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WHO IS LEAVING?

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AN INVESTIGATION OF THE EUROPEAN RESEARCH LANDSCAPE

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Abstract: International mobility of researchers has a key role in the creation of excellent research. By developing a novel composite index of international mobility of researchers in the EU space, this paper aims at understanding the differences that are still present to this day between the research environments of the European Union's member states. Gender differences are highlighted. A distinction between North and South Europe is well apparent in our results. Substantial differences between countries' research environments are documented

1. INTRODUCTION

Like in many other fields the European scientific research landscape can be divided by wealth areas with higher concentrations of funding, salaries and other monetary metrics usually located in the Northern part of the continent. The purpose of this project is to assess and measure if the policies undertaken by the European Union are successfully narrowing the gap between North and South Europe moving towards a direction of equality of opportunity on scientific research.

Several meanings can come to mind when thinking about opportunities in the EU. In the context of this project the given definition is mobility as in moving for long periods of time to a country different than the one of birth or origin to get hired by a local institution and conduct research. The final objective of this study is to understand if it's true that we're going towards a direction in which independently from the country of birth, the possibilities of moving to a foreign country within the European Union in order to conduct scientific research are the same everywhere.

Since its conception, the EU has carried out a large number of significant initiatives in order to promote mobility of scientific researchers within its member states. It did so both with the short term in mind with projects like the Marie Curie Actions or Euraxess which help researchers gain access to funding and job opportunities, but also on the long run with Resaver, a retiring scheme specifically thought for research that allows for mobile employees to keep their pension arrangements while changing countries and jobs. While these initiatives deserve credit and are already considered established successes, the scientific research landscape is far from being homogenous and many differences due to socio-economic conditions among member states are still very much present to this day.

This inevitably influences mobility since funding and financial support is an important enabler, or obstacle depending on the presence or lack of it, and has a direct impact on the poor ability of Southern and Eastern European institutions to attract researchers from other European regions (Fonseca et al., 2019). The result of this is an unbalanced situation which result in the widely studied phenomenon of brain drain and brain gain, or to put in in simpler words countries being net exporters or importers of researchers and therefore talent.

The analysis was conducted in order to answer the following research questions:

Do researchers in the EU face the same probability of being mobile independently from where they're from? Does gender have an impact?

Based on the existing literature some hypotheses were formulated to provide an answer to this issue which was finally obtained using a unique database from the MORE project, which will later be discussed. Different studies confirm the intuitive idea that financial support, whether in the form of competitive salaries or adequate research funding, is an important enabler of movement (McInroy et al., 2018). This idea is closely intertwined with the investigated concept of equality of opportunity in mobility as inevitably researchers tend to move towards areas with higher concentration of wealth. It can therefore be thought that researchers from poorer areas of the continent, Southern and Eastern Europe, have a higher probability of moving during their career than their peers from wealthier European countries which can already find financially adequate job positions home.

On opposing views, it is suggested that more social capital is associated with lower mobility (David et al., 2010). This idea has to be seen through the lenses of general social habits of individuals in a nation and proposes that a higher frequency of contact with friends, relatives and neighbors, which is more closely associated to Southern European countries, is inversely correlated with the mobility rates of people suggesting therefore that researchers from

Mediterranean origins are the ones with lower probabilities of leaving their home countries for long periods of time.

Regarding Gender, the literature is also mixed. The MORE study affirms that male researchers are more mobile although the gap has decreased throughout the years and it does so by using respondents' data from their 2012 and 2016 survey. While the number of female mobile researchers remained the same at a 25% in both surveys, men were less mobile in 2016, jumping down from 34% in 2012 to 29%. These numbers suggest there is a difference in gender, although not a big one. Another interesting finding of the MORE survey is that the share of female researchers with children is lower than the share of male researchers with children, this rejects an intuitive thought that women are less likely to be mobile because they are more likely to have a child to take care of.

On other views, (Fonseca et. al, 2019) affirm that similar percentages of men and women obtained their PhD in their current institution, meaning they haven't moved afterwards suggesting that gender doesn't have an impact on mobility.

