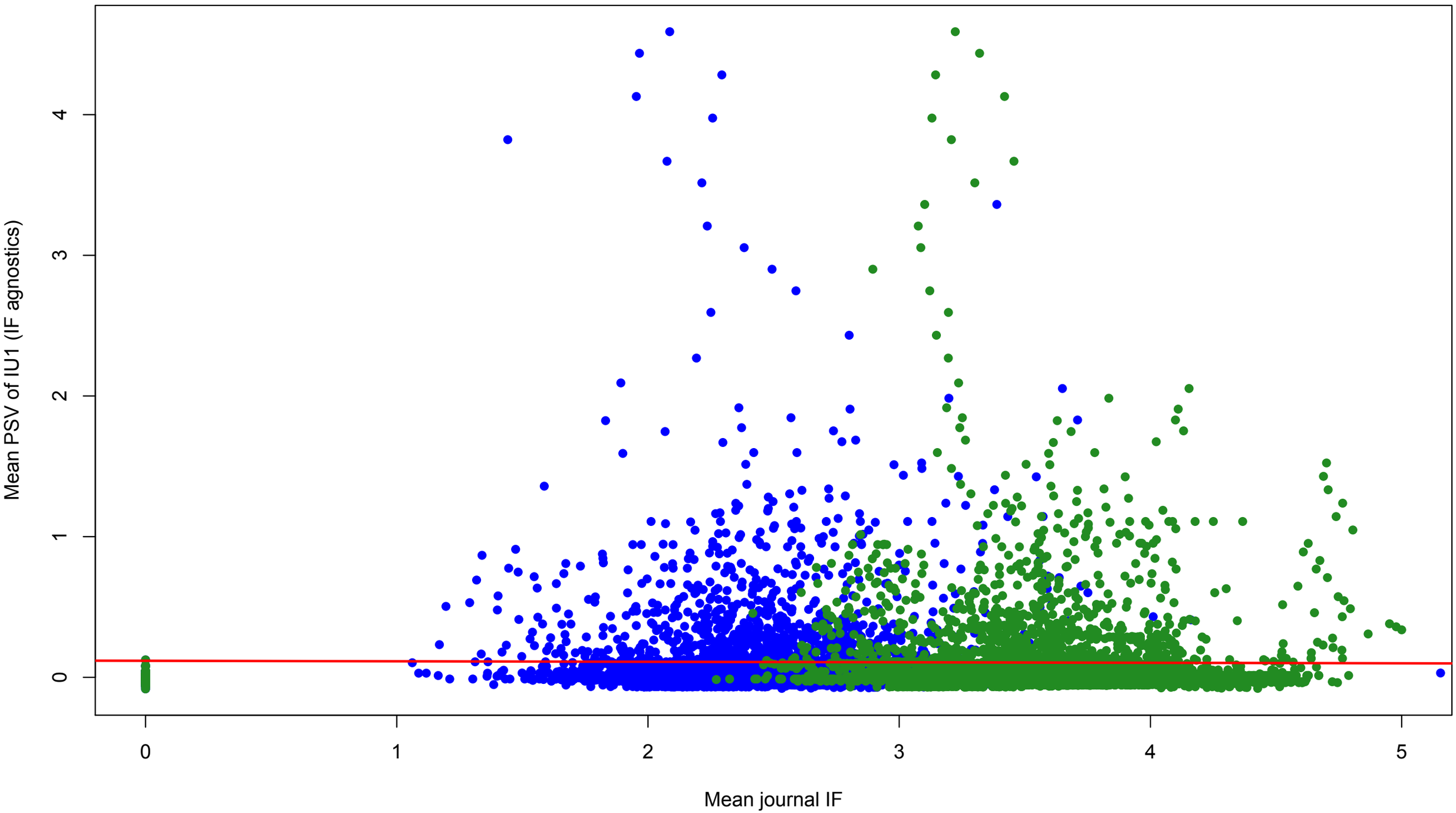


Mean inherent value of papers with “revisions” and respective mean journal IF

