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Supporting Diamond Open Access journals

Interest and feasibility of direct funding mechanisms

Abstract
As Article Processing Charges (APCs) have been a growing concern in academia and policymaking, the need for a model where both authors and readers do not pay – the so-called Diamond Open Access (OA), or non-APC model – is regularly called for. However, this call is often combined with questions about its sustainability, particularly in financial terms. To answer this concern, this article explores the practical conditions to implement a direct funding mechanism to Diamond OA journals, that is recurrent money provided by funders to support the publication process. Based on a questionnaire survey sent to more than 1,000 Diamond OA journals, it investigates their financial needs, as well as their capacity to interact with research funding organizations (RFOs). The results are structured around four issues regarding the implementation of a direct funding model. First, most Diamond OA journals already make use of money rather than exclusively relying on support and volunteering. Second, those needs would be fulfilled in the eventuality of a regular income from research funders. Third, under this hypothesis, a vast majority of Diamond OA journals can receive and spend money. Finally, most of these journals could develop funding acknowledgments for each article with the promise of regular income through a direct funding mechanism. The conclusion addresses the challenges that such a recurrent financial stream would spur.

Keywords: article processing charges, Diamond Open Access, Diamond OA journals, funding mechanisms, research funding organizations, sustainability

1 Introduction

More and more academics and governments consider that the open access model based on Article Processing Charges (APC) is problematic, not only due to the inequalities it generates and reinforces (Ellers et al., 2017; Ross-Hellauer et al., 2022; Smith et al., 2021), but also because it has become "corporate open access" (Fuchs & Sandoval, 2013), destroys bibliodiversity (Ma et al., 2023), is unsustainable for institutions and researchers (Khoo, 2019; Morrison et al., 2022), or for some, even opposed to open access values (The Budapest Open Access Initiative: 20th Anniversary Recommendations, 2022). They consider that scientific publishing based on a model where both authors and readers do not pay – so-called Diamond Open Access should be developed and supported (Becerril, Arianna et al., 2021; Miedema, Frank et al., 2020; The Council of the European Union, 2023). But beyond the display of such a support on an international scale, how to concretely achieve it, when the landscape of non-APC journals is rather in the form of loosely connected archipelagos (Bosman et al., 2021)? This article is a contribution to this ongoing movement that seeks to build a post-APC landscape (Estelle & Wise, 2023).

As a follow-up of the Open Access Diamond Journals Study (OADJS) recommendations (Becerril, Arianna et al., 2021) in which one of us took part, we explore the conditions of implementation of a key recommendation stated in the OADJS report, namely a direct funding mechanism for Diamond OA journals. Such a mechanism would give research funding organizations (RFOs) a permanent funding role in the Diamond ecosystem. If RFOs contributed to create and maintain the APC model by financing it, we make the hypothesis it would be possible for them to reallocate financial flows to expand the Diamond OA journals ecosystem. Consequently, we investigate the practical conditions to implement a direct funding mechanism to such journals, that is recurrent money provided by a funder to support the publication process. This funding mechanism would be primarily fostered by RFOs, which have been essential to the expansion of the APC model, and now show interest in exploring and supporting other models (Ancion et al., 2022; Yang et al., 2023).

At first sight, the APC model is the predominant revenue model of open access journals publishing, in which a fixed sum given by authors is the price to publish a given article in open access. Popularized in the 2000s by academic publishers such as BMC and PLOS, this model first spread primarily thanks to the support of some private and public RFOs that made their cost eligible in grant money, especially in the health sciences (Collins, 2013; Solomon & Björk, 2012). Though very visible due to big publishers promoting or adopting it, the APC model is still being adopted by a minority of open access journals (Crawford, 2023). It tends to outshine a wide variety of alternatives, currently referred to as "Diamond open access". Interestingly, this label is often defined negatively as "non-APC journals", that is, the absence of a requirement for authors to pay to publish in open access. For instance, the Directory of Open Access Journals website displays a "Without APC" filter for journal search. In this article, we adopt this definition: We consider that Diamond Open Access refers to open access publication without direct funding by authors.

But that encompassing label does not say much about the actual sources of funding and support, the diversity of these journals business models, and their associated costs. In order to clarify the content of this catch-all label, some authors tried to break down the diversity of models that it embraces, beyond the already long suggestion list written in the Budapest Open Access Initiative two decades ago. For example, Suber (2012) suggested to range them from direct institutional support to advertising model. This literature, which is small in volume, is almost always based on the same idea: offering business models to journals currently under subscription in order for them to flip to open access (Laakso et al., 2016). More recently, Wise and Estelle articles (2020, 2019) on "Plan S-compatible" transition models to open access for scholarly societies are prototypes for this approach.

In the same vein, the Open Access Diamond Journals study (OADJS) displays some elements about non-APC business models (Bosman et al., 2021). While describing for the first time a widespread ecosystem (nearly 30,000 journals in varied disciplines from SSH to STM), the report underlines the importance of non-direct monetary contributions. It also shows the diversity of monetary sources necessary for their functioning: grants, donations, crowdfunding, shared infrastructures, institutional support model or freemium. Additionally, some studies focus on the business model of third parties that would fund journals, such as dissemination platforms (Mounier, 2012), libraries OA funds (Verbeke & Mesotten, 2022) and the "subscribe to open" model to transform the relationship between libraries and publishers (Crow et al., 2020).

