

# **Mobility and inbreeding in the heart of Europe. What factors predict academic career in Dutch-speaking Belgian universities?**

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## **Abstract**

This article explores the factors predicting appointment at postdoc and professorial level, with particular interest on what conditions enable mobility to become an asset. We argue that the hiring process for junior and senior staff works differently. The professorial body represents to some extent an oligarchy, and oligarchies have renown tendency to preserve internal homogeneity by selecting candidates with similar values and social treats. We therefore formulate the hypothesis that in the absence of specific rules and norms preventing this tendency, categories that are majoritarian in the professorial body, namely males and native born, as well as inbred candidates will have more chances of appointments than female, foreigner and mobile peers. We test the hypotheses in the Flemish university system. Findings confirm that gender, nationality and career tracks are associated with different probability of hiring and, as predicted, the effects are stronger for higher academic ranks.

## **1.Introduction**

Researchers mobility<sup>1</sup> is beneficial for individuals and research institutions as it stimulates creativity and improve performance (Inanc and Turcer, 2011; Franzoni et al., 2014; Horta et al., 2010; Mamiseishvili and Rosser, 2010). Mobility of academic researchers also figures prominent in the European policy agenda towards an open and excellent research environment (Musselin, 2004). Given the scientific and political relevance of mobility, it hence important to understand under what circumstances it is career asset. Evidence on this regard is not straightforward. In countries like the US, mobility tends to have a positive effect on career, increasing the speed and chances of access to tenure, while in others like Spain the chances of obtaining a fixed academic position are higher for inbred personnel (Cruz, Menendez, 2010).

Scholars have suggested that in taking hiring decisions, organizations face dilemmas between mobility and universalism on the one side, and loyalty and particularism on the other side (Blau,1994; Long and Fox, 1995). The orientation towards one of the two poles might be dictated by strategic considerations in the context of a global competition for talents. Accordingly, universities in weakly attractive countries may try to strategically compensate their minor attractiveness by providing faster and more stable careers, stressing mutual loyalty between the institution and the candidate, whereas universities in highly attractive countries would be more open because they have more to gain from mobility and competition. As a matter of fact country's that are *attractive* to foreign researchers – like the US, Switzerland and the UK - also tend to be more open, e.g. to advertise positions internationally and valuing researchers' mobility in the course of their career, whereas less attractive ones – like Italy or Poland - also tend to be *closed*,

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<sup>1</sup> We adopt a strict definition of mobility, consistent with the literature on mobility and inbreeding, which does not include short term mobility of researchers spending periods abroad while remaining affiliated to their home institution.

as positions are not advertised and institutionally 'inbred' candidates are favoured to external candidates (Berelson, 1960; Burris, 2004; Enders and de Weert, 2009; Lepori et al. 2015).

Yet, the dichotomy between highly attractive and open systems on the one side and low attractive and closed systems on the other side may be overly simplistic. First, high attractive countries can be characterized by high levels of inbreeding too (Swedish Research Council, 2016). Second, several countries display large shares of international research staff at junior level but much smaller shares at professorial level (Lepori et al., 2015), suggesting that factors affecting the hiring processes – and the value of mobility – may vary across career' stages.

The goal of this article is hence to explore under what conditions mobility is related to a higher probability of an academic career within a higher education system? We develop and test hypotheses in the university system of Flanders, the Dutch-speaking part of Belgium. Belgium is an interesting case as it does not fit the dichotomy attractive and open vs low attractive and inbred. In fact, this system is a very attractive destination for researchers, scoring very high in terms of investment in R&D, wealth and opportunities, so that 34% of the PhDs comes from foreign countries, while on the other hand professorial positions are not systematically advertised internationally and the share of internationally mobile academic staff is low - at 5% (De Coster et al., 2008; Fernandez-Zubieta and Bavel, 2011; Lepori et al. 2015).

The article is organized as follows. In the following section we conceptually analyse the hiring process in the academic market, argue that the hiring process works differently for junior and senior positions and develop hypotheses accordingly. Subsequently, we introduce the data and methods, and in the fourth section we present the analysis and the results. We conclude discussing the findings and directions for future research.

## **2.Theoretical Framework**

### **2.1 Hiring process in academia**

Scholars have argued that the functioning of academic labour markets can be described by using queuing models (van Bouwel, 2012). Queuing models conceive the hiring process as resulting from the matching between two queues: employers rank the applicants according to their preferences and hire workers as high as possible in their labour queue, while workers rank jobs and accept a job as high as possible (Reskin, 1991).

Structural and normative forces are expected to affect this process, and consequently the level of mobility.

Lepori et al. (2015) argued – based on previous research – that academics decision to move results from an utility maximization process, comparing the costs of mobility with the opportunities offered by the hosting country's labour market and non-pecuniary rewards like reputation. Accordingly, more people apply for positions opened by highly reputed HEIs and located in wealthy countries. The authors found that the share of international professorial staff of a higher education institution (HEI) can be predicted reasonably well by the attractiveness of the country in which it is located and by the HEI' reputation. In turn, these *structural* factors indirectly increase the share of academic body that is mobile.

Lepori et al. (2015) assumed that HEIs will hire the best candidate in their queue, with no preference for mobile or non-mobile researcher, nationals or internationals, so that the difference in internationalization would be related to a variation in the composition of their applicant's queue. However, with such assumption it is not possible to explain why several European

countries display a share of international PhDs that is much larger than the share of international professors (Table 1).