Independently from the point of view one decides to adopt, it is still evident that the European research landscape isn't yet homogenous and differences are very much present.

At first the *methodology* will be discussed. First, I had to create several rankings of the countries based on different points of view and the second step was finding a way of obtaining the desired probability. A lot of choices needed to be made to build the structure upon which I based my analysis, this section will try to explain them in a complete and concise manner. Then, the *results* will be analyzed, to see if the hypothesis made, can explain the findings. Finally, the *research limitations* will be discussed, because no research would be complete without them.

2. THE MORE PROJECT

The analysis conducted in this research was made possible thanks to the MORE project, a study commissioned by the European Union on the mobility patterns and career paths of EU researchers which this year will reach its fourth edition.

The first MORE study was made in 2008 and it was described by the subsequent versions of the study as a pilot project used to improve and refine the following researches, this iteration wasn't considered when building the analysis as compatibility issues with the following versions of the project arose. MORE4 hasn't been taken into consideration as well since at the time of this writing the results haven't been published yet and preliminary information wasn't made available upon request.

The second and third versions of the study, from 2012 and 2016 respectively, were used to build the metrics and indicators upon which the analysis was conducted and which will be later described. The microdata of MORE3 was also shared by the European Commission, anonymously and for research purposes only and it was the bulk of data on which I applied my analysis as it gave me access to a database of over 10.000 European researchers and their mobility history between 2005 and 2016.

The way this paper differs from the MORE study is that its purpose is to get to a probability, the one of a researcher leaving its home state. While it is true that MORE does an exhaustive job in explaining what the mobility situation in Europe is and it does so by addressing both the researcher's point of view and academia's, this research contributes by quantifying this phenomenon in each country, taking into account many of the rationales adopted in the study and ultimately addressing the core issue of the field, if one decides to investigate what the mobility situation is, how likely is it that people are mobile in the first place?

3. METHODOLOGY

The idea has been as discussed to obtain a probability. The reason why a researcher would leave usually is composed by different sub-reasons, a person could leave to have a higher salary, because they desire state of the art machinery to conduct their research or many more. These reasons all together contribute in the decision-making process so it's important to define different categories of reasons for people to leave and within each, understand which countries offer the best conditions and which don't. This will allow to match the country of origin of a researcher within the ranking and understand how happy he or she will be of leaving. Finally, the process ends by putting all together these categories to obtain one final probability.

3.1 WEIGHTS AND RANKINGS

To start things off, I focused on the motives that made researchers leave their countries wanting to elaborate a picture of what were the main mobility enablers for the different nationalities. The MORE survey had a question in which the respondents had to state if a certain motive was Important or Not Important in the decision-making process of their last move. There were 15 motives that have been classified as follows based on what the researchers were looking for in their destination.

MOTIVE	CATEGORY
Research autonomy	Better research conditions
Working with leading scientists	
Balance between teaching and research time	
Access to research facilities and equipment	
Quality of training and education	
Availability of research funding	
Availability of suitable positions	Career & Network
Career progression	
International networking	
Remuneration	Remuneration & Job stability
Social security and other benefits	
Pension plan	
Job security	
Culture and/or language	Culture & Personal
Personal reasons	

Table 1: Classification of motives that lead researchers to move

I then proceeded to count how many times the researchers said a motive was Important or Not Important, dividing them by Nationality first and within each by Gender, to understand for each cluster what is the main driver of mobility. Another interesting take of this step is that people from different nationalities give different importance to the same issue. In addition to the contextual local research landscape it is arguable that different cultures weigh things in a different way, therefore independently from the context, the same issue can be felt more strongly or less by individuals of different upbringings. The first step of the analysis is exemplified as follows, for layout needs only one category is shown, the same process was though repeated for all four categories.