We aim to expand the Diamond OA journals revenue models beyond these collective funding initiatives (Pooley, 2021) by involving an important actor of the research ecosystem, namely RFOs, usually absent from this literature. While RFOs are still central in the APC world that they helped to expand, notably in the health sciences (Solomon & Björk, 2012), they appear to be vastly underrepresented in the Diamond OA world, with 5% of journals mentioning them (Bosman et al., 2021). However, when RFOs were directly mentioned in a question about the help expected by journals, they largely responded, ascribing to them the provision of services, grants, and donations, but also structural funding. In these conditions, one key question is raised regarding the revenue models of Diamond OA journals: what are the conditions of the implementation of a direct and sustainable funding model by RFOs? To address this general question, we organized our investigation by breaking it down into the following research questions:

RQ1: What are the actual monetary needs of Diamond OA journals? Do they really use money, rather than exclusively relying on support and volunteering, and to what end?
RQ2: What are the additional financial needs of such journals, that is, money they would make use of if they were in a hypothetical world with unlimited funds – what we call the "ideal world"?
RQ3: What is Diamond OA journals' capacity to engage monetary transactions, for this new financial stream to reach them?
RQ4: What is Diamond OA journals' ability to meet RFOs requirements as a counterpart for receiving direct fundings?

2 Methods

To address these topics, we developed a questionnaire survey between March and June 2021. The presentation of the questionnaire and the complete list of questions are described in appendices and a shareable open dataset is available. In this section, we focus on the methods followed.

In addition to benefiting from the feedback of the whole OADJS team, we also relied on their database. The OADJS survey has produced a population of 1,252 journal email addresses that agreed to be contacted anew by members of the team. This population has a significant advantage for our study: since we already had information about these journals (discipline, country, journal age, etc.), we were able to have a more compact questionnaire. Our survey was opened on June 16, 2021, via an email sent to the 1,252 journals. After two reminders, it was closed on July 12, 2021.

The questionnaire is structured in five sections (see Appendix 1), mainly consisting of closed questions with predefined answers and a minority of open-ended ones or comments related to the closed questions. The first section delivers basic information about the journal (e.g. title and ISSN). The second part tackles its economic configuration, that is, its embeddedness into a wider structure (or its independence vis-à-vis other structures). It also addresses questions about the journal's ability to engage in monetary transactions. The third section refers to the publication process and its associated

financial needs. For each of the 26 acts that describe the journey of a manuscript from submission to publication, we ask three questions: who performs the task? Does it involve a monetary transaction? In a world without financial constraints, would you pay for this task? The fourth section considers the relationship of journals with a potential funder, notably the capacity to meet funders' needs and visibility through reporting practices. Finally, the last section concerns Diamond OA journals' opinion concerning a direct funding mechanism and the form it would take.

To decompose the publication process in a list of acts (table 1), we began by mapping the range of tasks that OA journals must handle in order to go from manuscripts submission to published articles. To elaborate an extensive list of acts handled by a journal, we relied on a body of literature that includes cost breakdown presentations by publishers (e.g. IOP, Copernicus, MDPI…), a text published on The Scholarly Kitchen website (Anderson, 2018), and several academic works on publication costs (Contat & Gremillet, 2015; Grossmann & Brembs, 2021; Waidlein et al., 2021). We kept and ordered acts relevant to Diamond OA journals, notably excluding all acts related to print and to APC payment. The respondents had access to a list of 26 acts, ranging from the receipt of the submitted manuscript to its dissemination as a published document, through the evaluation and the material production of the format.

Name of the publication act	**#**
Receipt of a manuscript	1
Formatting the manuscript before entering the editorial process	2
Communication with authors	3
Finding reviewers and monitoring their work, schedule...	4
Reviewing (definition of criteria, written evaluation format, traceability of exchanges)	5
Decision of the editorial board (procedures and archiving)	6
Response to the author (acceptance, rejection, revision) and management of the re-submission process	7
Plagiarism check	8
Identification of the author(s)	9
Conflict of interest check (declaration form and archiving)	10
Copy-editing (grammar, spelling, style...)	11
Language editing	12
Checking compliance with the template	13
Graphic work (figures, graphs, tables, photos, transcription conventions, etc.)	14
Proofreading and checking the integration of changes	15
Translation (summary, keywords, full article...)	16
Format production (PDF, HTML, XML)	17

Semantisation of references	18
Image rights	19
Managing licenses	20
Rights management and author's contract	21
Addition of metadata	22
Assigning a DOI	23
Integration of the manuscript into an issue	24
Putting the document online and making it accessible	25
Publication of data associated with the article	26

Table 1 A list of 26 publication acts

Four important precautions must be taken regarding this list of acts. First, its construction obviously tackles theoretical and methodological problems: Other categories could have been considered, some refined or clarified, obviously leading to different answers. To identify possible gaps in the categories selected, we have associated an open-ended text zone in which the respondents were able to specify elements that did not fit into the formalism of our table. Some acts, such as website maintenance or archiving, were absent from our list as the aim was neither to be exhaustive nor to consider the singular reality of each journal. With these 26 acts, we strived to grasp the main tasks commonly shared by the journals. Secondly, the number of answers about the publication acts can vary from one question to the next. This led to a presentation of the final results in rates rather than in absolute numbers of journals. As the number of responses remains high, this part of the survey enables us to draw trends concerning the publication process and its financing. Third, note that the list of acts does not give any clue about the way funds (already existing or wished) are allocated between each task. However, our goal is not to describe in detail the amounts of money allocated. Rather, we try to connect RFOs and Diamond OA journals through a direct funding mechanism. The volume of money that circulates through this mechanism is another question. Fourth, the list of acts follows the individual article production process and does not shed light on the more general costs and constraints of a given journal. Once again, the aim of this paper is not to describe the general economy of Diamond OA journals, but to create a new financial stream between them and RFOs.