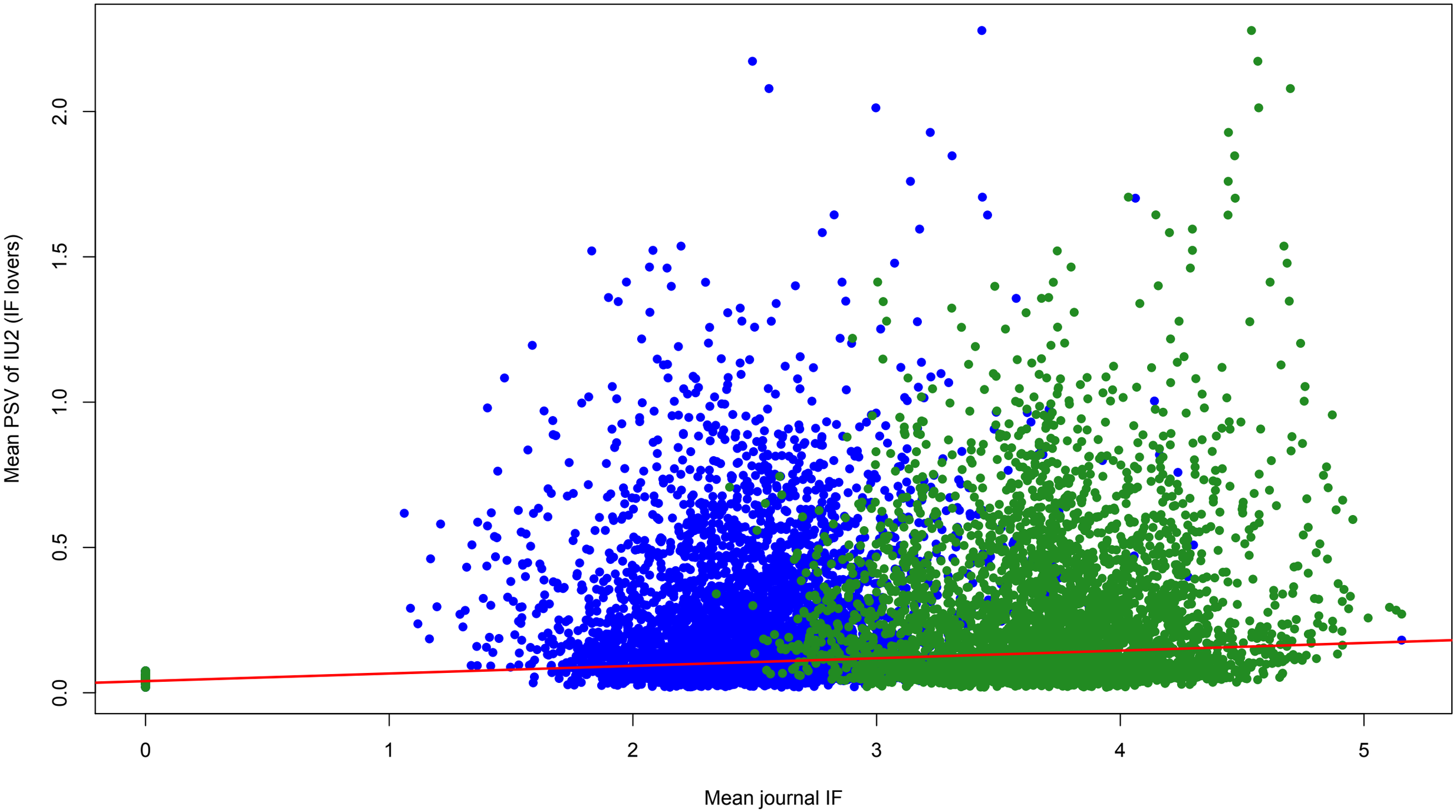


Mean inherent value of rejected papers and respective mean journal IF

ATTITUDES TOWARD IF