Table 1 – Share of foreign academic staff and PhDs, country attractiveness and International advertisement of academic positions (Source: Lepori et al. 2015)

Country	% Foreign staff	% Foreign PhD
Belgium	0.05	0.32
Bulgaria	0.01	0.06
Czech Republic	0.04	0.1
Denmark	0.11	0.2
France	0.07	0.41
Germany	0.097	0.09
Hungary	0.02	0.07
Italy	0.028	0.08
Latvia	0.02	0.01
Lithuania	0.02	0.01
Norway	0.11	0.29
Poland	0.01	0.02
Portugal	0.07	0.12
Slovakia	0.01	0.07
Slovenia	0.022	0.09
Spain	0.007	0.22
Switzerland	0.458	0.47
United Kingdom	0.235	0.48

One possible explanation of such differences is that more time is required to renew the body of professorial staff than the body of junior staff, namely PhDs and postdocs. Accordingly, *if only new appointments were considered then the share of internationally mobile junior and senior staff would be similar*. However, the gap in the shares of foreign junior and senior academic staff is observed also in the UK, a system with a long tradition of attractiveness of internationally mobile researchers. Moreover, the only countries with similar shares of foreign PhDs and academic staff are Germany and Switzerland, where specific rules and norms exist that forbid to obtain a professorial position in the same institution where a PhD or postdoc position was held.

An alternative explanation of the gaps is that hiring decisions at junior and senior levels may work differently, affecting the value of mobility and hence the chances of mobile-international researchers to be hired. Within universities the professors holds considerable more power than junior staff, having significant influence on decision making processes. This is particularly true in systems weakly affected by New Public Management (NPM) reforms (Seeber et al. 2015; Canhial et al. 2016), where governance is based on political regulation by the state and professional self-control of an ‘academic oligarchy’. Access to an oligarchy is regulated differently from access to powerless organizational positions. In fact, there is large evidence that oligarchies perpetuates themselves by appointments and nominations based on value congruity and social similarities (Enz, 1988; Westphal and Zajac, 1995; Kanter, 1977). From this perspective, explicit regulations and norms may be necessary to counteract the tendency of oligarchies to select similar peers. When such rules and norms are lacking, then the professorial body may display a tendency to preserve the internal homogeneity of its members, which can explain the likelihood of different categories of applicants to be hired at junior and senior ranks.

## 2.2 Hypotheses

We have argued that if a system lacks specific rules and norms that contrast the ‘natural’ predisposition of oligarchies to preserve its internal homogeneity of values and social treats, then

specific categories of will be favoured or not in the hiring process. In particular, applicants that present more similar traits and values to the established professorial body will be favoured in the hiring process, and this effect will be stronger the higher the academic rank. Accordingly, inbred researchers are expected to be appointed more frequently than mobile researchers because they have had more time to assimilate local values. When the professorial body is to a large extent composed by nationals and men – as it often occurs - than national-born researchers and males are expected to be appointed more frequently than foreigners and females.

Hence, we formulate the hypotheses that, in system that lacks specific rules and norms aimed to counterbalance the tendency of oligarchies to preserve its internal homogeneity, then:

Hp 1) The probabilities that female and foreigner PhDs to be appointed as postdocs in the same system will be lower than the probability of male and national PhDs

Hp 2) The probabilities that female, foreigner and mobile postdocs to be appointed as professors in the same system will be lower than the probability of male, national and mobile postdocs

Hp 3) The difference in probability between advantaged and disadvantaged groups will be stronger for higher ranks, namely for professors than postdocs positions

### 3.Data and methods

#### 3.1 Case of analysis, data and variables

Belgium is a federal State composed of three Regions: i) Flanders, the Dutch speaking part of the country; ii) Brussels Capital region, bilingual; iii) Wallonia, French speaking. The Flemish higher education system includes five universities and 13 other higher education institutions. The main characteristics of the five universities are resumed in Table 2.

Table 2 – Flemish universities (source: ETER dataset, year 2013)

Name	Foundation	Academic staff	Undergraduate Students	Budget (euros)
Catholic University Leuven	1425	8902	45761	818.042.046
Ghent University	1817	6553	35644	569.408.531
Hasselt University	1973	1003	3615	72.468.157
University of Antwerp	1965	2778	16704	236.835.493
Free University Brussel	1834	2492	10452	222.362.332

The analysis employs data from the Human Resources in Research – Flanders (HRRF) dataset, which keeps track of all academic staff and postdoctoral appointments, doctoral student registrations and doctoral degrees, of the five Flemish universities from 1990 until 2013, for a total of 69,928 researchers. We focus in particular on researchers born after the 1<sup>st</sup> of January 1965, as for this sample the dataset includes complete information about their careers (N=52,908). Compared to previous analyses of academic careers – which mostly relied on surveys, a sample of institutions, and data on a single year - the HRRF dataset contains the full population of researchers in Flanders and for a 23 years' time span.

We first investigate what are the composition of appointments at the professorial, postdoc and PhD bodies in terms of gender, nationality and career tracks. We consider appointments in Flemish universities in the period from 1990 until 2013.<sup>2</sup> Professors career tracks are described

<sup>2</sup> In the Flemish system professorial positions can range from 10% appointment to 100% appointment. In this study we only consider the professorial appointments of 50% or higher as professorial positions.

according to where the researcher held the PhD and the postdoc positions, namely in a Flemish university or outside the Flemish university system, leading to twelve possible paths, and three main tracks: i) *non-mobile* (all the career within the same institution); ii) *internal mobile* within the Flemish system; iii) *external mobile* (at least PhD or Postdoc outside the Flemish university system) (Table 3).<sup>3</sup> For postdocs it is considered where the PhD was obtained, namely in the same Flemish university, in another Flemish university or outside the Flemish university system, leading to three possible tracks alike for professors (Table 3).

