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Sur la marchandisation du processus de referee des revues académiques

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On the marketization of the academic review process

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- Résumé : La pression pour changer le système de referee des revues académiques augmente. Nous discutons deux groupes de propositions qui introduisent des mécanismes de marché. Tout d'abord, Prüfer et Zetland (2009) proposent, en se basant sur Havrilesky (1975), de créer un système de vente aux enchères : les manuscrits sont soumis et achetés aux enchères par les éditeurs des revues "dollars académiques", tandis que les citations rapportent des crédits aux auteurs. Deuxièmement, Fox et Petchey (2010), après Riyanto et Yetkiner (2002), proposent de créer une monnaie, le "PubCred", dans lequel les referees sont payés et peuvent ensuite payer pour leurs propres soumissions, tandis que Aarssen (2008) et Blanc et Ernest (2010) introduisent une rémunération en espèces pour leurs auteurs. Nous montrons que ces systèmes seraient susceptibles de compromettre les éditeurs, les arbitres, et aussi les auteurs, et bientôt s'avérer économiquement irréalisable.
- Mots-clés : Referee; éditeur; auteur; publications académiques; enchères
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On the marketization of the academic review process

- Abstract : Pressure to change the academic reviewing system is growing. We discuss two groups of proposals that introducing market mechanisms. First, Prüfer and Zetland (2009), based on Havrilesky (1975), create an auction system: manuscripts are submitted and auctioned to editors in "academic dollars", while citations earn credits for authors. Second, Fox and Petchey (2010), after Riyanto and Yetkiner (2002), create a "PubCred" currency, in which referees are paid and can then pay for their own submissions, while Aarssen (2008) and White and Ernest (2010) introduce hard cash remuneration for reviewers. These systems would adversely affect editors, referees, and authors alike, and would soon prove economically unworkable.
- Keywords : reviewing; reviewer; referee; editor; author; academic publishing; auction

1 Introduction

The academic reviewing system has reached saturation point because of the growing number of manuscripts being submitted to journals partly as a result of the slowdown of the publishing process (Hamermesh 1994; Ellison 2002; Azar 2005; Leslie 2005; Thomson et al. 2010) or the outcome of "publish or perish" behavior, rightly denounced by Varian (1997). Hochberg et al. (2009) refer to this as "the tragedy of the reviewer commons": too many authors wanting to publish in high quality journals saturate the reviewing system when they are not the most appropriate for these journals; scholars subdivide their papers so as to maximize the number of their articles; when their paper is rejected, they resubmit to other journals which increases the number of referees, some experienced reviewers refuse to review. To compound matters, the editorial process for scientific papers is becoming increasingly complex, partly because the growing specialization of scientists makes it difficult to find suitable referees. Some commentators (Weller 2002, Bornmann 2011) claim that both these problems can be largely overcome by innovative peer reviewing on the Internet, although the efficiency of this approach is sometimes questioned. The essentially organizational arsenal of non-monetary measures presented by the ecologists Hochberg et al. (2009) is criticized by de Mesnard (2010) and need not be discussed further here.[1]

Most scholars are preoccupied with the poor incentives for scholars to produce as many (good) reports as possible and recommend to introduce market mechanisms into the reviewing system. Among them, two young economists, Prüfer and Zetland (2009) (hereinafter P&Z) propose what they call "the auction market for journal articles". Authors post their papers on an auction platform and pay a fee in real money. Journal editors screen and value papers and bid for the papers they want for their journal in a pseudo-currency, the academic dollar (A$). The winning editor asks referees to improve the paper and then decides whether or not to publish it. The winner's bids remunerate the authors, editors and referees of articles cited in auctioned papers. In the last stage, editors accept or reject papers. P&Z claim that, as the articles remunerate nobody until they are cited, authors have an incentive to produce good papers and as referees and editors share the pseudo-currency, they are pushed to be timely efficient and to improve papers rather than reject them. Citation revenue is an accurate measure of articles' value: a paper receives more A$ if it receives more citations and if it is unique. For P&Z, summing an individual' s A$ income (from his three jobs as author, referee and editor) allows evaluating academic productivity and could help deciding about tenure, promotion, grants and so on. The A$ may even be exchanged to gain career benefits. P&Z propose the system be applied to economics first. Their system is not entirely new, as P&Z acknowledge; it is derived from Havrilesky's Manuscript Clearing House (1975) whom they cite in their introduction: for Havrilesky, this mechanism would reduce the social cost of information to editors, authors and the subscribing public and would improve efficiency and editors would be better informed about the papers available on the market, which would reduce delays and costs. The main difference with P&Z is that Havrilesky uses real money instead of a pseudo-currency; he also considers making payments for all cited articles and not just the auctioned papers. Moreover, authors and referees cannot spend their A$ in P&Z's system: the A$ may be reassigned by authors and referees to editors anonymously.