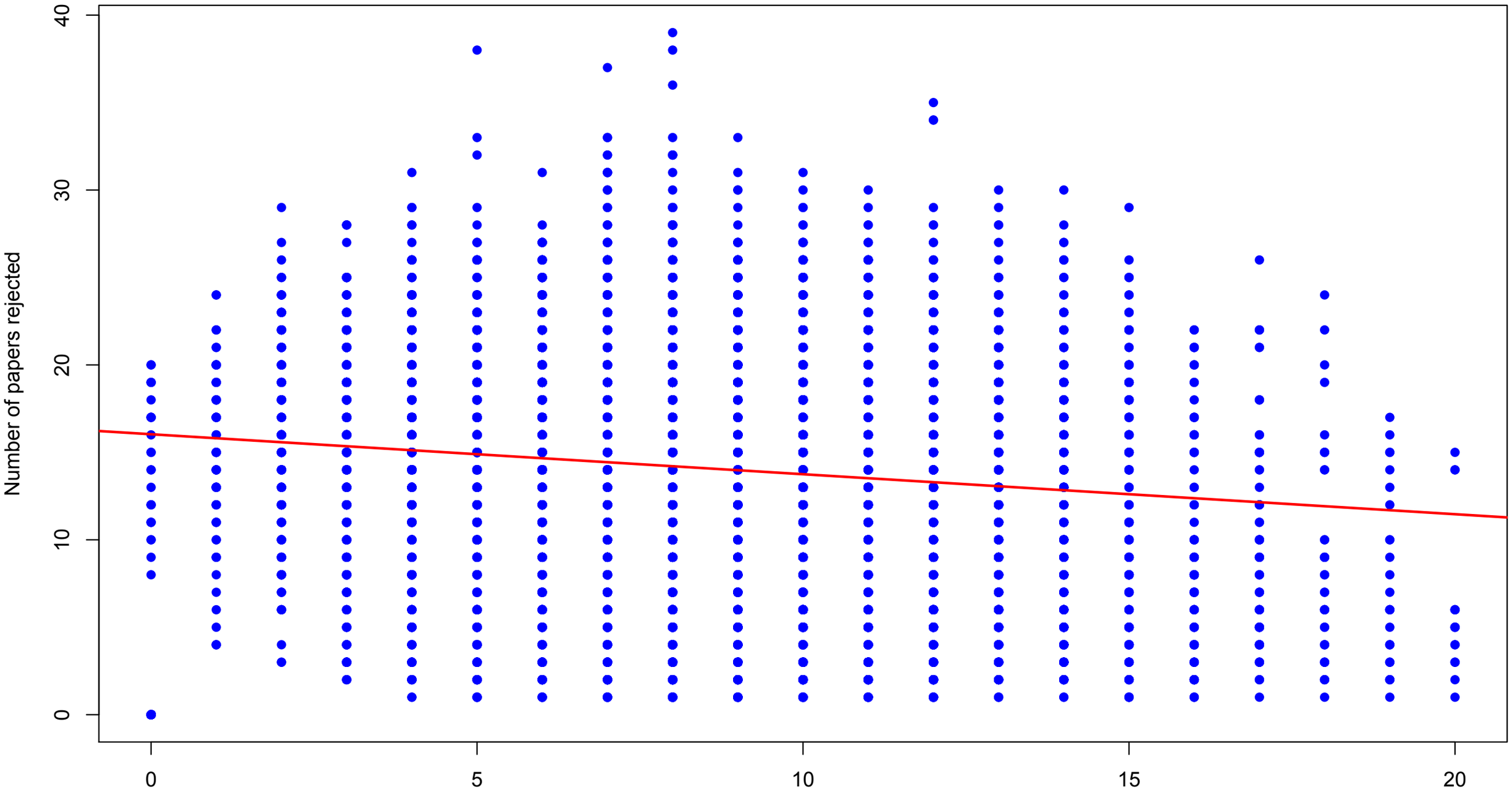


Mean perceived scientific value (PSV) and respective mean journal IF for IF agnostics

