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New public management and research productivity – a precarious state of affairs of academic work in the Netherlands

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New Public Management reforms have fostered universities to focus on performance and competition which has resulted in different pressures to perform and disruption of strong teaching–research balance at universities. The imbalanced division of teaching research workloads may be gendered and can strengthen the differences in research productivity among male and female academics. This study uses survey data of Dutch academics carried out in 2015 at selected three universities to understand how pressure to perform has influenced the workload balance and what is the relationship between teaching–research balance and research productivity of female and male academics across different disciplines in different organizational contexts. The findings support the Hattie and Marsh’s Common Wisdom model and show that balanced teaching research workloads improve research productivity across gender groups. Further, we show that the perception of managerialism at a university is an important mediating factor of gender balance in research productivity.

Keywords: research productivity; teaching–research nexus; managerial university; gender in academia; Dutch higher education; performance pressure

Introduction

Research productivity has been at the centre of the policy and academic managers discourse in the past decade as one of the pillars and tools to achieve competitive position of universities in their countries. Publications in peer-reviewed journals as well as external research funding have become important criteria for performance monitoring in academia which ensure promotion to higher ranks and more resources. Although traditionally these criteria have been important and research has for quite some decades been prioritized by academics to ensure their credibility building in their scientific communities, today with the New Public Management (NPM) inspired reforms, which strongly encourage competition between universities, this emphasis on research has become even more pronounced in daily work of academics. Some have argued that the Humboldtian teaching–research balance has been disrupted. Others have pointed out that this focus on research in performance criteria and spending more time on research in fact does foster higher research productivity and is a cornerstone of achieving high ranked positions for academic as well as universities where they work (Brew and Lucas 2009). Others have shown that teaching–research nexus and research

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productivity are intertwined (Horta, Dautel, and Veloso 2012). These days if we look at the ranking criteria of universities, we can often see that receiving prestigious awards, especially the Nobel prizes, achieving immaculate record of publications and attracting external research funding are much stronger prioritized criteria than teaching excellence.

Further, studies of academic performance in different disciplines have showed that gender differences are important in understanding the performance trends as well as the factors leading to higher performance. Literature in this regard have shown mixed findings regarding the factors improving or impeding research productivity for different gender groups (Aiston and Jung 2015; Sax et al. 2002). On the one hand, differences in division of academic tasks with women taking up more service roles due to individual and institutional mechanisms as well as cultures are witnessed. On the other hand, studies show that research performance of male academics tends to be higher than female academics. The reasons for this disparity include work–life balance, high levels of competition and lack of transparency in promotion criteria.

We see two key issues with these studies. First, they do not question the gender aspects of research productivity in the context of performance pressures and managerialism which is becoming commonplace in universities today. Second, there is very limited questioning on how research productivity actually relates to the balance of teaching and research among different gender groups, instead of focusing unilaterally on a more linear view of more research time leading to higher research productivity.

In the current study, we aim to fill this gap. We ask the questions of what is the relationship between NPM initiated changes emphasizing performance and research productivity with regard to gender. How are NPM inspired reforms manifested at Dutch universities in terms of perceived performance pressure? How have they influenced the workload balance of academics with regard to teaching and research? What is the relationship between teaching–research balance and research productivity with regard to gender? Answering these questions will contribute to the debates on the conditions and changes in research productivity and especially to understanding the gender aspects of academic work and how they play out in the relationship between balancing teaching and research and research productivity (Aiston and Jung 2015; Barrett and Barrett 2011; Cummings and Teichler 2014; Horta and Lacey 2011; Leišytė, Enders, and de Boer 2009).

Our research focuses on hard and soft sciences including various disciplines at three selected Dutch universities and explores the perceptions of academics regarding changing organizational environment, performance criteria and changes in academic work and research productivity. Our analysis is based on a secondary analysis of national and university documents as well as survey data of academics from the three universities carried out in 2015.