296 respondents opened and started to fill in the questionnaire. After extraction of the data on Excel spreadsheets, we proceeded to their cleaning: Deletion of duplicates and uncompleted forms. In the end, we reached a total of 260 journals whose answers were usable for the analysis. Of these 260 journals, 253 could be linked to data produced by the OPERAS survey by matching on ISSN or the name of the journal reported. This population is still very diverse (at least 29 different disciplines and 55 different countries of activity) but the matching allows us to state that the sample of our respondents is close to the OADJS population as the distribution by major groups of disciplines (HSS, Science, Medicine, Multidisciplinary) and by geographical areas are very similar. The sample of journals is thus dominated by Western European countries and HSS journals but leaves room for great geographical and disciplinary diversity among half of the respondents.

The number of answers to the different questions varies between 200 and 260 for the general questions, goes down to less than 70 respondents for conditional questions, and to only a few of them for subsidiary questions. When we state that 260 responses are usable for the analysis, we must keep

in mind the diversity of respondents' roles who answered on behalf of their journal. The status within the journal (editor-in-chief, editorial board member, editorial secretary, etc.), the degree of knowledge of the publication process, as well as the forms of investment in the work of publication, may vary from one respondent to another. Answers to the open-ended questions attest to this diversity since they range from extremely detailed comments to vague or even non-existent comments.

For most of the quantitative treatments, we took the dataset for a question, built a table compiling the information, and produced a graphical representation. Since the number of answers from one question to another varies, especially concerning the list of publication acts, we systematically displayed rates rather than absolute values. We also performed some cross-referencing of data sets generated by the answers to several questions. Here again, we made use of the OADJS to put our results in perspective. Several questions in the questionnaire were open-ended: They called for open text responses that could not be compiled and integrated directly into quantification processes. Most open text questions received a large number of answers (at least 200), such as the last two questions (5.1. and 5.2.), which collect the respondents' opinion on a direct financing method for Diamond OA journals, but also the questions associated with publication acts (3.4.1., 3.4.2., 3.4.3.). To work on these data, we exported the answers to a text file and used the qualitative processing software ATLAS.ti. The software enabled us to carry out inductive coding as we read, and ultimately to organize the material according to several categories and sub-categories. For example, question 5.2. asked about the Diamond funding models that journals were considering. Coding within this software allowed us to identify several general categories (infrastructure funding model, service provision model, direct funding models, conditions for implementing a given model, source of funds, desired amounts), which were further broken down into several subcategories (e.g., the direct funding model contains advertising, fundraising, voluntary contributions, fixed sum allocations, or volume funding of publications). Once the categories were stabilized and the coding done on the entire textual corpus, it was possible to find all the text associated with a particular code, and thus to quickly collect examples.

3 Do Diamond OA journals use money and to what end?

A major condition to implement a direct funding mechanism for Diamond OA journals relates to their effective financial needs. Do Diamond OA journals, often portrayed as volunteers' journals or "zero cost" initiatives, need money to last? How are these needs distributed among the acts of the publication process? Without financial needs, whether based on "zero cost" or full support by the owning or governing institution, the very idea of a funding mechanism is no longer relevant. By contrast, if these financial needs exist, we strived to precisely locate them in the publication process. In this section, we examine the current payment of publication acts within Diamond OA journals.

Considering our list of 26 acts, after having answered who was their main performer, Diamond OA journals declared which acts were subject to monetary transactions. As shown in the Figure 1, for a given act, the answers are globally distributed in a binary manner between "yes" for an act subject to payment, and "no" for an act performed without explicit direct financial support. The third possible answer ("I don't know") exists in fairly low proportions, up to 5% for the first 15 acts, and between 2% and 7% for the others.

We emphasize three distinctive results. First, in our sample of Diamond OA journals, the majority of publication acts are carried out without monetary transaction. We are in a situation typical of the general economy of scientific publication, where the work done by academics within journals is an integral part of their activity and is not subcontracted. The publication activity is indirectly

remunerated in the salary that institutions pay to persons (i.e. researchers or secretaries) working for the journal, as explained by one of our respondents:

> *ID 12778607986: "If I do [the tasks], I do them as part of my general workload and salary as a professor and by making sacrifices elsewhere (usually to my own research work)".*

This result is in line with the OADJS findings that already highlight this aspect of the Diamond ecosystem. Second, the publication process is not solely based on such work performed without a monetary transaction. Within each journal, the production of published texts involves human and technical resources that are partly based on some monetary exchanges, as the green line shows. Hence, we can state that Diamond OA journals do have monetary needs, that are used to pay in-house personnel, service providers, and subcontractors. Money from research funders could thus be useful if such a flow was designed.

Third, the payment of publication acts is distributed between four groups: A first group from acts 1 to 10 for which the payment rate is low; a second group from acts 11 to 18 for which the payment rate is relatively high; a third group from acts 19 to 21 for which the payment rate is also fairly low; a fourth group (acts 22 to 26) for which it is a bit higher. Such a distribution is an empirical result that we did not expect when we built the list of acts. To better understand what they exactly embrace, we now split the analysis according to these four groups and their content.

