

**Bégin-Caouette, O., Jansen, J. & Beaupré-Lavallée, A. (2018).** The perceived contribution of early-career researchers to research production in four Nordic higher education systems. *Higher Education Policy*. <https://doi.org/10.1057/s41307-018-0125-5>

## **The Perceived Contribution of Early-Career Researchers to Research Production in Nordic Higher Education Systems**

In the global race for academic prestige, early-career researchers (ECR) play a pivotal role in countries' research production. The objective of this paper is to analyse the perceived contribution of ECR to research production in Nordic higher education systems (HES). Based on 56 interviews with actors from different organizations in the Danish, Finnish, Norwegian and Swedish HES, the thematic analysis suggested the contribution of doctoral students and postdocs was essential, yet there was no convergence in actors' perspective regarding the contribution of other contract-researchers. The global theme "casualisation" linked organising themes and explained the underlying dynamics between ECRs and the research production process.

Key words: Early-career researchers; academic research production; Nordic higher education systems; casualisation; doctoral students; postdoctoral researchers.

### **Introduction**

One corollary of the knowledge society is the expansion of post-graduate education. From 2000 to 2012, the number of doctoral degrees being awarded in the OECD rose by 56% (OECD, 2013). These doctoral students are believed play a pivotal role in the global race for academic prestige (Münch, 2014). For Salmi (2009), the concentration of talent was a core dimension enabling universities' world-class status. Aghion (2010) also calculated that the top-10 institutions in the Academic Ranking of World Universities (ARWU) had a student body including at least 30% of doctoral students (Aghion, 2010). Comparing the number of peer-reviewed publications in the province of Quebec (Canada), Larivière (2013) found that doctoral students contributed to a third of the output.

Doctoral graduates also contribute to HES' research production if they remain in academia. Analysing the Norwegian context, Rørstad and Asknes (2015) found that, although publication rates increased with age and seniority, postdocs in the humanities

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In parallel, another set of studies note generational changes in junior academics, higher requirements to reach professorships and a complexification of academic career paths (Broadbent et al. 2013; Kitawaga et al, 2015; Marquina and Jones, 2015). Despite low unemployment rates, the OECD (2013) observed that prospects for doctorate holders to obtain indefinite contracts were more uncertain than for all employees in most countries. There is, in fact, a growing proportion of casual teaching and research positions in academia (Frølich et al., 2018; Gupta et al, 2016; Lama and Joullié, 2015). The Oxford Dictionary of Human Resource Management (2017) defines “casualisation” as “the process of increasing the numerical flexibility of the workforce by putting people on short-term and temporary contractual arrangements [to follow] fluctuations in demand” (para. 1). For Hill (2012), casualisation not only refers to contract duration, but also implies being at the “bottom stratum” (p. 24) of the hierarchy and working under “ad hoc systems of patronage” (p. 87). Multiple examples from the literature focus on the impact of casualisation on academics themselves (eg: Bataille, Le Feuvre and Kradolfer Morales,

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In an attempt to bridge the aforementioned issues, this study examines from systemic lenses, the perceived contribution of early-career researchers (ECRs) to academic research production in four Nordic higher education systems, namely Denmark, Finland, Norway and Sweden. This article examines three categories of ECRs: doctoral students, postdoctoral fellows and research staff on fixed-term contracts (Graybill et al., 2014). Like in Frølich et al. (2018), doctoral students, who often operate under fixed-term contracts, are here considered to be at the stage of the academic career. As Bosanquet et al (2017) noted, while “early-career” was typically defined as the five years following PhD completion, the lived experience of individuals who work on fixed-term contracts more than five years following PhD completion forces us to broaden the definition of “early-career” to include those individuals who work on fixed-term contracts, paid through research grants and use their time for research projects (Kyvik, 2015), including postdocs, research assistants, senior assistants and other researchers.

## **Background**

Despite notable national differences, this article considers the Nordic countries as one broad ideal type based on similar political-economic structures, HES and academic research systems. First, Nordic states have been linked by geography, history and common linguistic bonds (Derry, 1979). Their social-democratic welfare regimes have implemented comprehensive social policies, universal access to high-standards public

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services and consensus-based market regulations (Esping-Andersen 1999). Second, combined to an adaptation of the Humboldtian tradition, these regimes contributed to freedom in access, free tuition, public investments and common standards among universities (Ahola, 2007). Nordic HES also have highly-educated population, knowledge-intensive industries and massive public investments in academic research (Kalpazidou Schmidt, 2007).