COUNTRY	BRC_I_M	BRC_I_F	BRC_NI_M	BRC_NI_F
Austria	196	71	96	32

COUNTRY	BRC_I_M	BRC_I_F	BRC_NI_M	BRC_NI_F
Austria	67,12%	68,93%	32,88%	31,07%

Table 2: Importance of Better Research Conditions motives for their last move for Austrian researchers in absolute and percentage terms. BRC: Better Research Conditions; I: Important; NI: Not Important; M: Male; F: Female

Before moving on, one important consideration has to be made. I assumed that the motives that drive the different nationalities don't change significantly in time. This is a safe assumption to make as a transformation of this magnitude requires a cultural change which cannot happen in such a brief window of time. I did it to have a broader range of years that could explain my results as to not confine them to a brief window of time. This assumption is coherent with how I decided to proceed in this step of the analysis and is the reason why I decided to use statistics from years ranging from 2002 to 2021.

When it comes to the destination of mobility, the idea is that most countries have some categories in which they perform better compared to the others and some in which they're

worse, the best countries excel in all or most of the categories while the worst countries are generally below average. At this point I wanted to create four different rankings, one for each of the four categories, to understand which countries had the best conditions to satisfy the need in question therefore being more likely to be chosen as destination of the mobility, if a move was likely to be done in the first place which will be later discussed.

Information online from the European Commission, the Eurostat and other relevant sources was used to develop multiple rankings, which were then weighted to obtain the final ranking of the category. It is important to point out that as no guidance from existing literature was found, the weights were chosen to reflect the perception of what may be relevant.

3.1.1 *Better Research Conditions*

With regards to Better Research Conditions, funding and individual satisfaction were considered to create the ranking. Regarding the former, two statistics were chosen, one coming from the Eurostat, the second from the European Commission and both referred to 2016. The first considers the R&D expenditure of a country as a percentage of its GDP, this avoids the bias of bigger expenditures due to higher GDPs and infers how much a country decides to dedicate to research. The second statistic ranks countries based on how much they receive in funding from the European Union, to avoid the bias of countries with more universities receiving more funding in absolute terms, the figure was divided by the total number of projects to obtain the average funding per project. Finally, the researchers that answered the MORE3 survey reported their level of satisfaction with the academic aspects of their current position which include intellectual challenge, research autonomy and level of responsibility. This is obviously not an objective measurement as it is self-reported and researchers cannot accurately compare the different research landscapes, it is though a good contribution to the estimation of the research conditions in a country. Because of this lack of

objectivity, the individual satisfaction measurement has a lower weight then the aggregate of the funding statistics which in turn do a better job at reflecting the real conditions.
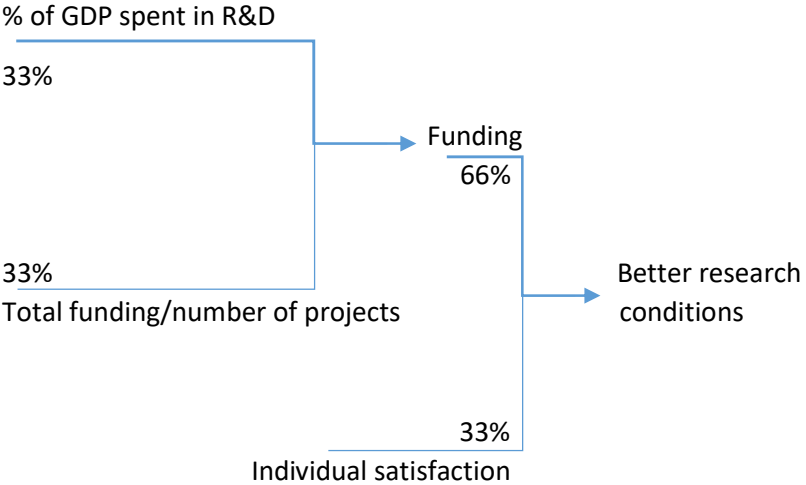
% of GDP spent in R&D