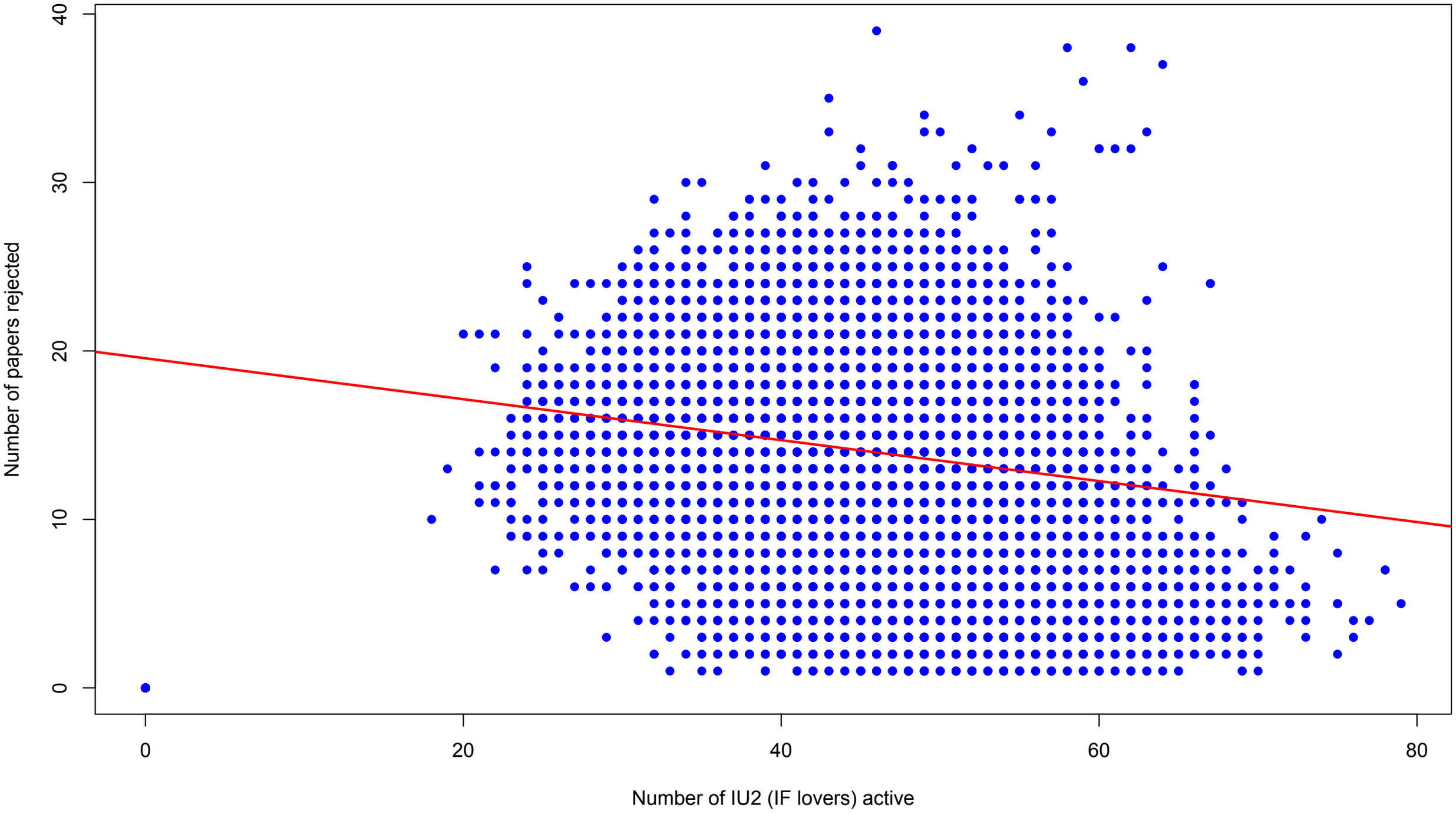


Mean perceived scientific value (PSV) and respective mean journal IF for IF lovers