Third, focusing on macros-systemic factors structuring research production in the OECD, Bégin-Caouette et al (2016) characterised Nordic academic research systems as “academically central”; and they do have the highest publication intensities in Europe with 2,628 papers per million inhabitants in Denmark, 2,269 in Sweden, 1,976 in Finland, and 1,834 in Norway, while the EU28 average is 1,085 (UNESCO, 2015). A correspondence analysis suggested that the dimension “academic centrality” was partly explained by doctoral graduation rates. These rates have, in fact, increased in ten years from 1.1 to 2.2 in Denmark, from 1.9 to 2.5 in Finland, from 1.0 to 1.9 in Norway, and from 2.5 to 2.8 in Sweden (OECD, 2013).

Beside this growth, it is also worth noting that doctoral education in the Nordic countries has become more standardised – partly through the creation of doctoral schools – and output-based funding (Nerad and Heggelund, 2011). Like in other European countries, doctoral education, and now postdoctoral positions, have become core policy elements in Nordic countries, transforming *de facto* postdoctoral fellowships from an elective activity to a required experience in some fields (Kyvik, 2015). Like for their European neighbours, research productivity indicators are increasingly used to determine promotion (Drennan et al. 2013), the amount of external research funding rises more rapidly than the funding for teaching (Hakala, 2009), and the proportion of staff in externally-funded positions is growing (Frølich et al. 2018).

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Although Nordic countries are considered here as being similar, some differences must be mentioned. Comparative statistics must be interpreted with caution, but it is worth noting that PhD candidates kept the formal status of university employee only in Norway (Frølich et al., 2018) even if Danish PhD students can sometimes be both enrolled as students and employed by the university (EC, 2017). Despite shortcomings, the Eurydice report (EC, 2017) revealed that more than 90% of Danish and Swedish PhD students considered themselves as students, but also that their Finnish and Norwegian peers considered themselves as researchers or scholarship holders. Postdocs positions are relatively new in the Nordic context, but their number is growing (Frølich et al., 2018). The number of temporary positions is also growing in all countries but Norway where there was a decrease from 21% to 18% in 7 years. Overall, Frølich et al. (2018) reported that the share of temporary positions varied from 18% in Norway, to 28% in Sweden and 70% in Finland. Permanent positions tend to be granted with seniority, but in Finland, even employees of the highest tier can end up with fixed-term contracts. In Sweden, Frølich et al. highlighted that the content of the contract or the share of teaching and research do not depend on the title of the position but on how the position is funded.

These data help framing the context of this study whose objective remains *to analyse the research contribution of ECRs across countries, as perceived by major system actors in Denmark, Finland, Norway and Sweden*. More precisely, this article attempts at answering two research questions:

1. How do system actors characterise ECR's contribution to academic research production in their country?
2. How do system actors characterise the relationships between ECRs' working conditions and their contribution to academic research production?

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Working conditions is here used as a broad term encompassing tasks, expectations, status and career prospects.

## **Methodology**

Like for all systems, studying HES requires to pay attention to the interpretation and actions of individuals who are agents in the system (Scott, 2008). This qualitative study consequently relies on the aggregated *perceptions* of actors working Nordic HES. This article complements bibliometric studies on ECRs' research output (e.g. Larivière, 2013) by focusing on the multiple contributions that system actors associate with ECRs.

Sampling was designed based on a multi-level framework (Bleiklie and Kogan 2006) in which we identified three levels (international, national and institutional) and fourteen types of organizations/actors involved directly or indirectly in the academic research production process. The data collection process was thus purposeful since each type of organisation was targeted in a non-probabilistic way to account for the different components of the academic research process (maximal variation) and ensure the compatibility of the data sets across countries (homogeneity). Targeting most organisations involved in the academic research production process and targeting the same type of organisations in each country was consistent with our objective to understand ECRs' contribution from systemic lenses.

### **[TABLE 1]**

Table 1 presents the number of interviews per organization/level. For interviewees at the international and national levels as well as for interviewees assuming leadership positions in universities or unions, they were considered "representative" of their organization since they held leadership positions and were designated to formulate positions on behalf of their organization. One research-intensive university has been

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selected in each country and, within each university, interviews were conducted with two senior and highly published professors in the field of natural and medical sciences. Three contract-researchers were interviewed, but only one postdoctoral fellow. Two have worked on fixed-term contracts for more than six years. All of them were female, three were working in the field of social sciences and one in the field of natural sciences. Five doctoral students (including two members of student unions) were interviewed; three were female, four were in the field of social sciences and one in the field of natural sciences. The small number of ECRs interviewed is not representative of the diversity of positions, duration, disciplines and types of institutions. The intent here, however, is not to explore how ECRs assess their own contribution, but rather to explore how HES – through the perspective of actors at all levels – perceive the contribution of one level of actors, i.e. the ECRs. The findings will thus sometimes present quotes from doctoral students, postdocs and contract-researchers, but only when their perspectives echo those of actors located at other levels.