33%

Funding

66%

33%
Total funding/number of projects

Better research
conditions

33%
Individual satisfaction

Figure 1: Description of the better research conditions ranking

3.1.2 *Career & Network*

When it comes to Career & Network things get trickier. It is a less objective category and much more dependent from a personal perspective. Measured at a country level adds a further level of complication as it becomes harder to generalize personal views to a broader population. To do so, two statistics from the European Commission adjourned to 2021 were chosen, in addition to a third from the MORE3 study. This ranking takes into account three different funding schemes from the European Union, namely FP6, FP7 and Horizon 2020 which all together cover the period from 2002 to 2021. The first statistic counts the number of partnerships the country participated in under each funding scheme, a partnership is a project which requires transnational collaboration between countries, therefore the higher the number of partnerships the more connected the country. It is true that up to a certain extent a country is favored by its size, and to partially counter this effect the second indicator was chosen as it will be explained shortly. It is also true though that in these countries a higher number of connections can be made because of their size, and if a researcher is looking to increase its

network it is natural that these countries become more attractive options. For these reasons no adjusting effects on the first statistic were adopted. As mentioned, the second statistic was taken into consideration to partially counter the size effect. It is a ranking of countries based on eigenvector centrality coefficients which measure the influence of a country in the network by examining whether participants of a country are linked to other important participants, normalized by size using country population. The third and final statistic comes from the MORE3 project and ranks the countries by individual satisfaction with career perspectives, to cover the career development side of the ranking. Career and Network contribute equally to the ranking with a 50% each. Within the Networking 50%, to highlight size as an enabling factor and not a bias, the first statistic has a 70% weight, while the second has a 30% aggregate weight being made by the three different rankings, one for each funding scheme, with 10% weight each.
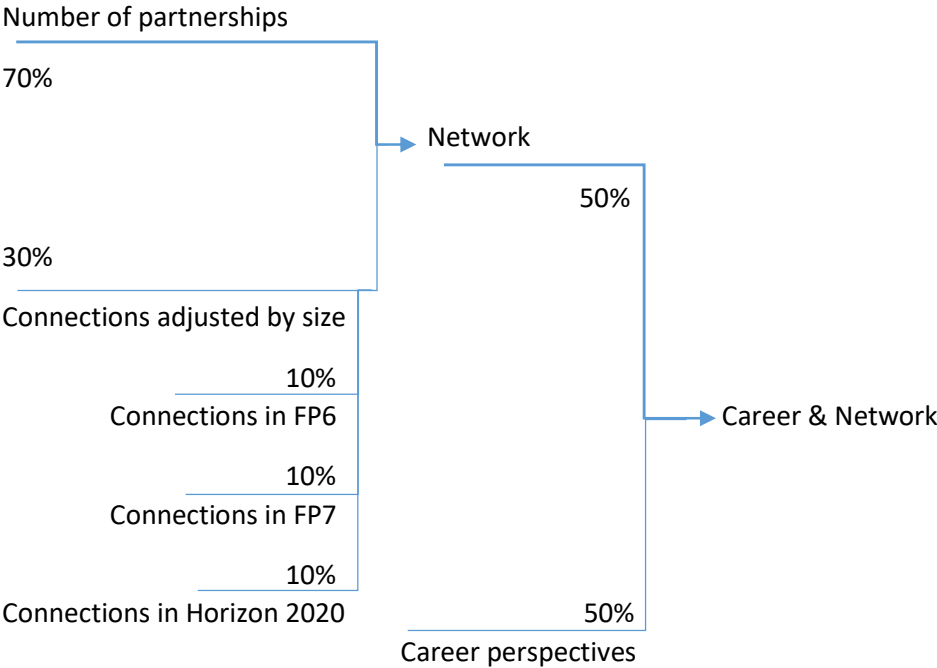

Figure 2: Description of the Career & Network ranking

3.1.3 *Remuneration & Job Stability*

Considering Remuneration & Job Stability two different statistics were used, the average gross annual salaries of researchers at different career stages and the mean tenure or in other words the average number of months a person works in the same job. The salaries data, drawn by the MORE2 study, are referred to a timeframe ranging from 2008 and 2011 and the tenure statistics have pre-crisis and post crisis values covering a period from 2002 to 2012. There are three salaries rankings based on the definitions of the MORE study which classify R2, R3 and R4 researchers based on the career stage, R2 being post-PhD researchers who are not yet fully independent, R3 researchers having developed a level of independence and R4 leading their research area or field. The mean tenure statistics considers the entire workforce of a country, a similar statistic only concerning research wasn't found but this is already a good proxy for the desired investigation. Both statistics have the same weight as no reason to do otherwise arose, for the same reason within the two statistics its subcomponents also have the same weights.