The article starts with the literature review of NPM reform influence on universities with a focus on performance measurement and pressure to perform and the determinants of research productivity. Further we explore the gender implications of teaching and research balance as well as research productivity. Then we present the methodology of the study followed by empirical evidence from the survey. We concentrate on the Dutch higher education system as it is highly productive higher education system in terms of research outputs, strongly managerial and at the same time is one of the lowest in terms of female academics in top professorial or managerial positions in academia in Europe (Leišytė and Hosch-Dayican 2014; She Figures 2015).
Managerial changes in higher education

Universities today are mass higher education institutions which are competing nationally and internationally for the limited resources of scholarly talent, students as well as financing. With the NPM approaches of public governance becoming deeply rooted in European higher education systems, emphasis on competition and efficiency have led to increased managerial oversight of performance and control of core processes of academic work: teaching, research and services. Universities today are characterized as ‘complete’ organizations with strategic capacities, stronger organizational control and stronger top down management and matrix structures (Bleiklie, Enders, and Lepori 2015). A range of control instruments of HR management, standardization of performance indicators and performance reviews, time management, workload management plans and other information systems regarding staff performance, university quality assurance departments, university technology transfer offices and external funding acquisition offices have become a common feature of European university administration (Barrett and Barrett 2011; Farnham 2009; Leįštė and Dee 2012; Musselin 2005). Besides the structures becoming more top down, organizational cultures also shift from ‘collegium’ to ‘enterprise’ (Deem, Hillyard, and Reed 2007; Enders and de Weert 2009; Musselin 2009).

The managerial pressures in higher education have been evident in a variety of systems. Its main features are often described as centralization of decision making in higher education institutions, increasing pressure to perform and monitoring of performance, pressure on diversifying resource based and increasing competition for resources. Studies have shown that these pressures in the Dutch system have multiple effects on modes of work (De Weert 2009). In some ways, the competition of resources, such as research projects and PhD students, has led to a constant race for writing grant proposals as well as publishing and perishing behaviour among academics across different disciplines. The recently introduced tenure track system in Dutch universities has further increased this competition and individualization of academic work, where the key race is to get ‘all the boxes’ to be ticked no matter what within a limited time frame. In some ways, this new system has introduced managerial and rather transparent career progression paths with quite clear criteria for academics.

At the same time, it has ‘left behind’ the bulk of academics who are among the ranks and files of Dutch academia who have to teach all the students as well as maintain research production and service and commercialization functions of the universities viable. These academics increasingly are evaluated according to the similar criteria as ‘tenure track’ academics, even though they do not have as much ‘protected spaces’ and recognition regarding future career progression opportunities as tenure track academics (Leįštė 2016). More than that, casual academic labour is also observable in the Dutch higher education, whereby working as postdoctoral researchers in numerous contracts and projects and having part-time positions is one way of dealing with the work pressures and position shortages in the system (De Weert 2009; WOPI 2014). Precariousness of academic positions, temporary and part-time contracts are increasingly dominating the academia in managerial universities. This implies limited time spans for career development, presupposes life in ‘projects’ and implies short-termism in producing research outputs or short-term teaching-only contracts which may lead to a lock-in with no possibility to pursue an academic career (Leįštė 2015; De Weert 2009; Ylijoki and Ursin 2015).
Teaching–research balance and gender

Teaching–research nexus literature has at length explored the shift from the Humboldtian model towards a Napoleonic or post-Humboldtian model of separation of teaching from research (Leišytė, Enders, and de Boer 2009). Despite of the trends towards separation between the two roles, evidence also suggests that the traditional academic career paths continue to include both of these activities (Healey 2005; Shin, Arimoto, and Cummings 2014). How teaching feeds into research and vice versa has been extensively discussed in the literature. Hattie and Marsh’s (1996, 511) Conventional Wisdom model, for example, notes that you cannot be a good teacher if you are not a good researcher, thus, both of these activities are supposed to be intertwined and mutually beneficial. At the core of it is the balance between these two activities as they feed into each other. On the contrary, the Scarcity model (Hattie and Marsh 1996, 508) notes that both activities are detrimental to each other, they compete for time, energy and commitment. So following this model, spending more time on teaching will negatively affect research and the other way around. Having more research time and spending more time on research will result in higher research productivity.

In this context, studies have shown that the holistic notion of teaching–research nexus in the Humboldtian sense is very much under pressure even in the traditionally systems embracing this view of academic, like in the Netherlands. Teaching-only positions like ‘docenten’ as well as researcher only positions abound in the Dutch system. Following the Dutch university statistics, temporary research positions (mostly post-docs) have increased from 67% in 2007 to 76% in 2014 of all researcher positions. Even in the cases of ‘regular’ academic positions such as assistant or associate professors, the interlinkages of teaching and research are not clear cut even though they are foreseen in the national job description system Universitair Functieordenen (UFO). The variability of the distribution of research and teaching tasks in various positions depends also on disciplines (De Weert 2009; Musselin 2005). However, the gender implications of this distribution are hardly known beside the literature showing the dominance of females in more teaching roles (Leišytė and Hosch-Dayican 2014). As studies on gender and academic careers so far have shown, reasons for this gender division in academic tasks of more research or more teaching lie both in the unconscious individual mechanisms as well as institutional cultures.