Fox and Petchey (2010) (hereinafter F&P), yet other ecologists, working independently but contemporaneously with P&Z, propose "privatizing" the reviewing system by creating a pseudo-currency, PubCreds. Authors pay for their submissions with a pseudo-currency, the PubCreds, that they earn by doing reviews. It costs three PubCreds to submit a manuscript, while a review is paid one PubCred to the referee. Every scholar would have an account held in the central bank, the PubCred Bank. Individuals may consult their account balance and transaction history on the PubCred Bank web site, which could also indicate declined requests to review, and the reason for declining. each scholar should have sufficient PubCreds to be allowed to submit. Handling editors should receive 0.5 PubCreds per manuscript. If a manuscript is rejected

[1]This paper will not discuss of the publishing market of scientific journals as a whole, as it is done by Easton (2007) but our paper complements Easton's one by focusing on the reviewing system.

without review, 2.5 of the 3 PubCreds paid to submit the manuscript are returned to the author. Notice that White and Ernest (2010) are supporters of F&P but propose to replace the PubCreds by real currencies. Along with White and Ernest (2010), Aarssen (2008) also propose using real money: authors pay to submit their papers and reviewers, who are not anonymous, are paid for their work.

For increasing reviewers' incentives, Yetkiner (2000), and Riyanto and Yetkiner (2002) (hereinafter R&Y), propose using a market mechanism facilitated by the Internet. They consider a network of qualified scientists who can act as authors, reviewers or both (which is encouraged), with a fully informed "middleman" who has full authority in distributing papers to potential reviewers (although, considering the possibilities of the Internet, they claim that the matching between authors and reviewers may work without a middleman). Members acting as authors submit their papers to the network at will and they receive feedback anonymously. It is claimed the proposal is based on agency theory (with a principal and an agent); the middleman checks the quality of reviews to ensure that reviewers give maximum effort although it is recognized that this idea is unrealistic. The core of their proposal is a mechanism similar to the emission trading system used in environmental economics: it amounts to receiving credits for carrying out a review which provides an entitlement to make a submission later. However, these permits cannot be sold in a market: their price is fixed, unlike pollution credits. It is claimed that the mechanism is based on Pascal' s law (one of the first physical laws of fluid mechanics) which ensures that the market is in equilibrium.

Overall, the common aim of all these systems is to create incentives for reviewers (and also for authors and editors); the P&Z auction system supplements this with the creation of an evaluation system. All the proposed systems claim to be able to create a new, more efficient, equilibrium. As of them would be a complete revolution in publishing, in economics as in other fields, this note concentrates on the systems advocated by P&Z and F&P, because R&Y' s proposal is far less precise. We will ignore the technical aspects of these proposals and concentrate instead on their hypotheses and the implications of their propositions for the workings of the publishing system and whether they are able to achieve their main objective: faster publication of better quality material.