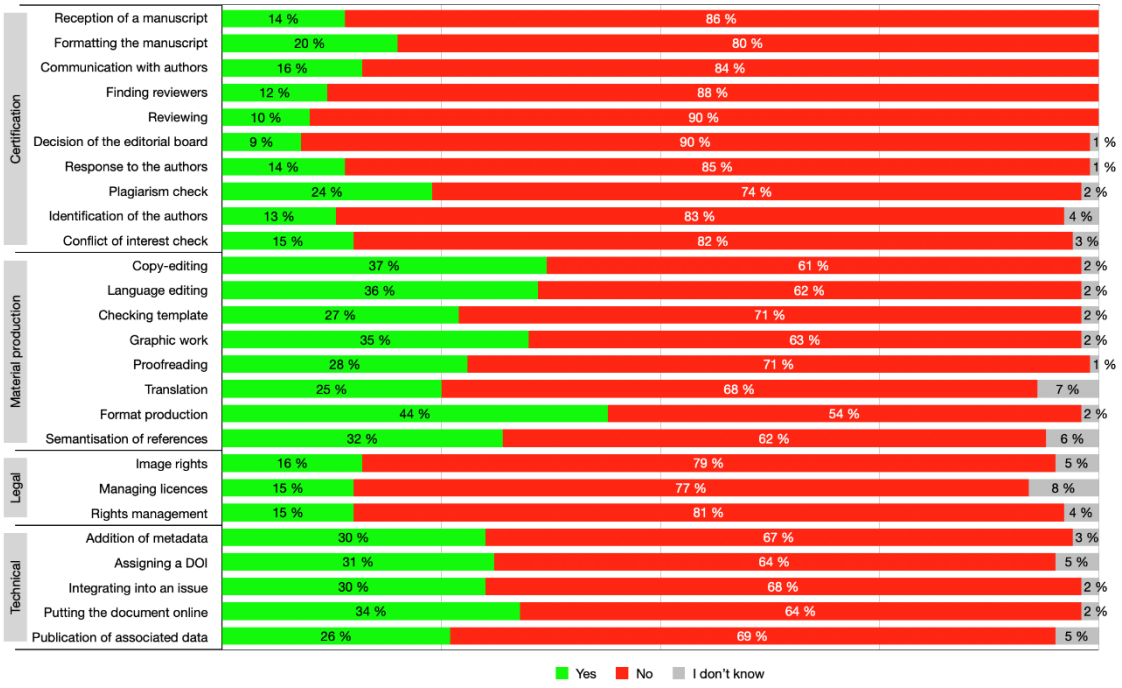

Figure 1 Distribution of currently paid acts

3.1 From act 1 to act 10: Certification acts

The first group covers different acts such as receiving a manuscript, communicating with authors, finding reviewers and making a review, deciding whether to accept or not a manuscript, checking information, plagiarism, and conflicts of interest. It shows that negative answers are particularly high (ranging from 74% to 90%), and that they peak for the search for reviewers, the evaluation itself, and

the acceptance or rejection decision (88%, 90%, and 90% respectively). On the other hand, the positive answers range from 9% to 24%.

We labeled this group “certification acts”, as they are involved in the transformation of a manuscript into a valid academic soon-to-be article. The low proportion of monetary transactions is not surprising here. These acts are generally considered the core of the editorial committee's scientific work, which comes in the long tradition of a gift economy in learned societies (Fyfe et al., 2022). In the survey, our question about actual monetary transactions was associated with a free field. Some comments illustrate this idea of a gift economy, as the one below:

> *ID 12754720887: “Editorial board members are acting as volunteers. All software used is free (or licenses are acquired for the entire research institute editing the journal).”*

However, in the few cases where there is remuneration, it is overwhelmingly attributed to the editor-in-chief. Even if the acts with the highest monetary transactions are at the margins of the scientific evaluation process, they are only partly delegated to external actors that would be paid for checking for plagiarism (money is given to software/ to a contractor in 12% of journals) or reviewing (referees being remunerated in 2% of journals).

3.2 From act 11 to act 18: Material production acts

The second group encompasses act 11 to act 18, including copy editing, language editing, checking compliance with the template, graphic work, proofreading, translation, format production (PDF, HTML), etc. Contrary to the first group, this group shows the highest positive answer rates, distributed between 25% and 44%. The most paid acts concern the production of the format (pdf, html, xml) (44%), copy editing (37%), language editing (36%), as well as graphic work on the text (35%). These results confirm those of the OADJS study. In the published report that displays a slightly different typology, editing, copy editing, typesetting, and design as the most prevalent expenses for Diamond OA journals (Bosman et al., 2021, p. 117-119).

We named this group “material production acts”, acts generally considered as “non-academic work” and the first historically outsourced acts to printers or publishers. Generally, these acts happen after certification and enable the manuscript to become a digital object within the journal tools. That being said, a majority of the “textual” paid acts are performed by copyeditors and not contractors. Only format production and translation are mainly subcontracted when paid. Moreover, the majority of answers were negative (ranging from 54% to 71%), in line with the first point we made about the general trends (Figure 1).

3.3 From act 19 to 21: Legal dissemination acts

The third group we identified goes from acts 19 to 21, including image rights, managing licenses, right management and author contracts. As it is oriented toward the dissemination of the manuscript made article and focuses on legal considerations, we named this group “legal dissemination acts”. As for the first group, this one cumulates high rates of negative answers, between 77% and 81%. We might think that the journal prefers to keep the control of legal acts for which its responsibility is at stake, as once again editors in chief and copyeditors represent the majority of beneficiaries when these acts are paid.