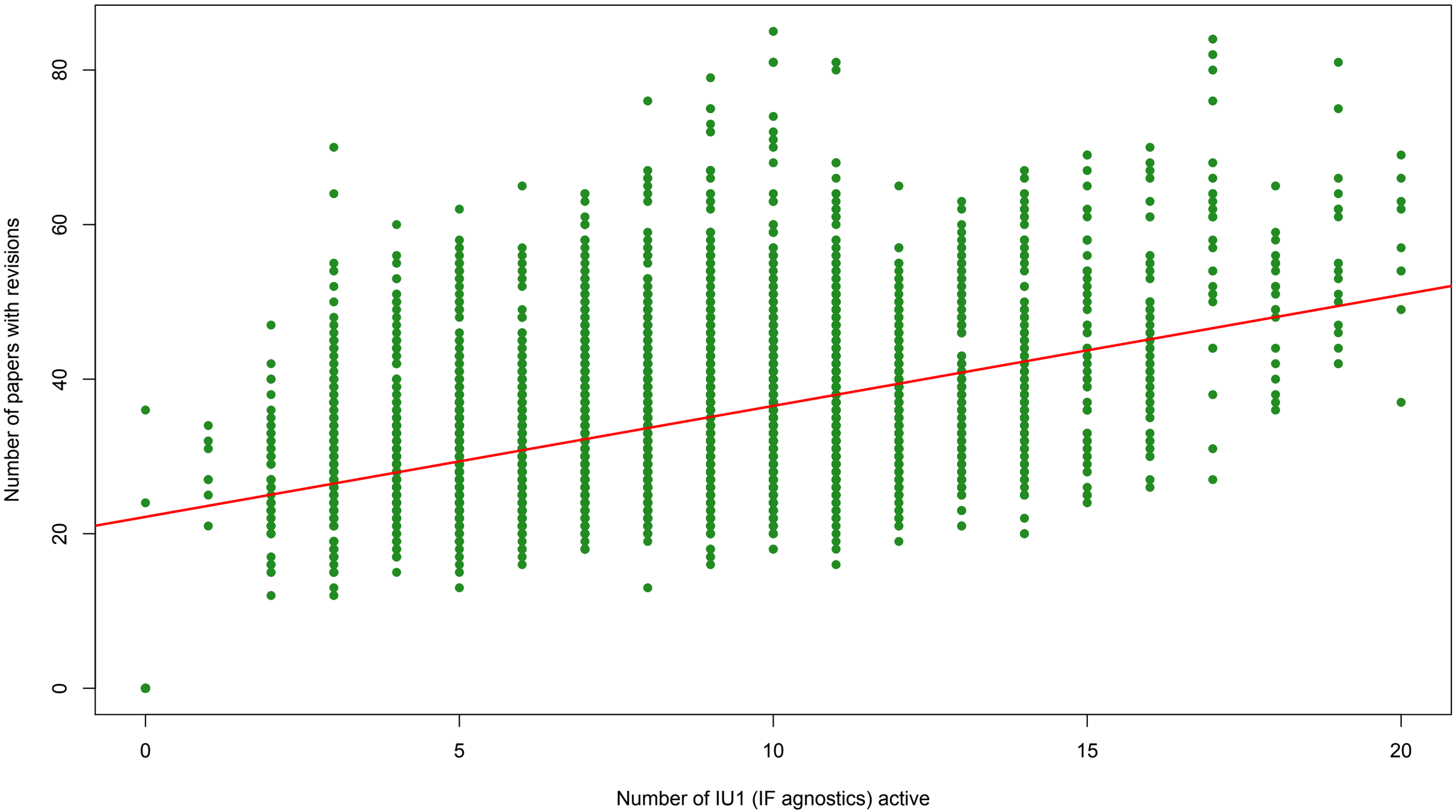
#REVIEWERS INVOLVED



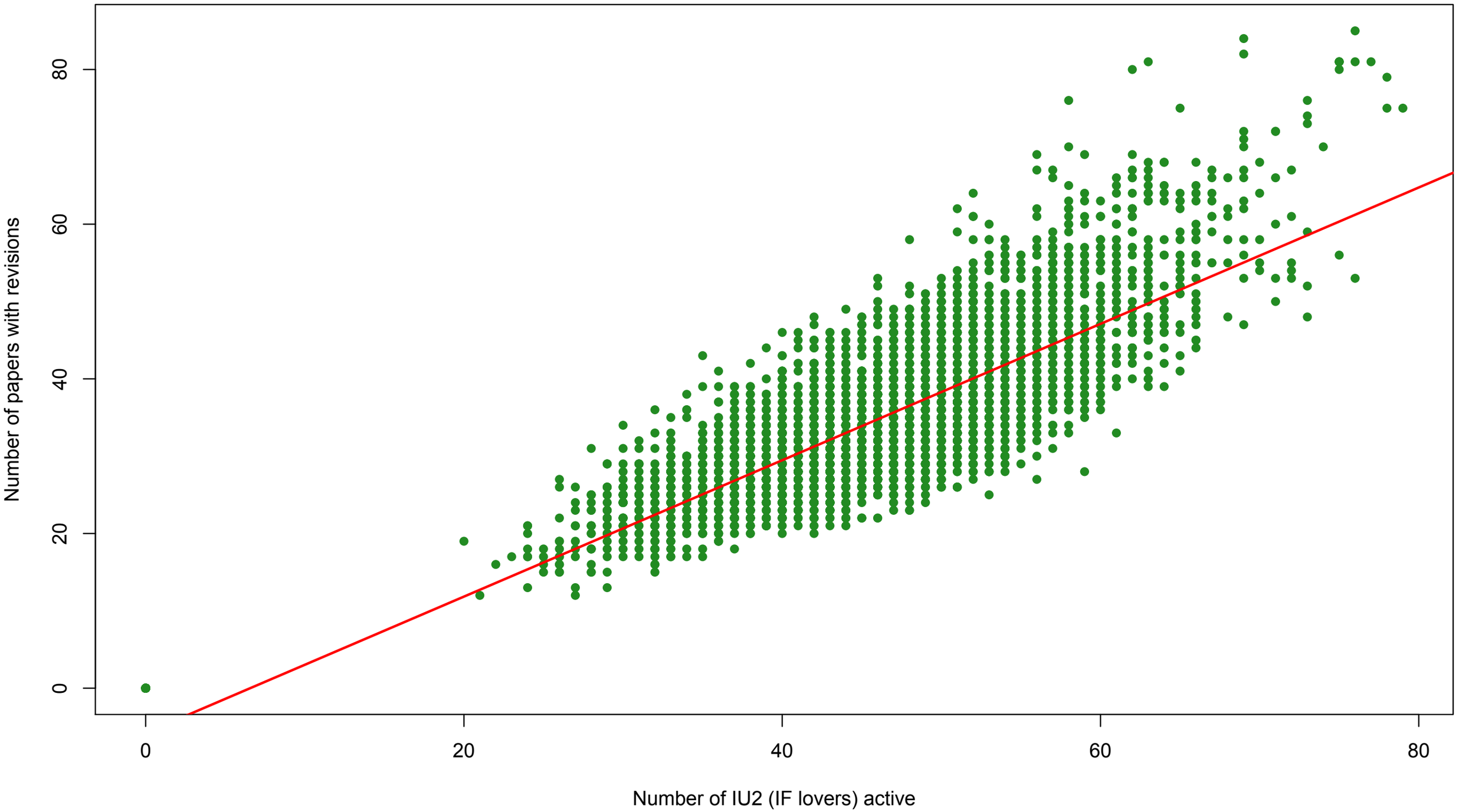
Number of papers rejected as a function of the number of active IF agnostics (IU1)



Number of papers rejected as a function of the number of active IF lovers (IU2)