2 Editorial efficiency of the system

2.1 Detecting good manuscripts

Today, thousands of working papers are published on-line before being published in print (and some, although widely cited, never make it into print). Editors may solicit manuscripts from authors, but this procedure is not at all widespread. Why do so few editors make extensive use of this exciting opportunity? After all, authors are only an e-mail away! We see how unrealistic P&Z are when they implicitly suggest that editors will screen thousands and thousands of papers, even if it is by using multiple keywords, heuristics, etc, SSRN-like abstract newsletters, or how unrealistic is the R&Y's idea of a middleman. The number of agents involved in the auction system may explode, with too many papers to scrutinize and a complete lack of control by scholars in economics. The time required to screen all papers in the "market" is simply too great: editors will simply be unable to find the needles in the haystacks.[2] To take an historical example, the pioneering paper by Coase (1937), Alfred Nobel Memorial Prize in Economic Sciences in 1991, was really recognized nearly forty years after the fact and by no less a figure than Williamson (Williamson 1975),[3] Alfred Nobel Memorial Prize in Economic Sciences in 2009! Overall, editors' workloads will be far greater under the P&Z publishing system: not all editors are likely to be happy about this.

[2]P&Z argue that their system ensures faster publication. However, no indications are given about the time taken for arranging the auctions, even if P&Z have in mind electronic auction systems, like eBay, which may be instantaneous.

[3]Even if the paper was reproduced by Stigler and Boulding (1952) and cited in Cyert and March (1963).

Moreover, P&Z claim that the JEL (*Journal of Economic Literature* of the *American Economic Association*) classification system (AEA 2009) will be sufficient when their auction system is applied to economics papers. However, even if the system is broad-ranging with 20 domains and more than 130 sub-domains, some of those sub-domains remain rather large. Overall, the field of economics is poorly defined; among leading contributors to the discipline Herbert Simon was also a computer scientist, Gerard Debreu was a mathematician, Daniel Kahneman is a professor of psychology, Elinor Ostrom is also professor of political science. These four were Nobel Prize winners in economics in 1978, 1983, 2002 and 2009 respectively. Therefore, either the field is narrowly defined and interdisciplinary papers are excluded; or the field is broadened but the number of possible journals will rapidly grow to encompass mathematical, philosophical, sociological journals and more, which again makes the R&Y's idea of a middleman largely unrealistic.

2.2 Importance and role of editors

Overall, P&Z give precedence to the editors because only editors can spend their A$ but this is not the main point. In their system, authors can no longer choose the journal in which they wish to be published. As editors bid their private values, which is of major significance, P&Z imply that editors should follow their noses when selecting papers! While no editor could agree with such a procedure, P&Z suggest this as a systematic practice. Moreover, the P&Z system reverses the editorial role. Today, except for the few journals that claim to solicit papers, editors have no control over which papers are submitted to their journal. While editors may reject manuscripts immediately without sending them to referees (a process that may take up to a month for the author) they have no control over which papers are actually submitted: it is generally a matter of pot luck. In the P&Z system, editors will have complete control over the content of their journal (save for the ambitions of other editors), while today the element of surprise in the content of unsolicited manuscripts affords journals the possibility of following new lines of inquiry that would not otherwise have been explored. This is not to say that editors never change the editorial line of their journals but that they may find new ideas in authors' submissions. This might be compared with the theory of evolution where the random mutation of a gene gives rise to new species by Darwinian selection. In the P&Z system, journals will not evolve much and certainly far less than they do currently.

2.3 On the uncertain role of referees

The P&Z (2009) system divests referees of much of their importance: referees become anonymous co-writers, who have no incentives to reject papers. This completely reverses the current picture: today, referees are the hinge pin of the system and their recommendations as to acceptance or rejection determine editors' decisions. What is more, P&Z reason as if the reviewers of a given manuscript invariably share the same opinion of it and so truly can improve it. This is highly doubtful (Frey 2003). Reviewers' reports may be contradictory and there is no guarantee they will converge toward an acceptable report (Dacey 2010; de Mesnard 2010). For Lindsey (1988) there is little correlation between the quality of the paper and reviewers' opinions of it, because reports are imprecise.