Table 3 – Types of career paths leading to a professorial and postdoc positions in a Flemish university

paths	PhD	Post Doc	Professor	Track
1	A	A	A	non mobile
2	A	-	A	
3	A	A	B	internal mobile
4	A	B	A	
5	A	B	B	
6	A	B	C	
7	A	-	B	
8	A	OUT	A	external mobile
9	A	OUT	B	
10	OUT	A	A	
11	OUT	A	B	
12	OUT	OUT	A	

A,B,C = Flemish universities

OUT=>6 months absence of the Flemish university

Second, we explore what factors predict the chances of a 8,634 researchers who obtained a postdoc position in a Flemish university between 1992 and 2011<sup>4</sup>, to be appointed as a professor in a Flemish university.

#### *Dependent variable*

The dependent variable ‘*Career outcome*’ is binary and indicates whether the postdoc has obtained (1) or not (0) a professorial position in a Flemish university in the period 1992-2013.

#### *Independent variables*

We test whether mobility increases the probability of a postdoc to be appointed as a professor in the system. Accordingly, the independent variables *Career postdoc* is categorical and defines the career track up to the postdoc position: i) *non mobile*: PhD and Postdoc in the same Flemish university; ii) *internal mobile*: PhD and Postdoc in different Flemish universities; iii) *external*

<sup>3</sup> For instance, the path “A-A-A” points out a career that developed entirely within the same Flemish university; the path “A-B-B” correspond to a researcher that moved from the PhD to the Postdoc in a different Flemish university, where s/he finally obtained a professorial position; the path “A-OUT-B” correspond to a researcher that after the PhD spent at least six months outside the Flemish university system and was later appointed as professor in the same university of her/his PhD; in the path “A- - - B” a researcher is directly appointed as professor in less than six months after obtaining the PhD degree.

<sup>4</sup> We consider this time span because before 1992 the number of new postdocs born after 1965 is very small and after 2011 the number of new postdoc that in the meanwhile obtained a professorial position is negligible.

*mobile*: PhD in a non-Flemish university. While mobile researchers have been found to be more productive than non-mobile (Horta et al. 2010) and that mobility as such increases productivity (Franzoni et al. 2014), nevertheless we expect that inbred will be favoured as more aligned with local values.

*Gender*. Several studies demonstrated that female researchers have less career opportunities in the academia than male peers, which have been explained with ability, social selection and self-selection, cumulative disadvantages (Zuckerman et al., 1991; Long et al. 1993; Long et al. 1995; Smith-Doerr 2004; Probert, 2005). For these reasons, and the fact that females are underrepresented in the academic oligarchy, then gender is expected to predict hiring decisions. Accordingly, a dummy variable is created identifying male and female postdocs.

*Nationality and Language*. Research in the US academic system found that despite their higher productivity, foreign researchers have less career chances of their native colleagues (Corley and Sabharwal 2007). Differently from Anglo-Saxon countries, language may represent a further barrier. In Flanders, Dutch is the official and compulsory language for teaching at bachelor level, and the majority of master courses are also taught in Dutch. We create dummy variables identifying groups increasingly distant in terms of language and culture from the Belgian reference group, which we expect to be less likely to be appointed as professors, partly because some of these researchers might be willing to come back to their home countries and possibly because of a nationality and language bias in the recruitment process. The groups are: i) Belgians (which include Flemish as well as postdocs originating from Wallonia, the French-speaking part of Belgium, and Brussels region) ii) The Netherlands (Dutch speaking country); iii) Europeans: from European Union and non EU; iv) Westerners: North America and Oceania; v) Rest of the world: South America, Africa and Asia.

#### *Control Variables*

*Scientific discipline*. The chances to become professor may differ across disciplinary areas. Research in natural science fields often requires many researchers employed in a laboratory, implying a larger ratio temporary to fixed staff. We introduce a dummy variable for five disciplinary areas of the postdoc: i) Medicine, ii) Humanities, iii) Social sciences, iv) Engineering, v) Natural sciences.

*Age starting Postdoc*. No empirical evidence exists regarding the impact of age on career chances. All other conditions being the same, the selection committee may prefer a younger candidate or an older candidate, depending on whether they appreciate more precocity or maturity. We construct a variable of age starting the postdoc, centred on the grand mean of the sample.

*Pregnancy leave*. Career opportunities may be reduced by a pregnancy leave. We create a dummy variable for researchers having a pregnancy leave during their postdoc or not.

*Prestige of postdoc institution*. Scholarly studies have shown that the prestige of the institution of PhD positively impacts career chances (Burris, 2004). We might expect a similar effect regarding the institution of postdoc. We introduce a dummy variable that set the prestige of Flemish universities as high for the Catholic University of Leuven and Ghent University – the two largest and highly ranked Flemish universities – and non-high for the University of Antwerp, the Free University of Brussels and Hasselt University.

### *3.2 Analysis and models*

Careers are analysed by computing the share of professors, postdocs and PhDs appointed in the considered period by gender, nationality (Belgian and non-Belgian), and the identified career paths and tracks.

The exploration of the factors predicting the probability of a postdoc to be hired as a professor in a Flemish university combines inferential and descriptive analyses.