3.4 From act 22 to 26: Technical dissemination acts

The last group (from act 22 to act 26) gathers metadata and ensures DOI assignment as well as online publication of the manuscript into an issue and its associated data. We named this group “technical

dissemination acts", that enable the certified and produced article to circulate from a technical point of view. As far as payment is concerned, positive answers are higher than in the third group, as we can see for metadata (30%), attribution of a DOI (31%), integration of the text in an issue (30%) and posting online (34%). These acts are still performed by a minority of contractors, but at a much higher rate than legal acts, between 28% and 37% of paid acts, hence between 8% and 12% of journals.

Technical dissemination acts seem closer to material production acts. As they do not imply scientific or legal responsibility, they are more likely to include a monetary transaction. Hence, in the answers to open questions, respondents explain that they pay for some parts of the technical acts (DOI assignment, web dissemination), but never for legal acts.

This section highlighted the actual monetary transactions within Diamond OA journals. Monetary transactions are low for most acts, notably when it comes to scientific evaluation as well as ethical and legal responsibility. Nevertheless, we saw that money – and not only volunteers or direct institutional support – was indeed used to run Diamond OA journals whether to pay journal staff or through subcontractors. We now turn to the financial needs of such journals, taking a step further by identifying the acts that could be funded if more money was available.

4 Do Diamond OA journals need additional funding and to what end?

If Diamond OA journals already make use of money throughout their publication process, do they need additional funding? If more money was available, would they be willing to use it, notably to avoid the overburdening of highly committed volunteers (Taubert et al., 2023)? To tackle these issues, we could have asked the journals about their current financial needs. But such a question assumes that those needs are well defined, do not change the journal organization, or the effect such funding mechanisms would have on the number of articles. To avoid this pitfall, we made use of the notion of "ideal world" in our questionnaire. We define the ideal world as a situation without any financial constraints, where the amount of money available to journals would be unlimited. The ideal world should not be seen as a realistic horizon for the economics of Diamond OA academic publishing. Rather, it is a useful fiction that, as a proxy, enabled us to highlight the acts for which journals would like additional funding or, on the opposite, would not have any use.

Based on this hypothetical situation, we asked Diamond OA journals about their willingness to pay for a given act. The total number of respondents varied, ranging from 202 to 231. To question the willingness to pay, we suggested four possible answers: "yes", "no", "maybe", "I don't know". As we can see on Figure 2, most of the answers are distributed between "yes" and "no" (the option "maybe" varies between 8% and 16%, while the option "I don't know" displays even lower proportions, between 3% and 10%).

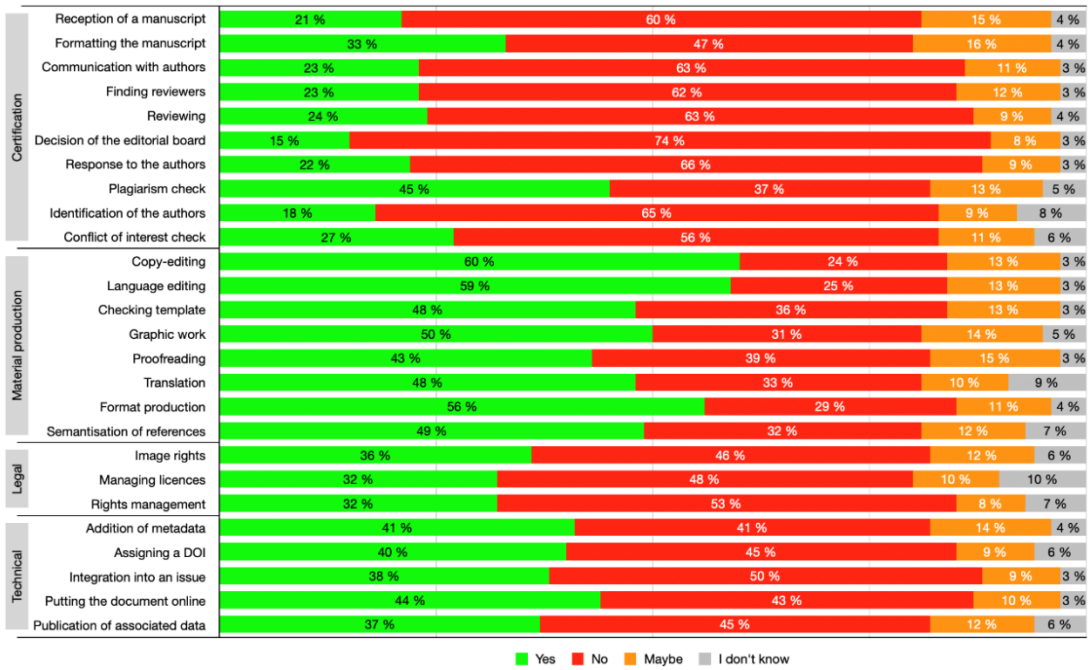

Figure 2 Distribution of willingness to pay in an "ideal world".

In line with the previous figure, answers are organized around the four same groups of acts. This first general result shows that actual monetary transactions and financial needs are well matched. Let us now analyze the answer distribution within each group.