Between June 2014 and March 2015, one-hour semi-structured interviews were conducted with 56 actors of the Nordic HES, including 22 women. Interviews were divided into four parts: participants' background, the evolution of research production in their country, factors contributing to research production and, in agreement with the two research questions, ECRs' working conditions and research contribution.

Using QSR-NVivo, a thematic analysis was processed on the 56 transcripts. Each category of ECR became a global theme in which we inductively generated a list of nodes. Patterns among nodes led to the identification of 73 basic themes, such as “applying for doctoral positions.” Basic themes were reviewed against the full data-set and merged into 24 organising themes, such as “research contribution.” Organising themes grouped the

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main ideas proposed by basic themes, and support the assumptions underlying global themes (Attride-Stirling, 2012).

This article attempts at portraying systemic perspectives so only the themes achieving a level of saliency across countries and types of organisation are presented below. The analytical strategy was to reduce a myriad of themes, types of organisations and countries to what was prevalent across countries and levels. After the sixth round of coding, five organising themes have reach a level of thematic prevalence (Guest et al., 2006). Since the objective is not to compare the different interviewees but to aggregate their perspectives regarding ECRs' contribution, quotes from ECRs, professors, administrators, union leaders and civil servants will be presented together for each theme. The Findings section includes numerous quotes and "thick description" to increase data credibility (especially regarding the convergence between actors' perspectives) and transparency in the analytical process (Roller and Lavrakas, 2015). It is worth noting that, while exploring relationships between themes, we identified another global theme (casualisation) cutting across categories of ECRs and linking the 5 organising themes. It will be presented in the Discussion.

## **Findings**

A thematic analysis based on the two research questions presented above led to the identification of five salient organising themes: expansion, standardisation, status, research contribution and bottleneck deferral. These themes will be presented in two sections, depending on the category of ECRs to which they correspond, and provide a first attempt to answer the two research questions for each category.

Before presenting those themes, it is however important to highlight that system actors' perspectives converged regarding the importance of higher education for the

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### ***Expansion, standardisation and status: The contribution of doctoral education***

The four most salient themes regarding doctoral students were: contribution, expansion, standardisation and status. First, the theme “contribution” referred to ECRs’ scientific output and was understood in terms of the number of publications. There was convergence in national and institutional actors’ perspectives across the four countries regarding the increasing amount of research undertaken by doctoral students. One Finnish professor noted that, “professors who are leading research groups can do research only to a limited degree” so “a lot of the actual research is done by PhD students and postdocs.”

Second, expansion is a theme that encompasses interviewees’ comments related to the growing number of PhD students in their country’s universities. This theme was associated to the theme “research contribution”. The senior administrator of a Danish granting organisation explained that the increase and reform of PhD studies have been essential in improving academic work in the country:

In the late 1980s, the research impact in Denmark was very low compared to other European countries. At that time, there was a major PhD reform and, later, there was an acceleration in the improvement of Danish research’s impact.

For a Danish university association representative, “The idea was that the Government would provide more money and then, in the development contracts, institutions would promise to produce more PhDs.” Similarly, in Norway, the senior administrator of a granting organisation said that, “the number of doctoral degrees has increased a lot in the last few years and it is an important part of the total picture.”

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Third, as doctoral education expanded, what is expected from them became more standardised. The theme “standardisation” encompasses to the application of standard norms and rules to PhD programmes. In terms of norms, pressure on students in natural and health sciences to write theses by articles rather than monographs extended to social sciences and humanities. In Denmark, a student said, “Today, it is more common to have article-based theses... Now, most PhD students are writing a thesis by articles.” A doctoral student in Norway noted that this new “standard” increased students’ research output:

If you look at the PhDs, almost everyone is guided to do an article-based thesis – you have a choice to do a monograph, but it is recommended to write articles. Of course, it is good, you already have articles when you complete your PhD.

In addition to this normative change, doctoral students faced regulative transformations taking the form of mandatory working hours. As this quote from a Danish doctoral student suggests, the PhD appeared more like a regulated academic program than a personal journey:

When you apply, you have three years of funding and then there are some standard demands in general. You must work 840 hours for your institution and, depending on where you are, it is either teaching or research... You have to do 30 ECTS, you have to present to at least one international conference with your own paper and go abroad.

A professor in the health sciences recalled the following: “In my days, master students could be very involved [in research projects]. But PhD students are becoming more like students... they have to finish on time and it is difficult to meet all expectations.”