First, we develop a regression analysis. The data have a three level structure - with five universities as the highest level, twenty cohorts-years of postdocs (1992 to 2011) as the second level, while at the lowest level are 8,634 postdocs within the cohorts. Hence, multilevel regression models are employed. Multilevel models divide the unexplained variance between level 3 (university), level 2 (cohorts-years), level 1 (postdocs) and allow to calculate their significance, as well as avoid ecological fallacies by introducing random intercepts at group level (Robinson, 1950; Snijders and Bosker 2004). Since the number of universities (level 3 units) and cohorts-years (level 2 units) is not that large, a Markov Chain Monte Carlo (MCMC) method of estimation is employed. Compared to maximum-likelihood methods, the MCMC algorithm is better able to recover stable parameter estimates with a low number of units (Stegmueller 2013). Since the dependent variable is the probability  $\pi_i$  that a postdoc  $y_i$  has been appointed as professor in a Flemish university, then multilevel binomial regressions are run (Snijders and Bosker 2004). The *logit* link function is used, i.e.  $f(\pi_i) = \log [\pi_i / (1 - \pi_i)]$ , where  $\pi_i / (1 - \pi_i)$  is the odds that  $y_i=1$  (Jones and Subramanian, 2012). As a diagnostic for model comparison we employ the Deviance Information Criterion (DIC), which penalizes for a model complexity - similarly to the Akaike Information Criterion (AIC)<sup>5</sup> - and it is a measure particularly valuable for testing improved goodness of fit in logit models (Jones and Subramanian, 2012). Multicollinearity is not of concern in our regression models because none of the variance inflation factors exceed the value of 1.6., which is well below the critical cut-off of ten.

Next, we explore longitudinal variations in the probability of hiring associated to gender, nationality and mobility. Because the number of units at higher levels are not large, random slope models cannot provide significant results. In other words, it is not possible to test through the multilevel regression models if the effects of the predicting variables change throughout time or not. Therefore, we explore this issue via a descriptive analysis, by exploring longitudinal variations in the odds of becoming professors for different categories of postdocs.

## **Analysis and results**

### *Composition of appointed professors, postdocs and PhDs*

Table 4 compares the composition of the professors, postdocs and PhDs appointed in a Flemish university between 1990 and 2013 - born after 1<sup>st</sup> of January 1965 - by gender, nationality (Belgian - non Belgian) and career path (non-mobile, internal mobile, external mobile).

In the table, the section above considers the sample of researchers that did a PhD in a Flemish university. Overall 17,9% have obtained a postdoc position in a Flemish university, and among

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<sup>5</sup> The Akaike Information Criterion - AIC (Akaike, 1974) compares models by considering both goodness of fit and complexity of the model, estimating loss of information due to using a given model to represent the "true" model, i.e. a hypothetical model that would perfectly describe the data. Accordingly, the model with the smaller AIC points out the model that implies the smaller loss of information, thus having more chances to be the best model. In particular, given  $n$  models from 1 to  $n$  models and  $model\_min$  being the one with the smaller AIC, then the exponential of:  $(AIC\ min - AIC\ j)/2$  indicates the probability of model  $j$  in respect to  $model\_min$  to minimize the loss of information.

those that obtained a postdoc position 13,9% was hired as professor in a Flemish university. The proportion of appointment by gender and nationality confirm the expectations that Males and Belgians have higher probability to be hired. Moreover, the gap increases – as predicted – for higher career ranks. In fact: Males PhDs have been appointed as postdocs in a Flemish university 35% more frequently than Female PhDs, while Males postdocs have been appointed 53% more frequently as professors than Female postdocs; Belgian PhDs have been appointed as postdocs in a Flemish university 73% more frequently than non-Belgian peers, and Belgian postdocs have been appointed as professors three times (+203%) more frequently than non-Belgians.

In the table, the section below considers the sample of researchers that did a postdoc in a Flemish university – comprehensive both of those that did a PhD in a Flemish university or those that obtained a PhD outside the Flemish university system. Overall, 12% have obtained a professorial position. Differences dictated by gender, nationality, and career track emerge. Males have been appointed 41% more frequently than Female peers, Belgian have been appointed eight times more frequently than non-Belgian peers (+696%), and non-mobile postdocs have been appointed 7,2 times (+620%) more frequently than external mobile postdocs and 38% more frequently than internal mobile postdocs.

In turn, the data supports the hypotheses.

Table 4 – Composition of PhD, postdoc and professor appointment between 1992 and 2013 (source: HRRF)

Sample of researchers that did a PhD in a Flemish university	PHD	postdoc	professor	share of PhD that becomes postdoc	share of postdocs that becomes professor
Female	16433	2480	261	15%	11%
Male	18879	3839	617	20%	16%
Female	47%	39%	30%		
Male	53%	61%	70%		
appointment ration Male vs Female				1,35	1,53
Non-Belgian	7152	799	40	11%	5%
Belgian	28044	5519	838	20%	15%
Non-Belgian	20%	13%	5%		
Belgian	80%	87%	95%		
appointment ration Belgian vs non-Belgian				1,76	3,03

Sample of researchers that held a postdoc position in a Flemish university	postdoc	professor	share of postdocs that becomes professor
Female	3149	301	10%
Male	5485	740	13%
Female	36%	29%	
Male	64%	71%	
appointment ration Male vs Female			1,41
Non-Belgian	3.147	70	2%
Belgian	5.487	971	18%
Non-Belgian	36%	7%	
Belgian	64%	93%	