Even if some interestingly advocated that referees can be paid in money (Chang and Lai 2001), Engers and Gans (1998) have demonstrated earlier that if paying referees may increase the quality of the journal, it is too costly. Who knows what future direction it might take? Furthermore, there are some other possibilities to reward referees. Gleser (1986) propose to nominate the best juniors referees as editors and associate editors of the journal. Bloom (1998), Roberts (2009) and de Mesnard (2010) propose paying referees but “in kind”, by means of books, free access to journals, etc. P&Z (2009) never discuss the question but F&P touch upon it (2010, p. 331).

3 Impact on authors

3.1 Importance of refereeing for academic careers

The P&Z system turns scholars' A$ incomes into proxies for their academic merit. This introduces a whole new factor into the way scholars are recruited and promoted. Today, reviews are done free-of-charge and by and large reviewers remain anonymous. Some journals list their reviewers for the previous year, without specifying which article they report on or how many reports they produced. Therefore, reviewing is not a significant component for academic career paths. While the P&Z system sets great store by the production of reports, albeit less than for articles, there can be no guarantee universities will decide to take reviewing into account in their recruitment and advancement policies: universities are likely to prefer scholars who have written many articles to scholars who have drafted many referee reports.

However, the proposed systems favor the quantitative production of reviews over the production of articles (F&P evoke three reports for one article, but these authors are biologists; a more suitable ratio in economics might be 1.5 or 2 reports per article). This is plain enough for young researchers at the start of their careers: F&P suggest that young academics might go into debt by 10 to 15 PubCreds (i.e., up to five articles) which clearly means F&P judge reviews to be more important than articles.[4] On the contrary, the present author believes that creativity is far more important, especially early in an academic career: the publish-or-perish system channels young scholars toward the mainstream in the hope of securing their future recruitment, while science, and economics in particular, needs fresh ideas to increase its predictive power, which has been undermined by past and present crises.

Nevertheless, there is an important internal contradiction in the P&Z system. As shown in subsection 2.3, the P&Z system removes much influence from referees in determining whether a manuscript will be accepted or rejected but at the same time, the whole system is created to encourage the production of reviews. This is a major flaw.

Moreover, the P&Z system might have drastic consequences for academics in countries where career advancement is determined by publication in high-ranking journals: submissions could not be targeted at specific journals.

3.2 Authors' effort

P&Z assume that authors write high quality papers for career reasons (and they ignore the other reasons), and hence are venal. This crucial hypothesis is dubious because it neglects the fact that most scholars simply love their job, do their best without thinking all the time: “I do this to be paid more”. It is perhaps a growing tendency because of the pressure of the academic system that become more and more competitive but, even in this case, career reasons are not the only incentives for doing well: self-satisfaction is also a very powerful one. We must not forget that pure career incentives may lead to fraud and scientific misconduct.

What is more, all these systems will favor what Merton (1968, 1988) has called the Matthew effect. The Matthew effect, i.e. “the rich get richer and the poor get poorer” means that those who are currently better placed to produce papers, the senior researchers, will be favored over junior ones---even if young researchers could go into debt of 10 to 15 PubCreds under the F&P system---because seniors are receive more demands to do a review than very young scholars. This could have an impact even on universities as the idea of Matthew effect has been applied to academia (Medoff 2006).

[4]Today, reviewing and authoring are clearly separated: some scholars produce reports while other produce papers. The systems proposed, especially F&P, suggest a causal link: a scholar must produce reports if he wants to be published.

Moreover, the system may exclude authors and perhaps editors who are not familiar with electronic auctions; this is more likely to occur for senior researchers since the penetration of social innovations is relatively slow. One may argue that such seniors will retire in due course. Nevertheless, the auction system is made for younger rather than older scholars.

Overall, the P&Z system will increase the tendency for authors to adopt the well-known publish-or-perish behavior because of their need to be "visible" in the market during the screening phase. Both systems are centered on the question of encouraging referees to produce more reports. They fail to consider how important it is to encourage authors to produce better science.