Fourth, the theme “status” refers to the provision of common terms, conditions of employment, rights and obligations associated with the working contract. According to

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It is different from the US where they are considered as “students” who are very dependent on the supervisor. In Norway, from day one, you are more independent. You are employed by the university; you are expected to produce articles either related to your PhD or something else. You have a bit more autonomy. There is now a tendency in Norway to talk more about “PhD Students.” But when I started, my position in Norwegian was like “scholarship holder.”

For a Danish doctoral student, being a university employee also provided the proper framework to develop as a researcher: “I think that having three years to do research allows you to pursue your research interests and it gives you time to really conduct your research... If I had to seek external funding all the time, I don't think it would be possible to focus.” When granted, the employee status was associated with a proper salary because PhD students have a master's degree, so “it must fit into the centrally bargained wage of junior civil servants,” as stated by a Danish university administrator.

In brief, beyond the expansion of doctoral education, system actors considered that the standardisation of programmes and the status of students also contributed to the level of academic research production in their country.

### ***Deferring the bottleneck: The role of postdocs and contract-researchers***

Research assistants and postdocs are presented together since the theme “bottleneck deferral” was salient for both ECR categories in interviews with actors in the four countries. There was however only convergence in actors' perceptions of postdocs' research contribution, and only in Denmark, Finland and Sweden.

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### *Postdoctoral fellows*

The theme “bottleneck deferral” refers to the postponing of the academic career turning point where a larger population of ECRs must pass through a contracted stage of increased competition for a limited number of permanent position. For example, multiple interviewees noted that, while doctoral students were “becoming more like students,” the postdoc was the new research training period. The representative of a Swedish faculty union noted that the postdoc became a pivotal position to then apply for lecturer position and then professorship. A Danish postdoc agreed that the postdoctoral phase was a career turning point: “I now have been given this opportunity to pursue for another three years; I have made up to myself that [research] is something I would like to do.” Institutional actors in Denmark, Finland and Sweden also reported that governments and research councils were shifting their funding from doctoral to postdoctoral positions. As a Finnish researcher said, “The Academy of Finland used to emphasise doctoral training, and now the emphasis is on postdoctoral funding... because we have so many PhDs and it is obvious that the Academy cannot provide opportunities for everyone.”

A bottleneck of multiple temporary positions would have been prolonged, and passage through this bottleneck would not be guaranteed. Multiple academic actors however suggested a relationship between this deferred bottleneck, uncertainty and research production. The Danish postdoc interviewed described this relationship as follow:

The bottleneck arrives at a later stage... [The postdoc] is a period in people’s career where they are expected to contribute a lot more than for what they are paid; because it is sort of the investment they need to make. They need to over-produce or they won’t get anything after this temporary period.

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Because of their dedication and “over-production”, a professor in the natural sciences in Denmark considered postdocs were more profitable for research groups than PhD students:

A postdoc costs about 20% more than a PhD. Yet postdocs don't have to accept to do teaching. PhD students must teach to cumulate a certain number of ECT points. Essentially half of the time of PhD students is already taken to do teaching and follow courses, which makes a poor investment [for research] compared to a postdoc. So many groups employ postdocs.

A Norwegian researcher held similar views and described the research contribution of postdocs as follow: “postdoc is the most productive period in terms first-author articles,” “the person is more dedicated to research” and “many postdocs have written their own project.”

#### *Contract-researchers*

Either before, after or instead of a postdoc, some doctoral graduates continued to work in academia as researchers on fixed-term positions. Although these positions resembled postdocs in providing an additional learning experience, their status, conditions and duration varied greatly across countries. There was convergence in actors' perspectives regarding the increasing number of people on those positions. The administrator of a large university in Sweden described the situation as follow:

What happens after the PhD is a weak point in our system. There is no clear step... Since so much research money comes from the research council, we have a lot of people with research funding and no proper positions. They are employed as researchers, but they cannot have promotion, they cannot teach or examine students. They are technically like administrative staff even if they are part of the academic staff. They are not part of the faculty. There is no way to anticipate who will get money from the research council and who will need tenure track position.

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There was however absence of convergence regarding the contribution of these researchers. Considering the structure of academia, a Finnish researcher (senior assistant) considered her role as essential to conduct research projects:

Contract-researchers facilitate the research because the normal structure is that we have projects head by a professor, and the professor is not entitled to receive any funding from the project. So, unless we have the contract-researchers, implementing projects would be difficult. External researchers are needed to get the project going and produce output. Most professors complain of a lack of research time. It is a substantial problem, and they have pressure to run research project as well, so they need to employ people.