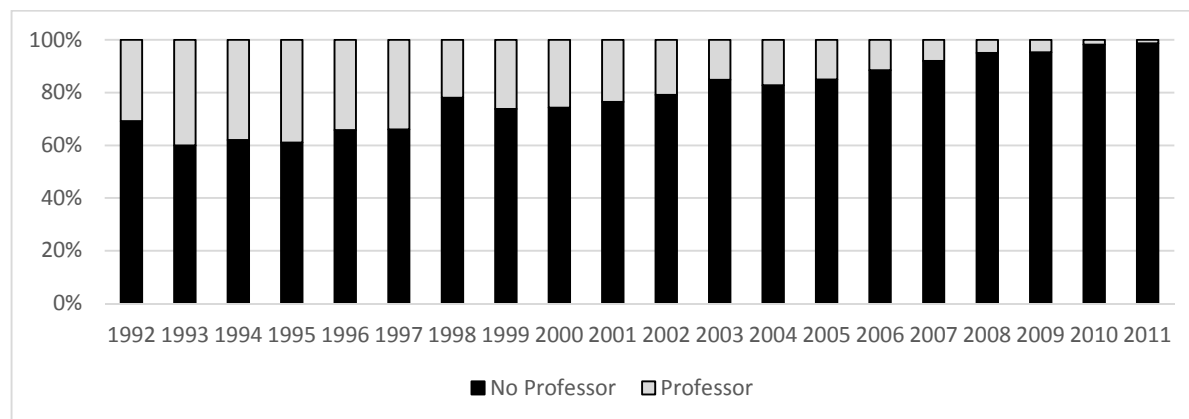


	appointment ration Belgian vs non-Belgian		7,96
external mobile	3192	80	3%
internal mobile	429	56	13%
non mobile	5013	905	18%
external mobile	37%	8%	
internal mobile	5%	5%	
non mobile	58%	87%	
	appointment ration non-mobile vs external mobile		7,20
	appointment ration non-mobile vs internal mobile		1,38

### *Factors predicting careers of Postdocs in Flemish universities*

In recent decades, the Flemish university system has changed drastically in terms of the composition of its human resource pool. From the beginning of nineties the number of academic staff has grown from six to over 17 thousands, professors has grown from 2,4 to 3,6 thousands, postdocs from 0,6 to 3,8 thousands and PhD from 3 to 9 thousands. Hence, whereas at the beginning of the nineties there was 1,6 junior researchers for each professorial position, the former now outnumber the latter by four times (source: VLIR Personeels statistieken 1992-2015). Due to the large number of postdoc positions and the small number of new professorial positions, the share of postdocs starting between 1992 and 2011 and born after 1964 that have obtained a professorial position is only 12,1%. This share is decreasing throughout the period, partly because the number of postdoc positions has grown faster than the professorial position, and partly because the average time between starting a postdoc and starting a professorial position is 5,8 years, so that values for most recent years can be underestimated (median 4,8 years) (Figure 1).

Figure 1 – Share of postdocs appointed as professor, by year of starting the postdoc – sample: born after 1964, N=8,634. (Source: HRRF)



Descriptive statistics show great variation in the professorial appointment rate along different categories of postdocs. Beyond variations between males and females, Belgians and non-Belgians, and inbred and mobile postdocs highlighted in Table 4, variations emerge also along other characteristics (Table 5). In terms of disciplinary background, postdocs in Humanities and the Social Sciences have been appointed two times more frequently than postdocs in the other disciplines. Regarding nationality groups, native Belgian postdocs display much higher appointment rates than all other nationality groups.<sup>6</sup> A gap is also observed between researchers

<sup>6</sup> The table provides descriptive statistics with a higher detail than the five groups identified in the previous chapter. Kruskal-Wallis non-parametric tests do not reject the null hypothesis that sub-groups

that had a pregnancy leave or not. No difference is observed between researchers in highly reputed and less reputed universities. On average postdocs appointed as professors have started their postdoc 1,1 year younger than non- appointed postdocs.

Table 5 –Probability of professorship in a Flemish university for postdocs with different characteristics (Source: HRRF)

		postdocs	%	appointed as professor	%	appointment rate
Dominant scientific cluster of postdoc	Medical sciences	2.072	24,0%	212	20,4%	10,2%
	Humanities	1.046	12,1%	215	20,7%	20,6%
	Social sciences	1.110	12,9%	243	23,3%	21,9%
	Engineering	1.731	20,0%	164	15,8%	9,5%
	Natural sciences	2.675	31,0%	207	19,9%	7,7%
Nationality	Belgium	5.497	63,7%	971	93,3%	17,7%
	Netherland	267	3,1%	15	1,4%	5,6%
	EU	1.321	15,3%	31	3,0%	2,3%
	Europe non-EU	388	4,5%	10	1,0%	2,6%
	North-America	136	1,6%	4	0,4%	2,9%
	Oceania	52	0,6%	0	0,0%	0,0%
	Africa	105	1,2%	2	0,2%	1,9%
	Asia	772	8,9%	8	0,8%	1,0%
	South-America	96	1,1%	0	0,0%	0,0%
Pregnancy leave during postdoc	No	8.042	93,1%	981	94,2%	12,2%
	Yes	592	6,9%	60	5,8%	10,1%
Reputation university of postdoc	Low	2.198	25,5%	267	25,6%	12,1%
	High	6.436	74,5%	774	74,4%	12,0%
Age Start Postdoc		mean age:		30,1 vs. 31,2 non appointed		

Some of the independent and control variables are associated. For instance, 91% of the Belgian postdoc and only 12,7% of the Europeans postdocs did their PhD in a Flemish university. In order to disentangle the effect of each variable we test them simultaneously in a regression. Table 6 presents the results of three multilevel binary regression models: i) an empty model – e.g. a model with no predicting variables; ii) the career path model; iii) the full model including the control variables. For each categorical variable, the coefficients point out the odd ratios of becoming professors compared to the reference category. DIC values highlight the better fit of the full model in respect to the career path model and the empty model. The results confirm what indicated by the descriptive statistics.