On the other hand, the studies of academic work and gender have largely neglected the organizational context. Usually the organizational aspect is limited to accounting for performance pressures, but they are often assumed to be rather homogenous across the board in higher education sectors. Although in some higher education systems academic work conditions are negotiated nationally and determined by law or national salary scales, the local idiosyncrasies and different situational contexts differ when it comes to organizational structures, cultures as well as size of institutions. Understanding the organizational context is important as it may have an impact on workload balance particularly for female academics as the recruitment and performance criteria, access to performance-related tacit and explicit knowledge in organizations may be gendered.

Research productivity and its determinants

In this context, academic productivity, and especially research productivity are extremely important to universities and have been under the radar of university management.
Usually measured in terms of the number of publications, the types of publications and
citations of scholarly work, H index or similar, research productivity is usually portrayed
as a neutral measurable criterion for hiring and promotion of academic staff. The notion
of research quality is often related to the number of publications in high ranking journals
and the standing in the field. Given the preoccupation of universities with performance in
terms of league tables, research productivity is also extremely important.

Literature has explored at length the factors which foster research productivity,
especially when measured through publications and co-publications using bibliometric
techniques. The changes in publication patterns and the determinants of these changes
in different disciplines and countries have been a key concern of these studies. It has
been established, that productivity depends on individual, institutional as well as
environmental factors (Abramo, d’Angelo, and Di Costa 2009; Barjak and Robinson
2007; Ramsden 1994). Studies have shown that sex, age and education, size of research
groups, size of departments, available technology and infrastructure matter for the
research productivity. Further, policies and governance arrangements, including
funding available for research from the variety of sources, availability of other
resources, such as talented staff, also impact research productivity. Studies of different
disciplines have shown that, for example, the size of faculty matters for individual pro-
ductivity as bigger faculties offer more possibilities for collaboration (Dundar and
Lewis 1998). Bigger groups mean greater division of labour which also may lead to
higher productivity (Adams et al. 2005).

Studies have shown that collaboration nationally and internationally increases pro-
ductivity, but it depends very much on the discipline and type of research (Bordons
et al. 1996; Lee and Bozeman 2005). It has been shown that research funding and
research projects are correlated with the productivity in somewhat negative way, as
project short-term orientation pushes academics to find shortcuts in carrying out
project and leaves less time for publishing higher quality publications. Further, litera-
ture has shown that research collaborations influence research productivity unevenly.
Collaborations in research are common in the laboratory sciences, while quite new in
social sciences and humanities. Despite this, the governance shifts and performance
pressures have influenced academics in all disciplines to explore more collaborations
and ‘save time’ by it and publish faster. A solid body of literature has shown that aca-
demics co-publish with colleagues nationally and internationally, especially when
working on collaborative and international research projects (Kwiek 2015).

Further, studies have shown that changing science governance arrangements, such
as research evaluation regimes, lead to changes in the patterns of academic publishing
in a variety of disciplines, where academics opt for ‘quick’ and ‘safe’ publications. In
this way, focus on research publications becomes even more pronounced in terms of
importance for career building as well as for institutions to attract prestige and
funding. In the more recent shifts in evaluation regimes towards measuring research
quality, such as in the UK Research Excellence Framework or the Dutch research
evaluation scheme, the move towards ambiguous and new notions of what constitutes
research productivity appear. They also lead to quantification of research outputs and to
‘mainstream’ research which is ‘publishable’ (Gläser et al. 2010; Gulbrandsen and
Smey 2005; Horta and Lacy 2011; Leišytė and Westerheijden 2014; Morris and
Rip 2006). At the same time, it has been challenging to show the direct effects of evalu-
ation procedures on research productivity (Hicks 2009).

Finally, studies of academic careers and productivity have revealed a number of cul-
tural and structural factors at play determining research productivity. The problematic
issue of determining how productivity is measured includes unconscious biases of what constitutes performance, gender schemas and stereotypes (Schein 2007; Valian 1999), limited access to networks and mentors (O’Leary and Mitchell 1990), and tokenism (Kanter 1977). Studies have noted that work and family balance and familial status may influence research productivity in negative and in positive ways (Aiston and Jung 2015; Bailyn 2003). The organizational factors as noted by Aiston and Jung (2015), perpetuate gender stereotypes and privilege masculine practices and norms (Harley 2003; Husu and Morley 2000). This may result in gatekeeping and selective allocation of resources, which may slow down publishing and career progression (Husu 2004; Leisyte and Hosch-Dayican 2014; Van den Brink, Benschop, and Jansen 2010).