For some interviewees, those contracts were necessary to allow HES to absorb a larger pool of PhD graduates and let them either gain experience, compete for permanent positions or find work outside academia. A Finnish university administrator made the following comment:

This contract-based funding has attracted more than there would be without it. The characteristics of universities are such that there are places where people come and work for a period and develop their own skills as researchers. In that sense, it has a positive impact. There is a competition based on that and, for the most successful, funding will continue after the contract. It provides an evolution.

Casual positions would give time for ECRs to prove themselves. For a Finnish professor: “It is very important that they are not in a permanent position. The good ones will always further quickly and become competent for professorship, and the not so good ones will remain [on contracts].”

This situation however becomes problematic when researchers run on temporary contracts for years. A representative from a Swedish faculty union stated that, “you can spend at least 10 years on different kind of time-limited position without ever getting close to a permanent position.” A Norwegian union representative gave the example of a “researcher who worked for 23 years – one year at the time – on part-time contracts”

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What we are seeing is that there has been a shift in the funding paradigm... This means that you are now much more dependent on running projects that are fundable. And these projects are of limited duration. So you have to staff these projects with people who are hired temporarily. But you are not supposed to hire people temporarily. On the other hand, as you are running your project, you may want to run another project funded by the EU and might want to hire people who worked on your projects as postdocs, and you want to keep them because they have a lot of expertise. So you want to hire them as temporary workers. So you are getting into problems because you are creating a new class of scientific workers. What about these persons' future? Because they are not on the track that leads to professorship, they cannot through their work claim a scientific position.

It might end up by altering the attractiveness of the academic profession and fail to get the brightest students to pursue that career. One Finnish doctoral student made the following observation:

Many people will work under those temporary contracts between one to twenty years. Maybe I'm sceptical, but on the other hand, the Trade Union of researchers and teachers in Finland did a survey among the academic staff and it showed that many people were thinking about leaving universities because the careers are very insecure.

It would represent a precarious situation for universities which, according to a university researcher, "don't want to build a young generation of postdocs who are already bitter when they start their career."

There was also convergence in institutional actors' perspective regarding the negative implications casual work for long-term projects. A Finnish professor noted that turnovers created puzzles for professors who had to continuously hire and train researchers who might then leave because of a lack of funding:

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All our contracts are short-term. It is difficult for us to hire people and plan the research because you may not know who will actually be carrying out your project. Professors' job nowadays is a huge puzzle work... Turnover is a good word... It takes a lot of work to educate young researchers and make them useful to the group. But when they have learnt, you don't know for how long you can maintain funding for them.

For a Danish professor, this lack of continuity altered professors' capacity to undertake important research project:

There is a clear lack of continuity when we rely so much on postdocs. This department has almost the same number of postdocs than scientific staff members. So, if you rely to that extent, on two-year contracts, there is no continuity. If I have a postdoc and I ask him to do some programming, then once he leaves, it is hard to continue the program that he made.

Similarly, the representative of a Finnish granting organisation explained that, in some cases, "contracts are too short and they [contract-researchers] are not able to finalise the report or the scientific writing before the project funding ends."

## **Discussion**

The objective of this paper was to analyse the research contribution of doctoral students, postdocs and contract-researchers as perceived by major system actors in Denmark, Finland, Norway and Sweden. The thematic analysis revealed that, within the global theme "doctoral students", the organising theme "research contribution" was associated with three other themes characterising ECRs' working conditions: expansion, standardisation and status. Within the global themes "postdocs" and "contract-researchers", the theme "research contribution" was associated with the theme "bottleneck deferral". After relating those findings to the existing literature, this section presents a new global theme – "casualisation" – which has emerged during the analysis and synthesises the dynamic interaction between ECRs' working conditions and the

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### ***Comparing the contribution of ECRs***

The first research question pertained to how system actors characterised the research contribution of the three categories of ECRs. Despite notable differences between career paths in Nordic countries, data suggest a significant level of convergence regarding doctoral students', postdocs' and contract-researches' contribution. Findings first come in addition to studies conducted in different countries and establishing a relationship between the expansion of doctoral education and professors', institutions' and systems' academic research production. Although the context is different, Münch (2014) has demonstrated that, in Germany, the average number of assistants had a positive and significant impact on professors' relative sum of research grants and publication score. At the institutional level, Aghion (2010) and Salmi (2009) showed that, across the globe, universities with the largest research output counted a large proportion of doctoral students. At the system level, Bégin-Caouette et al. (2016) showed that Nordic academic research appeared on the positive pole of a dimension named "academic centrality," which grouped indicators such as doctoral graduation rates, industry-science co-publications and internationally co-authored publications. This convergence between studies conducted at various levels mirrors the convergence we observed between institutional- and national-level actors' perspectives.