Table 6 – Multilevel binary regressions results

	empty model			career path			full model		
	coeff	S.E.	sign.	coeff	S.E.	sign.	coeff	S.E.	sign.
Fixed Part									

between the nationality groups comes from the same distribution. We hence retain the theoretically sampled groups. Within the European group: EU vs. Europe non-EU (p-value is 0.9449); Western group: North America vs Oceania (p = 0.7553); Rest of the World: Africa vs. Asia (p = 0.8851); Africa vs South America (p=0.8157); Asia vs South America (p= 0.8683).

cons	-1,755	0,141	***	-3,381	0,167	***	-2,567	0,244	***
career path: non mobile				2,033	0,120	***	1,337	0,154	***
career path: internal mobile				1,672	0,197	***	0,901	0,21	***
gender: female							-0,518	0,09	***
discipline: Humanities							0,787	0,12	***
discipline: Social sciences							0,926	0,118	***
discipline: Engineering							-0,239	0,122	*
discipline: Natural sciences							-0,418	0,114	***
nationality: Netherlands							-0,605	0,294	*
nationality: Europe							-0,91	0,188	***
nationality: North America & Oceania							-0,988	0,564	
nationality: South America, Asia, Africa							-1,575	0,329	***
Age Start Postdoc (grand mean)							-0,018	0,013	
Pregnancy postdoc: yes							-0,258	0,165	
Uni reputation: High							0,045	0,262	
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Random Part									
<hr/>									
Level: UNIVERSITY									
cons/cons	0,033	0,068	1	0,022	0,055	1	0,042	0,115	1
Level: YEAR									
cons/cons	1,132	0,217	1	0,977	0,186	1	0,99	0,191	1
Level: PERSON									
bcons,1/bcons,1	1	0		1	0		1	0	
<hr/>									
-2*loglikelihood:									
DIC:	5627,2			5225,1			4943,2		
Units: UNIVERSITY	5			5			5		
Units: YEAR	98			98			98		
Units: PERSON	8634			8634			8634		

\*\*\* p<0.001, \*\* p<0.01, \* p<0.05

We exponentiate the differential logits in order to calculate the odds of becoming professors in a Flemish university compared to the reference category. These difference are resumed in Table 7. For instance, a non-mobile postdoc had almost four times the probability to become a professor than an external mobile postdoc, whereas a female postdoc had 40% less probability than a male peer. It is also possible to calculate the combined effect of the predictors by considering that binomial regression coefficients are multiplicative. Thus, for instance, in the considered period a female, European postdoc that did her PhD in a non-Flemish university has been 15,8 times less likely to become a professor than a male, Belgian postdoc that did his PhD in a Flemish university (-94%).

Table 7 - Strength of the predictor's effect.

		sign.	proportion of probability	delta % probability
career path	non mobile vs external mobile	***	3,81	281%
	internal mobile vs external mobile	***	2,46	146%
gender	Female vs Male	***	0,60	-40%
discipline	Humanities vs Medicine	***	2,20	120%
	Social sciences vs Medicine	***	2,52	152%
	Engineering vs Medicine	*	0,79	-21%
	Natural sciences vs Medicine	***	0,66	-34%
nationality	Netherland vs Belgium	*	0,55	-45%
	Europe vs Belgium	***	0,40	-60%

	North America & Oceania vs Belgium	0,37	-63%
	South America, Asia, Africa vs Belgium ***	0,21	-79%
Age Start Postdoc (grand mean) : + 1 year		0,98	-2%
Pregnancy leave	Yes vs No	0,77	-23%
University reputation	High vs Low	1,05	5%

In turn, the results of the regression analysis further corroborate the hypothesis 2 that Mobile, non-national and female postdocs have less probability to be appointed as professors in the same university system than inbred, native and male postdocs.

As a last step of analysis, we explore longitudinal variation in the odds of becoming professors along different categories of postdocs. Due to the relatively small number of second level units – cohorts/years – it is not possible to run random slopes multilevel model. Therefore, we analyse longitudinal changes through a descriptive analysis. To do this, we focus on years for which our sample is sufficiently representative. In particular, while in 1995 only 29% of starting postdoc were born after 1965, their figure increased to 40% in 1996, and became the majority from 1997 onwards.

Figure 2 shows the composition of new postdocs appointed each years between 1997-2011 by gender, nationality and career track. The share of external mobile vs non mobile postdocs have gradually increased from 2004 onwards. The ratio female to male postdoc has also gradually increased from 2003. The proportion of non-Belgian postdocs has increased steadily from 2002.