Negative answers are particularly high for certification acts. Journals are generally reluctant to pay for this group of acts, even in a world without financial constraints. As explained by some respondents to the open questions, more money for the certification acts could harm the journal's scientific independence:

> *ID 12765440532: "It should be no conflict of interest, and financial support should not limit the action of Editorial board and editor in chief in selecting the content of the journal".*

Consequently, a respondent asks for editorial independence certainty in the eventuality of direct funding mechanisms:

> *ID 12798245985: "If it were funded externally in any way, the funding would have to be offered with few (or no) strings attached. The journal needs to be independent to ensure academic freedom".*

Hence, the decision to accept or reject a manuscript, which is the scientific decision par excellence, reaches the highest value with 74% of "No". The following acts which are still an important part of the editorial committee's work (communication to authors, finding reviewers and reviewing, answering and identifying authors) also receive high negative response rates, between 59% and 66%. Despite the massive negative tendency, we notice one exception. The act "plagiarism check" is the only one for which positive answers are superior to negative ones (37% "no" versus 45% "yes"). One possible explanation is that plagiarism check is either considered at the margin of the editorial

committee's scientific work or routinely achieved using largely available software, be it internal or external of the journal/publisher/dissemination platform.

We previously saw that monetary transactions had more chances to occur on material production acts. In an ideal world without financial constraints, this trend is confirmed. In a world free of financial constraints, the acts for which journals would be most willing to pay are copy editing (60%), language editing (59%), and format production (56%). The remaining answers ranged from 43% to 50% for compliance checking, graphic work, proofreading, translation, and semantisation of references.
Hence, figure 2 gives a clear message: as far as material production acts are concerned, Diamond OA journals would pay for it if they had access to external funds in addition to their self-support ecosystem. According to some of our respondents, financial capacities to outsource material production acts could be an opportunity to focus on the core of editorial tasks, what we called "certification acts":

> *ID 12772112368: "In an ideal world, we would delegate a lot of the jobs that are related to design, production and copy editing, in order to focus on the management of the editorial process and editorial selection/management."*

> *ID 12797718435: "In an ideal situation, all formal and technical tasks related to the publishing processes would be outsourced in order to help the editors to focus on organizing peer review and communicating with authors".*

Legal acts of dissemination concentrate high negative answers, even if they are still inferior to the negative answers of the first group. Journals tend to not embrace a monetary transaction for image rights (46%), license management (48%), and author contracts (53%). Even if they had access to unlimited funds, the journal's editorial teams still would not put at stake their legal responsibility when it comes to those acts. These results confirm what we saw in section 2 on actual Diamond journals' monetary transactions.

The trend for technical acts of dissemination is more nuanced than the previous group. Negative answers prevail, except for the addition of metadata ("yes" and "no" reach both 41%) and online publication (positive answers hardly prevail with a rate of 44%). Nonetheless, Diamond OA journals are more willing to make use of money for technical dissemination acts than legal ones.
From the ideal world perspective, the answers for the first two groups of acts delivered clear-cut messages. Funds are not welcome to support certification acts (except for plagiarism check), while they seem decisive in many cases for material production acts. By comparison, the answers for the dissemination acts are fuzzier. Negative answers are globally higher than positive ones, but it seems that an important proportion of journals could make use of funds, notably to ease the achievement of technical acts of dissemination.

Another way to look at these results is to compare the current situation with the ideal situation, to isolate the effect of unlimited funding. For all the tasks, we considered the changes that a new flow of funds would bring about among those journals that do not currently pay them. All tasks would be subject to additional payment, in proportions ranging from 14% to 52% of these respondents. If we shift from tasks to journals, we find that half of the latter would make use of supplementary money for at least four tasks, while 59% would need it for at least one task.

If a direct funding mechanism would be useful for most journals, most tasks would not be affected by financial flows. This result shows both the importance of institutional and volunteer support and the

non-profit nature of Diamond OA journals. To our question on their financial goals, only 4 journals answered they were supposed to make a profit, in line with the 1,4% of Diamond OA journals making a profit in the OADJS study. Hence, in the current Diamond OA ecosystem, a new funding stream would quasi exclusively be spent to support publication, rather than being redistributed to owners and shareholders. That is, under the condition that the journal would be able to receive and spend money.

5 Are Diamond OA journals able to engage in monetary transactions?

After having shown that Diamond OA journals do need extra money, we now investigate a second, related stake: The journal's ability to manage monetary transactions. We do know that the Diamond ecosystem is characterized by its small-scale economy. For example, the OADJS data for our responding journals confirms this small-scale economy, with 85% of them paying 0 to 2 full-time equivalent persons for operational work and a third of the journals paying less than $1,000 yearly for the same work. However, the literature does not tell whether these journals have no basic accounting services, rely on a gift economy, or, on the contrary, whether they rely on the same level of financial infrastructure as commercial APC journals.

Hence, in the design of this part of the questionnaire we distinguished three situations: First, journals do currently receive money and make spending. Alternatively, journals that are not able to make direct transactions, may perform it via an intermediary that would act on its behalf, here named "mediated transaction capacity". Finally, they could build such infrastructure if a direct funding mechanism is set, for which we coined the category "conditional transaction capacity". We also distinguished in each situation the receiving capacity and the spending capacity. To be fully operational, a direct funding mechanism also relies on the journals' ability to receive, and then spend money to buy some services or pay people that are not currently supported in its ecosystem.

To gain a more comprehensive view of Diamond OA journals capacities, it is possible to sum the conditional capacity with the direct and mediated one to form what we call a "total transaction capacity". In Table 2 below, we summarized the data and added two pieces of information: the total transaction capacity in absolute value and in percentages.