The theme "research contribution" was not only associated with "expansion", but also with "standardisation" and "status." The theme "standardisation" echoes other studies' findings. To improve the efficiency and productivity of doctoral studies, Nordic governments introduced policies such as additional giving grants to students who finish on time (Sarauw, 2014), encourage stays abroad (Norden, 2014) and publish theses by

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There was also convergence on the contribution of postdocs in Denmark, Finland and Sweden, and those findings are in line with the few studies conducted in other contexts. Based on interviews conducted in Australia, Åkerlind (2005) reported that postdocs were often depicted as essential to the work of laboratory groups. Focusing on the specific context of a chemical engineering laboratory at MIT, Gretchen (1999) also found that postdocs represented 43 percent of first authors of the research articles published in *Science*. The absence of convergence regarding postdocs' contribution in Norway does not imply that they do not contribute to research, but that not enough interviewees noted their contribution for the theme to become salient. Based on data from 12,400 Norwegian university researchers, Rørstad and Asknes (2015) demonstrated that postdocs counted more article equivalents than associate professors only in the humanities and social sciences, and fewer than full professors in all disciplines. Further bibliometric studies would however be needed to examine if there are actual and significant differences in postdocs' research production between countries.

Findings regarding contract-researchers' contribution are more nuanced and there are few studies with which to compare. Mishra and Smyth (2013) did find that Australian lecturers (on fixed-term contracts) had fewer citations and publications than professors, but also that this relationship disappeared when the academic rank was considered. Teichler (2014) observed that a greater proportion of junior than senior academic staff at Finnish and Norwegian universities were primarily interested in research and dedicated more time to it. Regarding productivity, Kwiek (2015) nonetheless found that, across

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Europe, the top 10% most performing researchers remained permanently-employed professors.

The contribution of postdocs and contract-researchers was associated with the theme “bottleneck deferral.” One could question the empirical validity of such a theme since the PhD remains the legal requirement to become professor in many countries (EC, 2017) and since there is fierce competition at all stages of the academic career (Frølich et al. 2018). But Frølich et al. (2018) noted the following: “There has been a strong growth of PhD candidates over the last years, but no similar growth of positions above the PhD level... Especially there are bottleneck situations for young faculty members in temporary positions” (p.50). The Science Europe Working Group on Research Careers (2016) regarded the postdoctoral phase as the “bottleneck” (p.7) and Brechelmacher et al. (2015) as the “hardest and most crucial during an academic career” (p. 17). Kyvik and Asknes (2015) also noted both an increased in academic staff’s qualification and in competition for permanent positions, thus corroborating our hypothesis of a relationship between a deferred bottleneck and the casualisation of research positions.

### ***The casualisation effect on academic research production: A core-periphery model***

The second research question concerned the relationships between ECRs’ working conditions and their contribution to research. The themes identified above served as characterising ECRs’ working conditions, but a second-order thematic analysis led to the identification of the global theme “casualisation”, which linked the other themes and appeared as a core underlying dynamic between ECR and research production. As explained in the introduction, “casualisation” refers the extensive use of fixed-term contracts to perform research-related tasks. Like Hill (2012), we consider that, more than an issue of contract duration, casualisation implies a loss of autonomy and agency. With

**Bégin-Caouette, O., Jansen, J. & Beaupré-Lavallée, A. (2018).** The perceived contribution of early-career researchers to research production in four Nordic higher education systems. *Higher Education Policy*. <https://doi.org/10.1057/s41307-018-0125-5> casualisation, “the apprenticeship stage from being a PhD student to become a principal investigator has been prolonged” (Frølich et al. 2018, 108).

This situation of dependence is adequately reflected in a core-periphery metaphor. In world-system theories, core regions have trade power, economic capital, higher wages and freedom, and they take from peripheries large quantity of raw material, cheap labour and skilled professionals and export to them their manufactured good (Chirot, 1986). Altbach (2001) has used this metaphor to portray China and India, the two most populous countries with strong scientific capabilities, yet peripheral in that their production was structured and, to some extent, capitalized by cores located in a few Western countries. Broadbent et al. (2013) also used the core-periphery model, but within one country, to describe the research workforce in Australian universities where there are few permanent positions at the core, and many casual ECR positions at the periphery of academia.

Although the level of casualisation across Nordic countries varies (Frølich et al. 2018), aggregated perspectives suggested that the four HES rely on doctoral students and postdocs to produce research. One could infer that these ECR in those systems would be at the core of the production process, but interviewees rather suggest that, even if they accomplish critical tasks, ECRs’ uncertain career prospects and dependence on permanent staff maintain them in the periphery.