3.3 Fee-to-submit

There is a serious downside to most systems, as P&Z (2009), Aarssen (2008) (or White and Ernest (2010) who are supporters of F&P but propose to replace the PubCreds by money currencies): authors systematically have to pay in true currencies for their paper to enter the editorial system. The fee-to-submit is not new: it is already practiced by some journals, even if it is in the guise of membership of a scientific association. However, F&P rightly underline that (2010, p. 326) "a fee-to-submit system would disadvantage authors who lack the means to pay, might require exorbitant payments in order to attract referees who would not otherwise agree to serve, likely would cause authors to avoid journals charging submission fees, and would require frequent currency exchange due to the international nature of science." Indeed, this system largely excludes authors from developing countries but also those who cannot ask their organization to pay: independent researchers, retired scholars, PhD students, post-docs, etc. It is not easy for the latter two categories to ask their university to pay because they have not yet proved their worth. Priming the pump may prove difficult.

Moreover---as rightly argued by White and Ernest---if only a small group of journals implement a fee-to-submit system, authors will simply avoid those journals, unless they are high status. The fee-to-submit system needs to be created by a comfortable majority of journals simultaneously, including the most prestigious titles: its incremental construction is not a viable proposition. However, a brutal generalization of a fee to submit would certainly lead to a rebellion of authors who would see it as a tentative to create a monopoly. We discuss this point below in subsection 4.3. Therefore, the whole fee-to-submit system is not likely to be settled in practice.

4 Economic issues

4.1 Equilibrium of the system

Generally, the authors think that the system they propose is optimal in the sense that it is better than the existing system. In particular, P&Z (2009) demonstrate, on the strength of a few assumptions about this game and auctions, that this new system is never worse than, and is generally better (i.e. "Pareto-improved") than, the current publishing system. The P&Z system effectively attributes significance to scholars' (authors' or editors') income in A$ as a way to evaluate their scientific merit: scholars A$ earnings signal their worth to the academic system. P&Z claim their system ensures faster publication. Even if their demonstration is technically true, it is based on the purely neoclassical assumption that even a very small difference in the earnings (here, in A$) may stimulate an individual such that he/she changes his/her behavior in a more efficient way (better reports, faster reports, etc.). This is all but certain. In other words, they neglect the Coasian transaction costs. Notice that P&Z examine just one type of auction, where the winner pays the second highest price. What about other systems?

The P&Z system is also based on the assumptions that auctions are a perfect way to determine market prices. However, bubbles are possible in which event the "price" paid for a paper might increase dramatically (Abreu and Brunnermeier 2003). If an editor bets all his A$ and has no money left for future auctions, its scientific journal may stop publishing. Conversely, prices might not be too low, thereby

discouraging the players. This situation has occurred in Europe with the carbon emissions trading system where prices are too low. This observation affects also R&Y's proposal. Frauds are also not excluded: any marketization system can always be bypassed. An example of out-of-control marketization is the TVA scandal in France's BlueNext (again the European CO_2 emissions trading system) that should lead us to be cautious.

The F&P system of PubCreds is not necessarily in equilibrium: some scholars may do too much reviewing and so "monopolize" PubCreds. It is true that some scholars are primarily authors while others are primarily reviewers, evaluators, administrators and so on. Even if ideally a good reviewer should also be a good researcher, some scholars clearly have better critical skills than creative skills. F&P count on the behavior of academics to balance the system naturally, but this cannot be taken for granted. On the other hand, some authors of the first category may way to recruit some colleagues that belong to the second category in order to obtain the right to submit. Artificial authoring is one on the worst things that can happen!

4.2 System bias

P&Z assume that high quality papers are published in high quality journals: this is a crucial hypothesis in their model to allow the reader judging the quality of an article before he spends a reasonable amount of time reading it (which avoids the readers' asymmetry of information) and explains why authors prefer high quality journals. However, as underlined by McDonald and Kam (McDonald and Kam 2007; Clark and Wright 2007), the whole system is biased: quality journals are defined in terms of quality journals, which is plainly a circular argument. Beyond that, the systems examined here can be biased by authors: given that their revenue depends on the number of citations, they could increase this figure artificially. Obviously, such practice already goes on for many reasons, but it might well become systematic.