Data and methods

This study is based on survey of academics at three selected Dutch universities across all disciplines. The survey was conducted as part of the project ‘The managerial university and changing academic work in the Netherlands: gender implications’. The universities are all research intensive universities. The case universities were selected based on two criteria: (1) Size with respect to the number of their scientific employees and students, (2) Disciplinary orientation, that is, whether the university has a broad disciplinary variety or a particular topical focus. Table 1 provides an overview of the characteristics of the case universities according to the selection criteria.

The Dutch higher education system is selected due to its low rank position in Europe regarding female academic representation in top positions. The proportion of women researchers in Grade A top positions is one of the lowest in Europe (15%) in 2013 and the proportion of women who are heads of institutions has not changed from 2010 to 2015 (14%) – again one of the lowest in Europe (She Figures 2015). At the same time, Dutch higher education has been subject to NPM reforms since 1990s and is an early adopter of the managerial performance measures at universities (De Boer, Enders, and Leisyte 2007) which have been perceived as new performance monitoring and pressure for academics working at these universities (Leisyte and Hosch-Dayican 2014).

The cross-sectional online survey was administered among all academic staff who were identified to have regular employment at the selected universities, including post-doctoral researchers, assistant professors, associate professors and full professors in the period from December 2014 to August 2015. We approached 5638 academics from all three universities by e-mail invitation to participate in our study. With the response rate of 13.5% we received 756 responses. After stepwise data cleaning procedure which eliminated respondents who did not fully filled in the questionnaire and

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<th>Table 1. Characteristics of selected universities.</th>
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<td><strong>University A</strong></td>
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<td>Size</td>
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<td>Disciplinary variety</td>
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further, we eliminated ineligible respondents (e.g. retired academic staff). In this way, we have 496 usable responses. The gender ratio among the respondents of the online survey is fairly close to the actual gender ratio of academic employees at Dutch universities. The proportion of female respondents is 34.9% (N = 173) and the proportion of male respondents equals to 57.5% (N = 285). Also at the level of individual universities, the male–female ratio was well represented by the respondents.

Further, looking at the distribution of our respondents in terms of their hierarchical positions, the biggest portion of the respondents stems from middle and top academic levels (assistant, associate and full professors). Among these, assistant professors form the largest group with 33.5% of the respondents (N = 166). The remaining positions (lecturers as well as senior and post-doc researchers) and other academic staff (e.g. junior researchers and interim teaching personnel) make up approximately 25% of all respondents. Strong discrepancies between gender groups can be observed in almost all positions, but particularly among full professors, associate professors and lecturers. As for assistant professors, the proportion of women reflects the actual percentage of female professors at the university almost perfectly with 38%. On the contrary, the shares of female full professors (26.9%) as well as of associate professors (31.4%) do not correspond to the actual situation (17% and 26%, respectively). Thus, these groups are somewhat overrepresented among the survey respondents.

Furthermore, the disciplinary belonging of the surveyed academics is distributed evenly. Two hundred and seventy respondents represent soft sciences (social sciences, humanities, business, economics, education and psychology) and 226 represent hard sciences (biology, medicine, chemistry, information technologies, engineering, physics and mathematics). Out of these, 42.2% of the academics from soft sciences are female, whereas they constitute only 26.1% of the respondents in hard sciences.

All in all, we can see that in the analysed sample various academic disciplines and career levels are represented to a considerable extent at the studied universities. In addition, the distribution of academics among gender groups is almost perfectly reflected by the survey respondents, which ensures the reliability of the key findings on gender differences presented in the following section. However, as discussed above, some career groups seem to be slightly overrepresented by the respondents. This seems to be the case particularly regarding the gender ratio among full professors and post-docs. Furthermore, participation in the survey of some disciplines has remained notably low. These small deviations are hardly avoidable, as the so-called non-response bias (the bias that results when respondents differ in meaningful ways from non-respondents) is inherent to online surveys. Yet knowing the extent of such bias is helpful in approaching the results with the necessary caution so that they can be correctly interpreted.

Managerialism, research productivity and gender

Studies of academic profession have shown that academic careers strongly depend on the number and quality of research-based publications and increasingly on attracting external research funding rather than obtaining teaching awards (Leisiyte and Wilkesmann 2016) as research performance is at the centre of the academic prestige economy (Morley 2014).