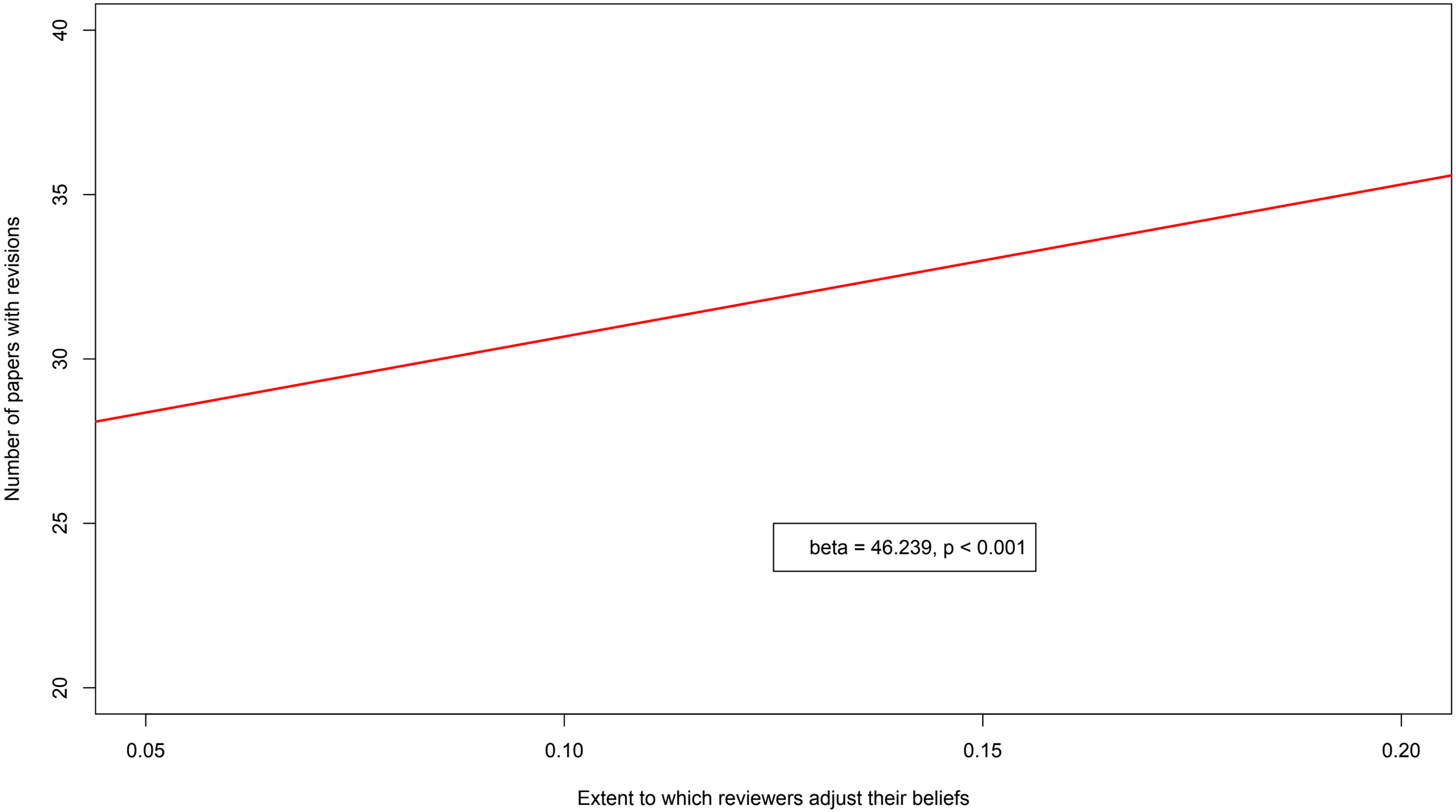


Number of papers with revisions as a function of the number of active IF agnostics (IU1)