Remuneration & Job Stability

50% Mean Tenure   Gross Salaries 50%

Mean tenure before crisis (25%)   Gross Salary R2 (16,66%)

Mean tenure after crisis (25%)   Gross Salary R3 (16,66%)
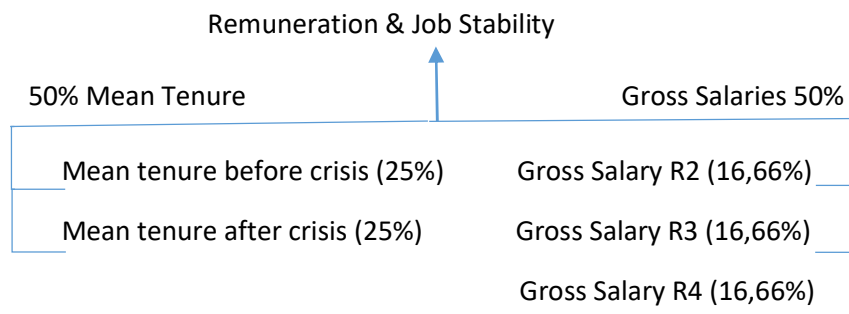
Gross Salary R4 (16,66%)

Figure 3: Description of the Remuneration & Job stability ranking

3.1.4 *Culture & Personal*

Finally, regarding Culture & Personal three statistics covering the Culture aspect of the ranking were chosen along with a self-reported measurement on the satisfaction with the personal aspects of the researchers' current position which include contribution to society and social status. The first statistic is about the influence a culture has on other cultures based on eight attributes ranging from entertainment and fashion to art and trendiness. The second statistic uses the number of UNESCO sites as an indicator of richness of culture. Finally, the Culture Diversity Index developed by Fearon in 2003 and widely used in macroeconomic affirms how rich and diverse a culture is by examining its heterogeneity. The Personal contribution to the ranking, with the self-reported measures of satisfaction weighs 50%, the Culture contribution also weighs 50% with its three sub-components equally contributing.
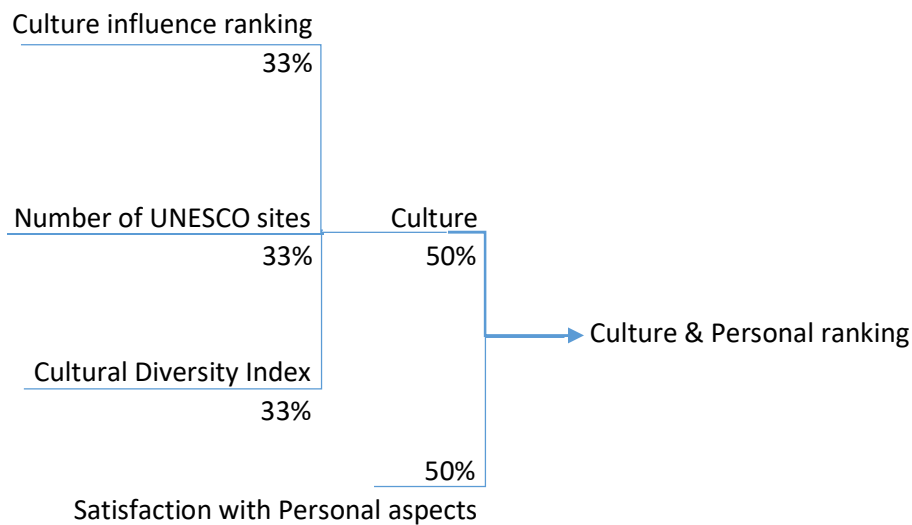
Culture influence ranking
33%