In this skewed towards research academic performance world, men seem to benefit more than women as shown in some research productivity studies. Men tend to publish more, while women are reported to be found more in teaching and supervisory/service
roles in academic departments (Morley 2007). To a large extent these studies follow the Scarcity model of teaching–research nexus where teaching and research are competing activities. Women also tend to publish in lower impact journals, although differences between disciplines in terms of this pattern are not well established. Our survey of Dutch academics in three universities (2015) results show a similar trend (Figure 1).

As shown in Figure 1, studying the percentages of academics who have ‘5 to 10’ and ‘more than 10’ publications (categories combined) in each gender group we see some differences. We asked respondents to note how many publications and what types of publications they have produced in the past five years. The responses show that male academics produce more peer-reviewed journals, more other scholarly journals and more newspaper articles than women. However, we see slight differences if we compare the outputs by gender across hard and soft sciences divide taking into consideration that academic practices differ significantly between disciplines (Trowler, Saunders, and Bamber 2012) (see Table 2).

Among soft sciences respondents across the three studied universities we see greater gender differences compared to hard sciences. In hard sciences men are more productive in journal articles, but no significant differences can be found in terms of other types of scientific outputs. At the same time, we have to be careful in interpreting these findings as the answers are based on respondents’ own perceptions whereby men might be more inclined to exaggerate their outputs or women may downplay their productivity or both. These results thus point to the importance of discipline and gender in research productivity.

However, in order to understand the underlying conditions for gender and disciplinary differences it is important to note the influence of organizational factors such as perceived performance pressure. The literature on the implementation of NPM tools such

Figure 1. Productivity of respondents by gender across three studied Dutch universities (N = 496).
as performance agreements and monitoring procedures coupled with the traditional credibility seeking behaviour of scientists to build their reputation and attract external funding fuel the pressures to write scientific articles (Latour and Woolgar 1979). When asked about the experienced performance pressure from the university and from their departments, the responses of highly productive academics differ by gender (see Figure 2). Figure 2 shows the example of peer-reviewed journal articles, how performance pressures are felt among highly productive male and female academics coming from different disciplinary backgrounds. Here we focused only on academics who stated to have published more than five peer-reviewed journal articles in the past five years (N = 278). The entries are the percentages of academics who feel increased pressure to perform from the university as well as from their department, within this highly productive group.

The figures show that overall men with a high number of peer-reviewed journal publications feel slightly more pressure to perform than women. This means that pressure to perform has a slight influence on the journal article productivity of

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<th>Soft sciences</th>
<th>Hard sciences</th>
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<td></td>
<td>F</td>
<td>M</td>
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<tr>
<td>Scholarly books (co-)authored/(co-)edited</td>
<td>1.8</td>
<td>6.7</td>
</tr>
<tr>
<td>Chapters published in academic books</td>
<td>11.4</td>
<td>24.4</td>
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<tr>
<td>Articles published peer-reviewed journals</td>
<td>45.6</td>
<td>43.0</td>
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<tr>
<td>Articles published in other scholarly journals</td>
<td>11.4</td>
<td>19.3</td>
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<tr>
<td>Research reports/monographs written for a funded project</td>
<td>9.6</td>
<td>10.4</td>
</tr>
<tr>
<td>Professional articles written for a newspaper or magazine</td>
<td>4.4</td>
<td>15.6</td>
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<td>Patents secured on a process or invention</td>
<td>–</td>
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<td>N</td>
<td>114</td>
<td>135</td>
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Figure 2. Percentage of academics who feel increased pressure to perform.
Note: N = 278 (Academics who published more than five peer-reviewed journal articles in the past years).
gender groups. When we focus on disciplines we see that the relationship between gender and pressure to perform is the other way round. Women among soft sciences with a high number of journal publications feel more pressure to perform than men.

To be able to compare the institutional factors influencing productivity of different gender groups focusing on disciplines is not enough. We turn to the perceptions of managerialism at the studied universities by creating a perceived managerialism index. It consists of the five questions of how academics perceive the management of the university in terms of perceived university management style, communication between management and academics, evaluation and monitoring of teaching and research performance, collegiality in decision-making processes and the extent to which managers determine performance criteria. Based on this index, we classify University A as a highest on perceived managerialism index (it is also the biggest university). The mid-range university in terms of perceived managerialism index is University B, which is the smallest university in size. Finally, University C scores lowest on perceived managerialism index. In Figure 3 we can see that the number of produced articles differs by discipline consistently across the three universities. It is interesting that in the University A, the most managerial university according to the respondents, differences between the productivity levels by gender are least pronounced, while in the least perceived managerial university, the gender differences are most pronounced for both soft and hard sciences. At the universities that had middle-range and low levels of managerialism, among the highly productive academics, female academics in the soft sciences produced more publications than men, but in the hard sciences, female academics were less productive than men within the previous five years.