Figure 2 – Proportion of new postdocs 1997-2011 (Source: HRRF)

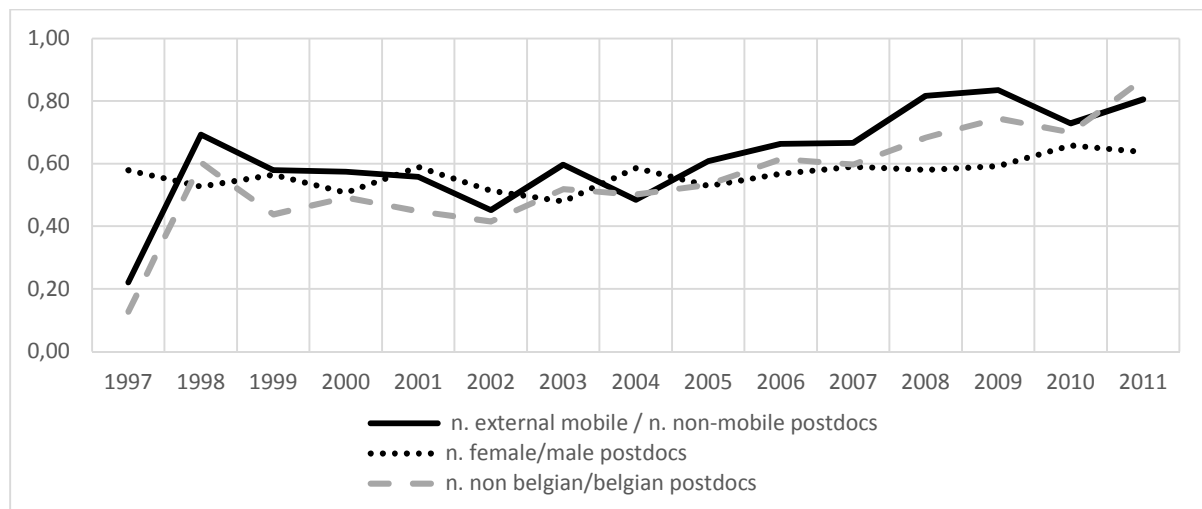
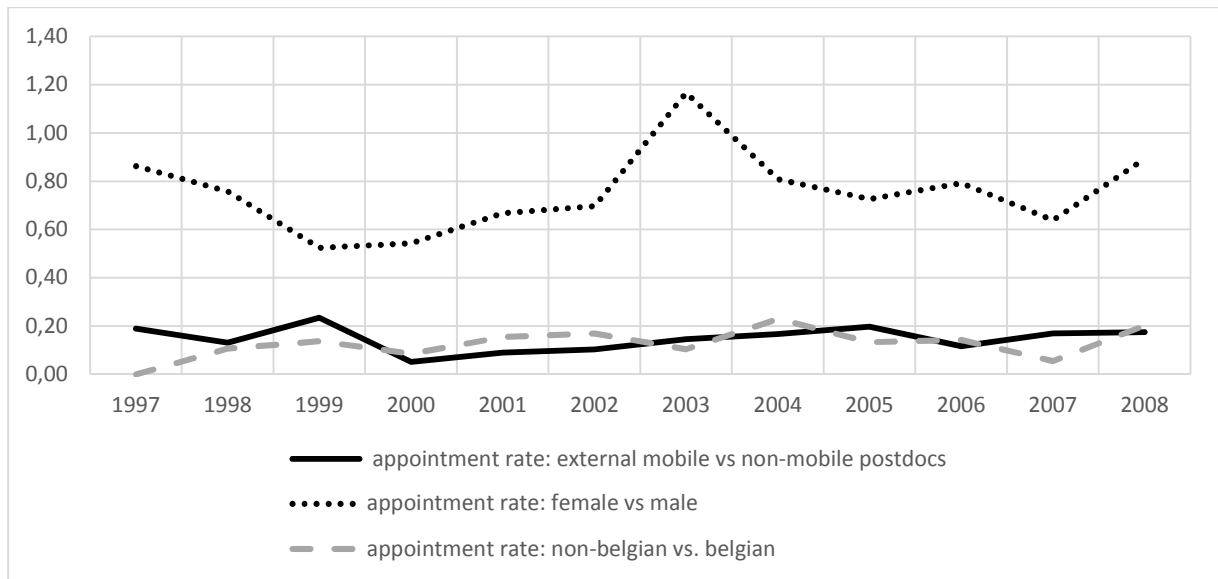


Figure 3 displays the ratios between the professorial appointment rates of external mobile vs non-mobile, female vs male, and non-Belgian vs Belgian postdocs, by year of starting the postdoc (period 1997-2008<sup>7</sup>). While the influx of external, female and non-Belgian postdoc have been very high throughout the period (Figure 2), nevertheless the appointment rates compared to non-mobile, males and Belgians postdocs have remained significantly smaller and stable throughout the period.<sup>8</sup>

<sup>7</sup> Later years are not considered due to the very small number of appointments among postdoc with few years of experience

<sup>8</sup> The gap is larger than that found in the regression analysis because most external postdocs are also non-Belgian.

Figure 3 – Comparison of postdocs appointment rates as professors in a Flemish university by gender, nationality and career track; years 1997-2008 (Source: HRRF)



## Conclusions

This article explored the hypothesis that hiring processes at junior and senior level works differently, affecting the probability of different categories of researchers to advance in the academic rank. We argued that the professorial body – alike other oligarchies - may display a tendency to preserve internal homogeneity by selecting new members that share similar values and social backgrounds. Accordingly, we formulated the hypotheses that in systems that lack rules and norms to counteract the self-perpetuating tendencies of oligarchies, then mobile, female and foreign researchers will have lower probability to advance in the academic ranks of a university system, and especially at the professorial level. We tested the hypotheses in the Flemish university system and employ data from the Human Resources in Research – Flanders (HRRF) dataset, which keeps track of academic staff and postdoctoral appointments, doctoral student registrations and doctoral degrees, of the five Flemish universities from 1990 until 2013.