The system can be biased by referees too. The F&P system ignores the problem of report quality and reasons only in terms of report quantities. This is a major flaw. How can an author with no A$ or PubCreds be prevented from persuading an editor to bypass the system? The P&Z system can be easily circumvented: authors may advise an editor they have produced a manuscript before it is entered in the system, which is a big advantage in any auction system. As today, a reviewer can always produce a report that looks great but that is merely cosmetic. This is information asymmetry. How can it be prevented? F&P suggest editors could decide whether reports are good enough to earn PubCreds; in other words, they suggest editors produce reports on reports.

The system may also be biased by editors: in the P&Z system, they might adopt predatory behavior to prevent other journals from publishing certain papers, especially if they are rich in A$ paid back by authors or referees, a possibility considered by P&Z.

One question is just how "non-strategic" is the organizer of the auction platform? This is not to say that platforms like eBay are dishonest and bias auctions, not at all, but they are commercial undertakings, created to make money, which is only to be expected in a capitalistic world. And adverse selection still occurs, at least in markets for used goods (Ghose 2009). However, even if the academic publishing system is capitalistic, surely the dissemination of knowledge should not be. The organizer of the auction platform, who will have to be paid (out of authors' submission fees), could be tempted to increase the number of submissions artificially by engaging in marketing, spending money on advertising. This will indeed increase the number of submissions but will also increase costs and hence fees.

A last remark on bias. The A$ are essentially in editors' hands as the A$ may be reassigned by authors and referees to editors anonymously, a mechanism that voluntarily allows to make imprecise the amount of A$ that each editor may have. P&Z claim that this makes the auctions more efficient, which is technically true: anonymity is a necessary condition for the auctions to work. However, it is doubtful whether reassigning the A$ from authors to editors is an effective way to prevent editors' budgets, or ball-park estimates of them, from becoming common knowledge. Moreover, this introduces a strange dose of non-

market economics in a pure market system: authors and referees may be sluggish in reallocating their A$, or worst, a black market may appear where some authors may try to violate anonymity for paying editors and obtaining some favors.

4.3 Oligopoly and monopoly

Who will organize the auction platform? One of the main publishing houses? Others will not accept to let the first-off-the-mark to act alone and will create their own systems, generating an oligopoly within the A$ system or the PubCreds system. It is unsure that the traditional model of oligopoly applies but a very detrimental consequence is that many systems (based on A$, PubCreds or real money) could co-exist, a possibility generally not discussed. The oligopoly may be also mixed (this could be the subject matter of a complete paper), in A$ and PubCreds or other systems such as hard currencies: today we have two proposals, the A$ and PubCreds, along with the real-money systems. Moreover, it is a safe bet that other pseudo-currencies would be created if the system were to be set up, some on the A$ model, some on the PubCreds model. The smart money is on the hard currencies: supermarket customers invariably prefer immediate cash discounts to tokens for discounts at some future date! Even within each system, the consequences could be dramatic. An author may have surplus PubCreds from one publishing house but be short of PubCreds for a second publishing house, but want to submit work to a journal belonging to the latter rather than the former. Here Gresham' s law could see “bad money drive out good”. Similarly, the consequences for the A$ system could be negative: a manuscript submitted to one system cannot be auctioned in another system, unless exclusivity (not discussed by P&Z) is not a requirement. If a system has few economic journals but contains a particular journal that an author has in mind, then that author faces a dilemma because the risk of not being auctioned becomes large. The risk-averse attitude is to submit the manuscript to the system with most journals in the author' s discipline (here, economics). This problem is akin to the choice of standards in industrial economics when network effects occur: VHS vs. Betamax, Blu-ray versus HD-DVD, etc. Which standard will prevail is initially unpredictable and chaotic: random small events may result in one rather than another prevailing.