Figure 3. Peer-reviewed journal articles by gender and university.
Note: The entries are the percentages of academics who published more than five peer-reviewed journal articles in the past years within each university – discipline – gender group.
Literature on NPM and managerial university has shown that as part of the performance-oriented procedures, criteria for promotion are made more explicit and are wider communicated among academic staff. This could be one explanation why slightly more female academics than male academics produce more than five publications in five years in the highly managed university (see Figure 3). Based on the previous example of the experience of performance pressure we also see that more female academics in soft sciences produce articles compared to men, which can be a by-product of the pressure to perform. The same holds for male academics in hard sciences – they outperform female academics (in less managerially perceived universities). One explanation for this could be that male academics in such a university experience higher performance pressure than female academics as they may be more aware of the ‘unwritten rules’ of the game of what counts in academic career progression at their university.

**Academic workload balance and gender**

The perceived academic workload of individual employees was understood through an open question on the time spent on various academic activities in percentages in an average week. The traditional academic tasks of teaching and research take up most of the weekly work time of all surveyed academics (33.3% and 34.8%, respectively). These activities are followed by administration (15.6%) and valorization (7.4%) activities. Next to these, the respondents seem to devote a smaller portion of their work time to other professional activities (7.4%) which are not clearly attributable to any of these categories.5

Hardly any gender differences can be observed in the distribution between teaching and research tasks. However, the time spent on different academic tasks can vary among different academic career profiles, since the academic staff employment regulation (UFO) features diversified career patterns in which teaching and research tasks may occur in different proportions (De Weert 2009). For instance, mid-career academics are allocated more teaching than research tasks, while the administration load is disproportionately high for full professors.

Moreover, despite the uniformity of classification criteria, the composition of activities within an academic career profile can be determined by factors such as the organizational context (e.g. research group, department or faculty) and the foreseen contribution of this profile towards the organization. Individual development plans are used in which different academic roles are to be acknowledged including both vertical and horizontal mobility. Based on the assessment of their qualifications, individual staff members may for instance apply for specific roles, for example, to be more involved in either teaching or research.

If we look at the differences between average hours spent on different tasks based on gender in soft sciences and hard sciences, we see that women spend slightly less time for teaching (37.3%) than men (41.4%) and more time on research (33.3% versus 27.9%) in soft sciences. Overall, we see that the percentage of academics with balanced workload division differs by gender. While 27.7% of female respondents have balanced division of tasks, this percentage is slightly higher for male academics (33.7%). Here is important to note that a balanced teaching research division means the perceived difference between both tasks per week up to ±10 hours.

When we look at the percentage of academics with balanced task division in soft sciences (see Table 3), we see that a higher percentage of male respondents have a more balanced division compared to women (30.4% versus 28.9%, respectively).
When looking at the hard sciences, the picture is similar. Women tend to spend time less on teaching (24% women compared to 27% male), and more time on research (41.4% compared to 39.5% male). At the same time, male academics seem to experience more balance between teaching and research than female academics among the studied hard scientists (25.4% for women compared to 36.7% for men).

**Research productivity and teaching–research balance**

To understand the relationship between research productivity and teaching–research balance we carry out bivariate analysis of the reported production of various scholarly outputs with the time spent on teaching and time spent on research (see Table 4). We can see that weekly time spent on teaching is inversely related to produced number of peer-reviewed articles in the past five years (−0.199). A negative correlation is also seen between weekly time spent on teaching and the number of produced written reports and monographs (−0.150) as well as patenting (−0.104). These findings are in line with the Scarcity model of Hattie and Marsh (1996), which postulates that teaching and research activities are competing for time and resources.

When examining the weekly time spent on research, we observe a positive correlation between the time spent on research and peer-reviewed articles (0.117). Negative correlations are also seen between weekly time spent on research and research productivity in terms of producing professional articles for magazines (−0.160), articles published in other scholarly journals (−0.147), chapters in academic books (−0.131) and scholarly edited books (−0.128). One way to interpret these findings is that the more academics spend time on research, the more focused they are on producing peer-reviewed articles and pay less attention to the production of other types of outputs. In a way this is understandable in the organizational managerial contexts where peer-reviewed articles are one of the key criteria for positive evaluation and promotion, as we can find in the studied Dutch universities. At the same time, it is surprising, that the correlations are negative, as one would expect that having more time for research will also spill over to writing other publications besides peer-reviewed articles.