The academic career paths traditionally proceed through a series of peripheral and casual career stages, but Jaeger and Eagan (2011) observed an expansion of a periphery of “precarious knowledge workers.” Potential causes would include the increase in administrative tasks for professors (Aarrevaara and Pekkola 2010), an over-supply of doctorates (Kitawaga et al. 2015), an “audit culture” disaggregating academic tasks into adjustable positions (Broadbent et al. 2013), the increase in temporary external funding (Välilmaa 2012), and universities’ strategic management (Pietilä, 2014).

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Most interviewed actors agreed that ECR needed to publish more than their contract stipulated to go through the academic bottleneck and obtain a permanent position. Professors also needed an extensive temporary workforce to implement large-scale research projects and produce the output for which they were funded. These perceptions confirmed that ECR spent more time doing research than their senior counterparts (Teichler, 2014) and that postdoctoral positions were used to increase ARS' research production (Kyvik, 2015).

For some system- and institution-level actors, casualisation was beneficial in some respects. A Norwegian university administrator explained, for instance, that project-related positions appeared as a “new class of scientific workers” with limited career advancement, but which allowed institutions to produce more research while remaining financially viable. Some interviewees even argued that casualisation had a positive influence on ECRs' career. Fixed-term contracts would allow the most qualified and persistent of them to pursue an academic career and block others. Casualisation would thus increase academic research production by allowing systems to absorb a larger pool of doctorates, encourage over-production, adapt to short-term funding, alleviate professors' responsibilities and enhance meritocracy. In interviews with Finnish university administrators, Pietilä (2014) reported that the cost of research forced institutions and academic units in Finland to make choices, and that casualisation allowed HR plans to open fixed-term positions in areas considered, for the time being, as strategic. Adopting a more critical stance, and commenting on the Australian case, Morgan (2016) reported that human resources managers and financial officers did refer to the narrative of market risks and increased competition to justify employing precarious workers, but also suggested that institutions benefit from maintaining a large periphery that

**Bégin-Caouette, O., Jansen, J. & Beaupré-Lavallée, A. (2018).** The perceived contribution of early-career researchers to research production in four Nordic higher education systems. *Higher Education Policy*. <https://doi.org/10.1057/s41307-018-0125-5> accomplishes profitable tasks without requiring the same level of academic freedom and collegial decision-making.

In Sweden, Öquist and Benner (2012) criticised the emergence of a “shadow career model” – caused by the erosion of block grants – in which professors had to strive for external funding if they wanted to maintain research activities, and to use this short-term funding to hire others who would do the work. For interviewees in Denmark, Norway and Sweden, this growing trend of relying extensively on ECR prevented them to qualify for professorship. It was indeed common for interviewees to find ECR around 40 years old who had completed their PhD a decade ago and still strived for a permanent position. Casualisation could thus prevent ECRs leaving the periphery because individuals are stuck in similar positions and focus only on one aspect of the professorial work. Su (2013), for instance, found that the first postdoc appointment was a significant predictor for research productivity, but also that the return on investment waned after three years because such positions encouraged similar sets of knowledge, norms and behaviours. And interviews with postdocs (e.g. Åkerlind, 2005) and quantitative analyses (Ackers and Oliver, 2007) suggest that there would be no direct relationship between ECRs’ productivity and their capacity to obtain a permanent position in academia. And in every country, there are always some types of contracts that do not qualify for permanent positions. Frolich et al. (2018), for instance, give the examples of the postdoc in Denmark, which does not alone qualify for appointment as associate professor because it does not provide teaching experience.

This article focuses on research production and our findings suggest that, beyond impacts on individual ECRs, casualisation might have three negative consequences on countries’ capacity to produce research. First, casualisation would make it more difficult for institutions to retain high calibre researchers who feel they have limited agency in the

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periphery. As one Danish postdoc said, “A lot of people refer to postdocs as slaves because they are here only on a temporary contract, so if they don’t over-produce, they won’t get anything afterwards.” A Norwegian doctoral student also used the word “slave” to describe the role of ECR. These quotes also mirrored qualitative studies done by Åkerlind (2005) and Kyvik (2015) in which ECRs felt they were an invisible pair of hands in a lab. As Goode (2006) put it, ECR who did most of the actual research became disembodied and the rewards bore no common measure with the work undertaken. The scientific capital they would have accumulated would be converted by the core into economic capital – in the form wage increase or external grants – or symbolic capital – in the form of positions, responsibilities, authorship or citation (Münch, 2014). Sutherland’s (2015) interviews suggested that, for ECR, the core represented the freedom to choose which classes to teach or which research to conduct.