Alternately, all publishing houses, mainly when they are for-profit (see Easton 2007), could join forces to create a vast unified monopoly over the auctioning system. As a monopoly, it would set the fee so as to maximize its own profit, well above the marginal cost, with an obvious loss of welfare for consumers (primarily the scientific community); it could also practice price discrimination, etc. However, antitrust authorities might object to any monopoly being created: setting up such a monopoly would require publishing houses to sign an agreement, which the antitrust authorities might view as outright collusion. Even a non-profit bank of PubCreds, which F&P recommend setting up, might enjoy a monopoly and fall foul of antitrust regulations.

Conversely, competing publishing houses could create a clearing house to exchange credits between them. Again this could be considered as collusion but above all, this would cause confusion in scholars' mind with possible changes in the exchange rates, devaluations, etc. Scholars have better to do than survey the evolutions of pseudo-currencies exchange rates.

5 Conclusion

Pressure to change today' s reviewing system is growing. We discussed two groups of proposals that introduce market mechanisms into the reviewing system to some extent. The most sophisticated of these is the proposal by the economists Prüfer and Zetland (2009), following on from Havrilesky (1975), to set up an auction system whereby manuscripts are submitted and auctioned to editors in a pseudo-currency, the A$, while citations earn credits for authors. We next considered the proposal by ecologists Fox and Petchey (2010) that comes after the fuzzier proposal by Riyanto and Yetkiner (2002). Fox and Petchey propose to create a pseudo-currency, PubCreds, which serves to pay referees and enables them to pay for their own submissions as authors, while Aarssen (2008) and White and Ernest (2010) introduce a straightforward

remuneration for reviewers. We have clearly stated that these systems are not a good solution for three sets of reasons: (i) editorial efficiency of the system: screening manuscripts, the significance and role of editors, the uncertain role of referees; (ii) the impact on authors: the importance of refereeing for academic careers, authors' effort with the Matthew effect (Merton 1968, 1988), and fee-to-submit; (iii) economic questions: uncertain equilibrium and possible speculative bubbles, bias of the system, monopoly-oligopoly considerations and co-existence of competing systems.

Overall, these systems lead to the marketization of the reviewing process, which cannot be a good thing. If the reviewing system is in crisis, it is not because of the poor incentives of referees but because the of the "publish or perish" pressure. Introducing the market, auctions, currencies or pseudo-currencies, etc. will not solve the problem. Science in general must find a new mode of operation. However, examining why such proposals arise mainly for the disciplines of ecology and economics might prove an interesting subject of study for sociologists. Are editors in other scientific domains in a different position?

Reviewing must continue to be done free-of-charge, unless it is rewarded in kind, as advocated by Bloom (1998), Roberts (2009) or de Mesnard (2010), mainly because it is the best way to ensure quality: those who accept to do a report for free will not deliberately produce a low-quality review; in other words, the principal-agent problem largely disappear. This is why, instead of ever more marketization in scientific publishing, scholars should be thinking about how to create new free-access journals, especially in economics where they are rare.[5] Easton's propositions (2007) about on-line journals namely, *post-publication review publication* where the reports are posted on-line along with the paper, *post-publication open peer review* which is similar but anybody can also post a comment (and is also proposed by Aarssen (2008)), *before publication open peer review* where the paper is posted in a dedicated site and anybody may comment it before its definitive publication, *open publication and peer review* where the readers freely upload the paper and post a review (while *open access* and *open publication without peer review* are a limit case) should be considered to improve the reviewing process. It is also necessary to continue to increase the quality of the reviewing system, for example by developing the double-blind evaluation (Raab and Moorthy 1998) even if it is costly in terms of workload, or to select referees who have the necessary knowledge for understanding the paper (Clark and Wright 2007).

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[5]However, Ellison (2011) shows that the internet allows researchers to disseminate their researches without passing by the referee process.

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