This leaves us with a puzzle if we capture the full picture of what is happening in terms of research productivity and teaching and research duties of academics. Therefore, we have developed an index of teaching and research balance, which allows us to compare academics on how balanced or imbalanced their teaching research portfolios are. The range of values in our newly created index ranges between 0 (perfect balance, equal time spent for both tasks) and 100 (absolute imbalance). The balance is determined subtracting time spent on research from time spent on teaching. Negative correlation means ‘the less imbalance in terms of time between the teaching and research tasks, the more number of produced outputs in the past 5 years’ and vice
versa – the more imbalance between teaching and research the lower number of produced research outputs in the last five years. This correlation may allow us to get a better picture of what is the impact of teaching and research balance on research productivity.

As shown in the third column in Table 4 we see that the more balanced teaching and research portfolio, the more articles are published in peer-reviewed journals (−0.252) and the more articles published in other scholarly journals (−0.179). Further, negative correlations show that the more balanced the portfolio, the more scholarly books (−0.159) and more chapters in academic books are published (−0.139). Finally, negative correlation is found between the balanced teaching research workload and the number of professional articles written for a newspaper or magazine. All in all, most of the research outputs produced correlate with the balanced teaching research workload. This presupposes that the correlation between such balance and research productivity supports the notion that maintaining the nexus between teaching and research may have positive productivity benefits for research, which can be partly captured by Hattie and Marsh’s Conventional Wisdom Model.

However, based on the literature we know that gender plays a strong role in teaching and research balance on the one hand – while the research productivity also depends on gender as already shown earlier. If we compare the academics who were highly productive and published more than five peer-reviewed journal articles in the past five years and who have balanced teaching and research workload for the hard sciences and soft sciences, we see gender differences (see Figure 4).

Based on this observation, we can conclude that academic workload balance has a slight influence on the journal article productivity of different gender groups.

When we compare soft versus hard sciences we see that gender differences almost disappear. Thus, the percentage of academics with balanced teaching and research workload in soft sciences is much lower than among the hard sciences among the

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<th>Table 4. Teaching–research balance and research productivity.</th>
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<tr>
<td>Weekly time spent on teaching</td>
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<tr>
<td>Scholarly books (co-)authored/ (co-) edited</td>
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<tr>
<td>Chapters published in academic books</td>
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<tr>
<td>Articles published peer-reviewed journals</td>
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<tr>
<td>Articles published in other scholarly journals</td>
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<tr>
<td>Research reports/monographs written for a funded project</td>
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<tr>
<td>Professional articles written for a newspaper or magazine</td>
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<tr>
<td>Patents secured on a process or invention</td>
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Note: Entries are correlation coefficients (Pearson’s r).
*p ≤ .05.
**p ≤ .01.
***p ≤ .001.
respondents. This trend also reflects the different levels of journal articles’ production between hard sciences and soft sciences (77.0% vs. 43.7%). This leads us to conclude that having a balanced teaching and research workload positively affects research productivity in both hard and soft sciences (if academics have a balanced teaching research portfolio their productivity rises to 85.9% vs. 58.2%, respectively). However, the stronger effect of this relationship is observed for hard sciences. On the one hand this is not surprising as soft sciences tend to have higher numbers of students, thus, much more teaching obligations compared to the hard sciences. At the same time, hard sciences are strongly dominated by men (in some disciplines with less than 10% women represented in disciplines like physics or mechanical engineering), thus, the overall gender bias of research productivity and teaching research workload balance is apparent across the disciplinary divide.

Discussion and conclusion

In this paper we aimed to understand the relationship between NPM initiated changes emphasizing performance and research productivity with regard to gender. The data show that pressure to perform is experienced by all academics to a certain extent in the studied three universities partly due to the performance pressures at universities which are geared towards productivity in terms of publications and acquiring external research funding and partly due to individual academic credibility building imperatives in science. Our study has showed gender differences in the perception of the level of pressure to perform among the highly productive respondents. Men overall feel slightly more pressure to perform than women. However, when disaggregated by disciplines we can see that women among soft sciences feel more pressure to perform than men and the opposite holds true for hard sciences. This shows that in order to understand managerial performance pressures it is important to take into account disciplinary and gender variables.

Figure 4. Relationship between teaching–research balance and peer-reviewed journal articles (% of academics with a balanced teaching–research workload).
Note: \(N = 278\) (Academics who published more than 5 peer-reviewed journal articles in the past years).
The traditional academic tasks of teaching and research take up most of the weekly work time of all survey respondents. Our findings further show that female respondents experience more teaching research imbalance than male respondents which confirms the findings of gendered workload allocation in academia. More importantly, we found out that the more balanced teaching and research portfolio, the higher is overall research productivity, including peer-reviewed journal articles, books, book chapters and the number of professional articles written for a newspaper or magazine. In this way, Hattie and Marsh’s Conventional Wisdom Model is strongly supported as we see a positive relationship between teaching research workload balance and research productivity. In light of these findings and given that female respondents have less balanced teaching–research portfolio, this has repercussions for their research productivity.