Types of transaction capacity	Receiving side	Spending side	Receiving and spending
Direct transaction capacity	178	185	151
Mediated transaction capacity	25	16	12
Conditional transaction capacity	15	15	15
Total transaction capacity (N)	218	216	178
Total transaction capacity (%)	86%	85%	70%

Table 2 Total transaction capacities (N=254)

While the previous section clearly showed that Diamond OA journals had monetary needs, this section highlights a crucial result: for 6 out of 7 Diamond OA journals can either receive or spend money, and 7 out of 10 Diamond OA journals can already manage both or could engage in such activities under the condition of sufficient funds from RFOs. This result underlines the diversity of

current accounting and financial infrastructure in Diamond OA journals and does validate the need for a "capacity centre" as recommended by OADJS. Nevertheless, this diversity does not prevent the setup of a direct funding mechanism which would already be effective for most Diamond OA journals.

6 Meeting RFOs requirements

We finally anticipated the expectancies of RFOs involved in this new financial stream, based on what they usually ask researchers who have received funding. That is, to acknowledge the funding by indicating the name of the funder and the grant number in their research outputs. In fact, RFOs are usually neither authors nor are they cited, but are part of the things, people and institutions that have contributed, hence named somewhere in an acknowledgment section which rewards them for their monetary contribution (Cronin & Weaver, 1995). For the past fifteen years, a specialized literature has dealt with these funding acknowledgments and has regularly shown that the information they contain is often incomplete despite mandates issued by RFOs within their grants (Álvarez-Bornstein & Montesi, 2021) and the promotion of a shared database by Crossref, Open Funder Registry (ORF). So, in a publishing world more and more revolving around transparency and openness principles, we considered the development of new funding channels as demanding the same requirements that already exist for APC and subscription journals. This section examines the propensity of journals to ensure the traceability of research funders in their articles. The first part highlights the current capacities of journals to provide visibility to research funders (5.1.) As Diamond funding mechanisms must be distinguished from the APC model, we asked journals about their ability not only to match funding metadata but to report yearly for any given RFO. The second part focuses on journals that currently lack reporting capacity and develops thoughts on potential incentives for journals (5.2).

6.1. Making the funders' contribution visible

Making the contribution of funders visible starts at the level of individual articles: The challenge is to be able to match, for a given article, on which funding basis the authors carried out their research and produced their manuscript. This match clearly rests on information provided by authors, hence our question to journals: "For each article you publish, do you ask authors to indicate the RFO of the research or grant identification that led to its publication?". Among the 232 answers, 56% of the journals declare that they carry out minimal acknowledgment of research funding. Symmetrically, a significant proportion of journals (42%) do not perform any such acknowledgment, while 1% of respondents were unable to answer. That could seem like a rather low rate, but the literature shows that less than half of the Web of Science journal articles showed funding metadata in 2016 (Tang et al., 2017).

While the acknowledgment of funding by article is key to any funding information, to achieve reporting, it would be necessary for journals to produce a list of RFOs and the articles that they have contributed to produce, whether they are based on ORF or other identification systems. When asked about that, journal answers show a reversed trend: of the 136 respondents, 36% claim to be currently able to produce such a report, while 40% consider they could not. We notice a large proportion of respondents who simply do not know whether reporting to funders is possible (24%). If we add the fact that 96 journals didn't answer this question while they did to the previous one, we have unveiled a new piece of evidence of the absence of RFOs in the Diamond ecosystem.

6.2. Incentives for the development of a reporting system

The previous sections indicated that Diamond OA journals were ready to welcome money from research funders for two reasons: they need that money to achieve certain acts of the publication process, and they are for a large part able to receive and spend it. This section on the funders' visibility requirements highlights a possible pitfall for the implementation of direct funding mechanisms. As

we saw above, an important part of Diamond OA journals does not currently acknowledge funding information for each article. Moreover, this part grows when it comes to produce a systematic reporting. Obviously, the current situation regarding funders' requirements derives from the fact that very few funders currently foster Diamond OA journals or even the research that gets published in these outputs. Hence, we asked to what extent journals would develop a reporting system as a counterpart for direct funding.

To further explore the conditions under which journals would be able to acquire technical reporting capacities, we addressed the question of potential incentives: "If research funding organizations required this type of report in order to provide regular funding to your journal, would you be likely to put it in place?". The hypothesis of a regular income seems to largely increase the willingness to take charge of reporting practices. 73% of the 175 respondents who currently do not have the reporting capacity would agree to adopt a reporting scheme. Negative answers were extremely low (7% of the population). We also note that the proportion of undecided remains low, with one fifth of journals (19%).

Despite the eventuality of obtaining a regular income for the journal, a small minority of respondents declined the setting of reporting (N=13 journals in total, or 7% of responses). Nine of them agreed to provide explanations in response to the open-ended question. Let us emphasize once again the diversity of disciplines (postcolonial studies, social sciences, geography, biology, materials science, etc.) and countries that make up this subsample (France, Italy, the USA, and several international journals, including a group of Middle Eastern countries). Two main arguments are put forward to explain the refusal to set up a reporting system. First, some journals explain that they do not need additional funding, considering that they rarely deal with RFOs, or that the research behind the submitted manuscripts was not granted by RFOs. Second, the idea of reporting is not desirable for some journals, because of the additional administrative work it would entail and the risk of losing the journal's independence.

7 Conclusion

We started this article by insisting on the political and ethical problems that APCs entail, and the urge to develop a sustainable Diamond Open Access world. To contribute to this perspective and give practical tools to go beyond APCs, we followed one OADJS' key recommendation: We examine the practical conditions to set up a direct funding for Diamond OA journals. Though our results only rely on around 2% of the total Diamond OA journals landscape, we have drawn four main results that allow us to understand the practical modalities of such direct funding.