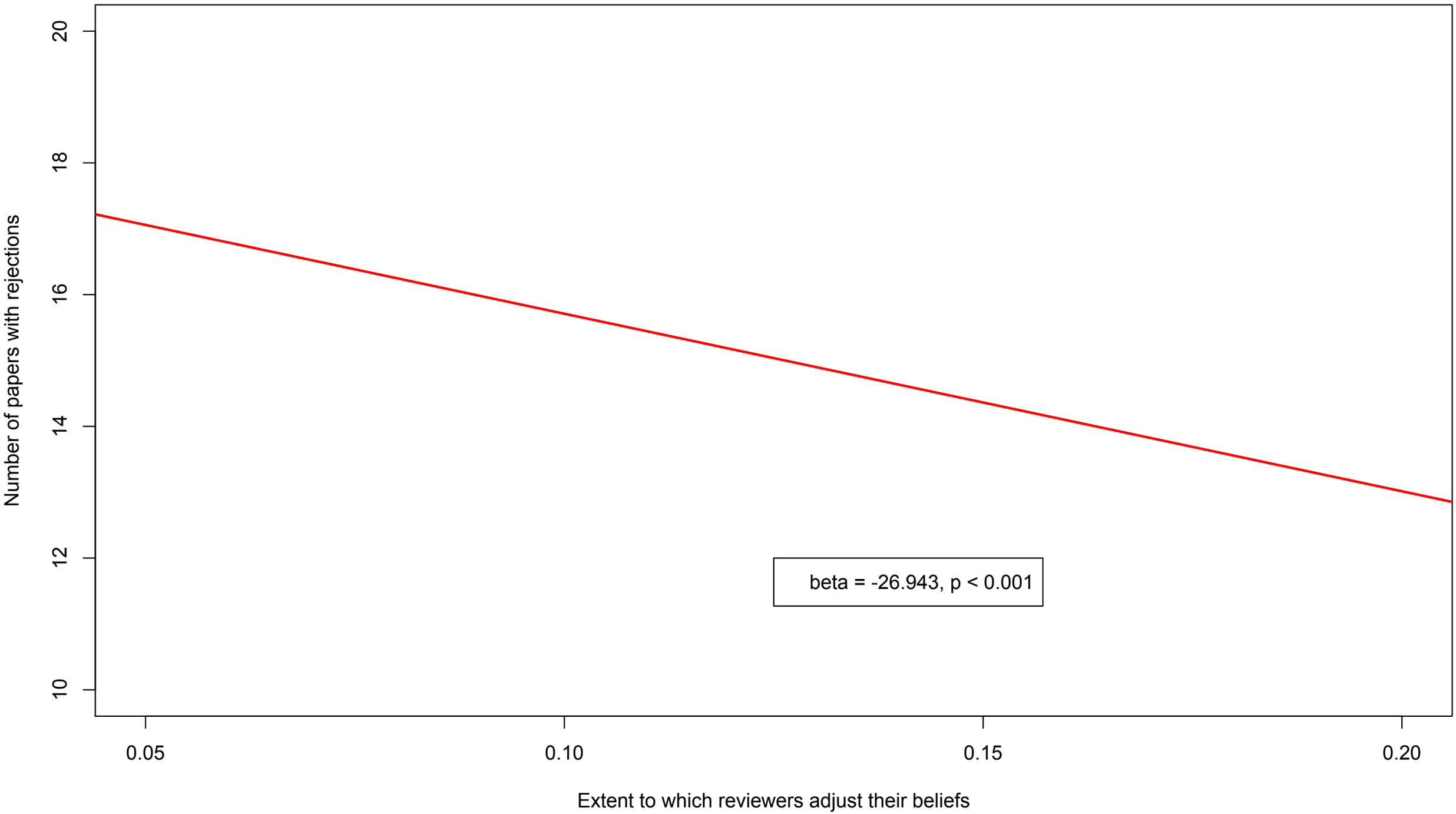


Number of papers with revisions as a function of the number of active IF lovers (IU2)

DOCILITY



Number of papers with revisions as a function of reviewers' beliefs adjustment



Number of papers with rejection as a function of reviewers' beliefs adjustment