Thus, our choice to focus on teaching–research nexus as a mediating variable to understand the relationship between NPM performance-oriented imperatives at universities and research productivity has proved to be a useful contribution to the literature. Further, as shown in our results, the workload division may be gendered as well as research productivity has gender differences. Thus, we can conclude that although gender is directly related to research productivity as noted in other studies, this relationship is likely to be modified by gender differences in teaching and research task division among academics.

In this regard, the Conventional Wisdom model of teaching–research nexus seems to be relevant to understand research productivity. At the same time, as shown in different studies managerial university tends to disrupt teaching–research nexus towards teaching-only or research-only positions at the junior ranks of academics with only a limited few having access to the traditional academic tracts, where both teaching and research are connected and balanced (e.g. the relatively new tenure track system in the Netherlands). This managerial trend towards teaching-only and research-only positions may have a negative impact on overall research productivity for the Dutch higher education system, because our findings show that ‘teaching–research balance’ contributes positively to research productivity. Policy makers, university managers and research funding agencies should thus be aware of this relationship and curb the chronic growth of temporary postdoc positions across the disciplinary spectrum and provide more balanced teaching research portfolio building possibilities for academics.

Policy makers and managers should take into account the more nuanced and gendered nature of teaching–research balance when determining human resources policies and performance criteria for academics at universities so that a more balanced and sustainable use of academic talent for both men and women in academia can be ensured.

Further, as the workload balance and research productivity criteria are also negotiated within the departments and at different career levels (Barret and Barret 2011), one can see how gender is important to be taken into account by professors and department heads. The insight that workload balance is gendered in academia should further help make better choices for the criteria and timings of promotions and increase research performance overall at universities.

Finally, we have found significant differences between research productivity between different gender groups in less managerial universities, while the perceived most managerial university gender parity was observed when it came to research productivity. This finding supports the notion that the transparency of promotion criteria in more ‘corporate’ like organizations and more centralized decision making makes explicit requirements for what ‘counts’ for future career prospects and in this way, ensures that both women and men are aware of this and perform at a comparable levels in
research. It also shows that organizational context, both at the department, faculty and university level matters for research productivity, workload balance and gender equality. In this sense, we are line with the findings of previous studies of Smeby and Try (2005) and Leišytė, Enders, and de Boer (2009).

At the same time, our findings have to be taken with caution as the perceptions collected from our respondents come from three universities from the Dutch higher education system in 2015 after the increased awareness of budget cuts due to economic crisis and, to some extent, related experiences of strong managerialism, against which many Dutch academics have protested. In this sense, self-selection bias may be to some extent present in our survey. At the same time, as we focus on academic productivity and workload balance, we believe we could capture an important relationship which seems to differ by gender, discipline and the level of perceived managerialism at a university, which we hope significantly contributes to the current debates on gendered managerialism in academia and research productivity.

Specifically, we add a new dimension to be considered when we discuss the differences between men and women in research performance alongside issues like levels of competition, lack of transparency of promotion criteria or work–life balance and employment status. We show that workload balance needs to be taken into account when understanding the gendering of research performance. Further, we show that the types of research outputs produced by men and women differ – and this should be taken into account by literature on productivity which tends to focus largely on peer-reviewed journal articles rather than taking into account a broad range of research outputs such as book chapters, popular media publications and project reports. Finally, we show that it is important to include organizational context when trying to understand research performance.

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Disclosure statement
No potential conflict of interest was reported by the authors.

Notes
1. Source: WOPI (2014) (Wetenschappelijk Onderwijspersoneelinformatie, available at http://www.vsnu.nl/f_c_personeel_downloads.html). In total, 35.5% of all academic personnel excluding PhDs at Dutch universities in 2014 were female, while male respondents made up 64.5%.
2. In total, 7.7% of the respondents have unfortunately not indicated their gender.
4. The pressure to perform consists of answers to two questions (1) My department has increasingly applied performance and efficiency monitoring of my work. (2)
performance evaluation has changed in my university during my employment towards more evaluation.
5. These include: Attending courses for professional and personal development, editorial and reviewing work, participation in external scientific committees as well as organizing conferences and other networking activities.

References