The results support our hypotheses. Mobile, female and foreign researchers have been appointed significantly less frequently than their inbred, male and Belgian peers, and differences are stronger for appointments at professorial level than postdoc level.

The analysis has some limitations. First, we did not consider measures of performance as predictors of appointment. While there is some evidence that males are generally more productive than female researchers – at least in terms of publishing productivity, scientific evidence have shown that international and mobile scholars are more productive. This suggests that the results of the analysis would probably not be substantially affected by the inclusion of productivity measures, and not necessarily in the direction of reducing the advantage of local candidates. Second, we did not possess data on the actual composition of the applicants to positions. In order to address this limitation, we focused on PhDs and postdocs that were already employed in the Flemish university system. Moreover, while after their degree a certain share of PhDs aim to leave the academia or to come back to their countries of origin, instead the goal of most postdocs is to pursue an academic career and possibly stay in their current institution, especially when located in a wealthy country. Thus, it seems unlikely that the difference in the

probability of appointment between national and foreigners is due to the latter willing to leave the country, also because, if this was the case, then difference in appointment rates would be greater for hiring at postdoc than professorial level.

In light of previous studies on academic hiring, the works provides some original contributions. While large evidence have accumulated showing that females have less opportunities than males, and recent studies have shown that foreigners researchers have less career chances than national peers, evidence on the effect of mobility on career chances is mixed. We suggested and provided evidence that the value of mobility for academic hiring may be dependent on norms and regulations, without which inbred may be favoured also in attractiveness systems. Further, we argued that academic labour markets at junior and senior levels are fundamentally different. Empirical evidence support this claim, it shows that universities manage the dilemma between universalism and particularism in different ways across career levels, and suggests that differences in the composition between junior and senior staff can be a lasting treat. These findings have important policy implications. First, while policy rhetoric supports the virtues of mobility and meritocracy, and allocation of funds is increasingly related to performance – in the Flemish system, already for two decades – these instruments are seemingly not sufficient to reduce inbreeding significantly. Laws and norms, alike those adopted in countries like Germany and Switzerland, may prove to be more effective measures enabling countries like Belgium to better exploit their attractiveness, while granting fair opportunities to all researchers.

Future research can be oriented to explore what factors affect the likelihood to be hired of candidates with characteristics dissimilar from the oligarchy. We have already suggested that norms and rules – such as those sanctioning inbreeding or promoting gender balance– may be more effective than policy announcements or competition for resources, arguably because competition mostly affects temporary staff rather than fixed term staff. One further factor may be the size of the oligarchy, absolute or related to the other personnel. In Flanders, the professorial body is relatively small compared to temporary positions (1 to 4); systems with a larger or smaller oligarchy may display stronger or weaker propensity to homophily in the hiring process. Also, research can explore whether a collegial hiring process favours or hinders appointment of heterodox candidates when compared to hiring decisions taken by leaders, such as chairs or departments' heads.

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## APPENDIX

Table A - Career paths leading to a professorial position in a Flemish university (Source: HRRF)

	1	2	3	4	5	6	7	8	9	10	11	12	
PhD	A	A	A	A	A	A	A	A	A	OUT	OUT	OUT	
Post Doc	A	-	A	B	B	B	-	OUT	OUT	A	A	OUT	
Prof	A	A	B	A	B	C	B	A	B	A	B	A	
n. total	786	81	128	18	35	4	42	23	17	69	16	141	1.360
share total	57,8%	6,0%	9,4%	1,3%	2,6%	0,3%	3,1%	1,7%	1,3%	5,1%	1,2%	10,4%	100%
Men	58%	5%	9%	1%	2%	0%	3%	2%	1%	5%	1%	11%	966
Women	57%	8%	10%	2%	3%	0%	4%	1%	1%	5%	1%	9%	394
large 1	62%	7%	3%	1%	1%	0%	1%	3%	0%	7%	1%	13%	459
large 2	69%	4%	7%	1%	2%	0%	3%	1%	1%	3%	1%	8%	468
small 1	34%	8%	22%	1%	5%	1%	8%	1%	4%	7%	2%	8%	189
small 2	51%	9%	14%	3%	3%	1%	3%	1%	0%	3%	2%	11%	178
small 3	39%	3%	20%	0%	9%	0%	3%	0%	3%	6%	2%	15%	66
Med	82%	0%	5%	1%	5%	0%	0%	0%	0%	6%	1%	0%	213
Hum	67%	0%	19%	1%	4%	0%	0%	0%	0%	6%	2%	0%	215
Soc	65%	0%	18%	3%	4%	0%	0%	0%	0%	8%	1%	0%	244
Eng	87%	0%	6%	2%	1%	1%	0%	0%	0%	2%	1%	0%	164
Nat	75%	0%	11%	1%	1%	0%	0%	0%	0%	8%	2%	0%	211
Belgian	64%	7%	10%	1%	3%	0%	3%	2%	1%	3%	1%	4%	1.184
Non-Belgian	13%	2%	5%	1%	0%	0%	1%	1%	0%	19%	3%	55%	175
Belgian	97%	96%	93%	94%	100%	100%	98%	96%	100%	51%	63%	31%	
Non-Belgian	3%	4%	7%	6%	0%	0%	2%	4%	0%	49%	38%	69%	