Second, as Broadbent et al. (2013) put it, universities gained research output from the periphery, but their commitment to ECR was limited to the end of their contract. Managers faced continuing cycles of recruitment and training and transferred risks to ECRs who had to use their own resources to build their career. Market risks were shifted to ECRs and failure to secure funding were individuals’ fault (Välilmaa et al. 2012). Our findings suggest Cantwell’s (2014) conclusion could be expanded to the macro-dynamic of ARS:

People and money were reciprocating resources. Generating research findings was necessary to consistently prevail in grant competitions, and generating research outputs was difficult without graduate students, postdocs, and technicians working in the laboratory. Such an arrangement cast students and postdocs as employees whose labor is an indispensable ingredient in production, but who are also expendable when resources become scarce. (p.493)

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Some interviewees did not consider it was a problem since the private sector increasingly hired them (CFE Research, 2014). However, like in Åkerlind's (2005) study, the ECRs we interviewed pointed out they wished to reach the academic positions they felt they were primarily trained for.

Third, professors mentioned issues regarding turnovers, expertise losses and the incompatibility between long-run research projects and casual positions. ECRs are highly-qualified workers who develop cutting-edge competencies when working on long-run projects, so their replacement eats research time and resources (Figuerosa, 2015). Even when projects are completed, short-term contracts would limit in-depth or breakthrough research. For Öquist and Benner (2012) the extensive use of ECRs would undermine risk-taking and renewal in research, as well as create "a culture of opportunism among new entrants" (p. 32).

In sum, our findings support the hypotheses regarding the positive contribution of PhD students and postdocs, but also add a note of caution regarding the contribution of other ECRs working under fixed-term contracts. The literature discusses extensively the impact of casualisation on teaching quality (e.g. Gupta et al., 2016; Morgan, 2016; Lama and Joullié, 2015), but the impact on countries' research output remained unexplored. The Science Europe Working Group on Research Careers (2016) hypothesised that it would have a negative impact, but our findings are more nuanced. According to actors involved in the research production process, casualisation would be beneficial to research production in the short term since it increased flexibility, workforce and overproduction, though could be detrimental in the long since it affected planning, recruitment and stability.

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## **Conclusion**

The objective of this paper was to analyse contribution of early-career researchers (ECR) to academic research production in four Nordic higher education systems (HES). Based on 56 interviews, the thematic analysis revealed strong convergence in actors' perspectives regarding the contribution of doctoral students and, in Denmark, Finland and Sweden, the contribution of postdocs. There was however no convergence regarding the contribution of other contract-researchers, possibly because of the diversity of positions it encompasses. The themes "research contribution," "expansion," "standardisation," "status" and "bottle-neck" were also subsumed under the global theme "casualisation." The casualisation of the academic profession was perceived as advancing research production in that it allowed institutions to absorb a larger pool of doctorates, professors to adapt to external funding and encouraged ECRs to "over-produce" if they wanted to leave the periphery and reach the core of academia. Yet it could also have a negative effect in the long run since it made research planning difficult, discouraged high-calibre researchers and led to expensive turnovers.

This study focused on four Nordic countries and findings might not be easily compared to what happens in other contexts. Nordic countries rely on powerful welfare states and unemployment among PhD graduates is among the lowest in the OECD, yet in Denmark, like in Belgium, the Netherlands, the US and Spain, most of them work outside academia (OECD, 2017). Frolich et al. (2018) also noted that the share of doctorates under temporary contracts less than five years after receipt of their degree was higher in Portugal (57%), Germany (45%) and the Netherlands (41%) than in Sweden (28%) and Norway (18%), but lower than in Finland (70%). Finally, although the issue of casualisation is reportedly more salient in other countries (e.g. Lama & Joullié, 2015), multiple studies suggest that the share of staff on temporary contract is a global trend and

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some of our interpretations might thus inform policymakers in other contexts (Frølich et al. 2018.; Gupta et al., 2016; OECD, 2017).

In sum, with the evolution of science, one could find reasonable the expansion of doctoral education, a deferred bottleneck and the casualisation of research positions. This article suggests that policies expanding doctoral graduation rates and the number of postdoctoral fellowships might have increased countries' capacity to produce research; yet in a context of decreasing proportions of basic funding and permanently-employed professor positions, it also raises the question of the sustainability of casual positions. In other words, what is the maximum size that a periphery can reach in the academic profession before returns on research production diminish? Further studies based on larger samples including many disciplines would be needed to better portray interactions between academic cores and peripheries in the research production process. This study is nonetheless innovative in that it relies on the perspectives of multiple categories of actors to assess the contribution of one category and is thus able to shed an actor-centred light on the principles and structures dividing work and determining hierarchies in academia and proposes avenues of reflection for policy-makers concerned with the level of research production in their country.