We examined first the monetary needs of Diamond OA journals all along the publication process. We saw that contrary to a uniform view of volunteers' journals, a vast majority of Diamond OA journals already make use of money to produce scientific papers for certain acts, notably concerning the material production of the article and the technical acts of its dissemination. Second, we demonstrated that those needs would be fulfilled in the eventuality of a regular income from research funders, lowering the volunteers' burden. Third, we tackled the question of Diamond journals' capacity to manage monetary transactions. Despite underlining a diversity of situations, our survey shows that a vast majority of them can receive and spend money or could be able to do so in the eventuality of the setting of such a direct funding mechanism. Lastly, we looked at the funders' requirements. If a small majority of Diamond OA journals currently have funding acknowledgments for each paper, it is still far from being met for lots of respondents. Nevertheless, we saw that this point could be enhanced with the promise of regular income through a direct funding mechanism.

A logical follow-up of our work would be to inquire RFOs about the feasibility of direct funding on their side. Even if the national Austrian funding agency has done it in the past (Rieck, 2019), it is in particular their legal ability to directly subsidize journals that should be questioned. If RFOs' main scheme is to support research projects or institutions through grants, journal funding seems to be far less common.

If Diamond OA journals are globally ready and eager to welcome direct funding mechanisms, coming from RFOs or other supporting institutions, the permanent monetary flow induces new challenges. The first one is administrative given that an accounting and reporting system can imply a new administrative task for the editorial team. The second challenge is a well-known ethical one. Indeed, financial dependency could harm the independence and integrity of the editorial policy: an incentive to publish "funding" authors (that is, the ones supported by a research funder), or, as a more general rule, the laxing of peer review to enhance funding sources. However, this threat is not specific to Diamond OA journals since it has been suspected and observed at some APC OA publishers. Third, in line with the predatory journals that have developed as parasites of the APC model, several of our respondents warned against the possible emergence of Diamond predatory journals. Even without going that far, the question of the increase, displacement, and decrease of inequalities specific to the academic world will have to be an integral part of the evaluations of concretely designed direct funding mechanisms. Only then can this new financial stream be deemed sustainable for Diamond OA journals.

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Appendix 1

1. Your journal Identification	
electronic ISSN	
Journal Title	
2. Your journal general economics	
2.1. Is your OA diamond journal an economic entity of its own, rather than a part of a broader economic entity?	Yes
	No, the economic management includes the paper journal
	No, the economic management includes the electronic journal and other publishing media (books/journals...)
	No, the economic management includes the electronic journal and other scientific activities (congresses, conferences...)
	I don't know
2.2 Do you have an annual financial target (we do not expect a monetary amount)?	To break even
	To make a profit
	Losses are possible
	I don't know
2.3 Is your journal (or its owner) able to receive recurrent monetary funding from third party organizations?	Yes
	No
	I don't know
2.4 Is your journal (or its owner) able to make monetary expenditures?	Yes
	No
	I don't know
2.5 (conditional question depending on 2.3 and 2.4) Is an intermediary able to receive monetary fundings on behalf of your journal?	Yes (and indicate the annual amount considered sufficiently large in €/US$)
	No
	I don't know
2.6 (conditional question depending on 2.3 and 2.4) Is an intermediary able to make money expenditure on behalf of your journal?	Yes
	No
	I don't know

2.7 (conditional question depending on 2.3 and 2.4) If not currently able to do so, would your journal set up an accounting system if the potential financial amounts received were considered significant enough?	Yes (and indicate the annual amount considered sufficiently large in €/US$)
	No
	I don't know
3. Tasks on any given manuscript (see tasks list at the end)	
3.1.1. For all of the following tasks: who, among the choices given, performs them (this can be most frequently or systematically)?	Editor-in-chief, assistant
	Member of the editorial committee
	Editorial secretary
	Reviewer
	Contracter (specify)
	Other (specify)
	I don't know
3.1.2 Comment on the task performers (free field)	
3.2.1 For all of the following tasks, do they involve payment in monetary form?	Yes
	No
	I don't know
3.2.2 Comment on payments in monetary forms (free field)	
3.3.1 In an ideal world without constraints, would you like to eternalize and pay for these tasks?	Yes
	No
	Maybe
	I don't know
3.3.2 Comment on the task accomplishment in an ideal world (free field).	Open comment with free-text field
4. Funding and grant report	
4.1. For each article you publish, do you ask the authors to indicate the research funding organisation of the research or grant identification that led to its publication?	Yes
	No
4.2. If yes, are you able to produce a report including the list of research funding organisation involved AND the number of articles per funder that you have published?	Yes
	No

	I don't know
If Yes, the questionnaire goes directly to question 5.	
4.3. Nevertheless, would you have the technical capacity to put in place the elements necessary (list of research funding organization, number of article per funder…) to produce such a report?	Yes
	No
	I don't know
4.4. If research funding organizations required this type of report in order to provide regular funding to your journal, would you put it in place?	Yes
	Yes if the associated annual cash flow exceeds a certain amount (indicate it)
	Maybe
	No
4.5 (If "no" to 4.4) Please specify the reasons why you would not put it in place (free field).	Open comment with free-text field
5. Opinion on funding mechanism	
5.1 What do you think of a direct financial support of research funding organisations to OA diamond journals?	Open question with free-text field
5.2. What would you propose as a specific funding scheme for your journal ?	Open question with free-text field