Number of UNESCO sites   Culture
33%   50%

                                                             Culture & Personal ranking

Cultural Diversity Index
33%

                                              50%
Satisfaction with Personal aspects

Figure 4: Description of the Culture & Personal ranking

3.2 GETTING TO THE PROBABILITY

Once the Weights and Rankings were defined the next step was to obtain the Probability of a researcher being mobile. More specifically the idea is to find, for each of the categories, the likelihood of a researcher leaving its home state given how much they care about the specific category, which is quantified by the Weight, and what the home country and the rest of the countries can offer, quantified by the Ranking. The same analysis will be applied to each of the four categories which in turn will give four different sets of probabilities. These four probabilities will be then combined, using a weight system, to obtain a final list which will tell for every country the probability of a researcher of its citizenship to leave and go work abroad, based on the motives that were expressed in the survey and the importance each country gives to them.

To do so one needs to compare what the research will obtain by staying home and by leaving in order to understand in which case they'll be better off. This comparison is done by multiplying the weight and the ranking score of the home country, which allows to quantify a "satisfaction" level of a researcher staying home and by doing the average of the same calculation with the remaining 25 countries, obtaining the "satisfaction" level of the researcher going abroad. There is a limitation to this way of proceeding which will be discussed in the research limitations. This step is exemplified as follows.

COUNTRY	WEIGHT	RANK	HOME	ABROAD	+/-
Austria	81,59%	71,73	58,53	48,24	10,29

Table 3: Career & Network scores for Austria. +/- is the difference in absolute terms between Home and Abroad

Now, the +/- becomes the important value to watch. A +/- equals to 0 means that the Home value and the Abroad value are the same, in this case the researcher would be equally satisfied staying home or going abroad. A +/- equals to 0 therefore corresponds to a probability of

leaving of 50%. Oppositely, a higher +/- means that the researcher is more incentivized to follow the suggested outcome, staying home or going abroad depending on which of the Home and Abroad values is higher with the highest +/- of the list receiving a probability of 100%. The +/- values of the countries are then ordered from highest to lowest in order to calculate a percentage between 50% and 100%. As previously mentioned, this first percentage represents the likelihood of the researcher following the suggested outcome, leave or stay depending on which of the Home and Abroad value is higher, and it doesn't represent yet probability of a researcher leaving. To obtain this, a quick computation is due, if a country has a higher Abroad value, then the obtained percentage already represents the probability of leaving, if the Home value is higher this probability is represented by the complementary value.

COUNTRY	HOME	ABROAD	+/-	OUTCOME	Probability	PofLeaving
Netherlands	58,46	43,68	14,78	STAY	100%	0%
Austria	58,16	47,94	10,22	STAY	84,56%	15,44%
Greece	41,64	46,98	5,34	LEAVE	68,06%	68,06%

Table 4: Example of Probabilities from the Career & Network category of motives

Finally, the four probabilities need to be aggregated in one unique value that represents the probability of a researcher leaving, having taken into consideration all the motives.

It could be thought that one should use the different weights a country gives to a certain category of motive, this is though already considered when computing the Home and Abroad values. The way I decided to do it is by giving the weight of the number of motives each category is made of. Better Research conditions is made by 6 motives, Career & Network by 3, Remuneration & Job Stability by 4 and Culture and Personal by 2, the weight of Better Research Conditions would therefore be 6/15 and so on.

4. RESULTS

COUNTRY	PofLeaving_MEN	COUNTRY	PofLeaving_WOMEN
Bulgaria	91,04%	Bulgaria	94,33%
Lithuania	89,36%	Lithuania	86,92%
Croatia	76,07%	Croatia	84,28%
Hungary	74,06%	Hungary	80,95%
Poland	69,23%	Poland	70,66%
Iceland	68,32%	Iceland	66,33%
Estonia	64,86%	Estonia	62,38%
Slovakia	64,39%	Greece	60,93%
Greece	60,10%	Czechia	58,25%
Portugal	59,49%	Portugal	58,23%
Czechia	58,37%	Slovakia	57,59%
Ireland	55,80%	Ireland	56,61%
Slovenia	48,69%	Slovenia	47,90%
Spain	42,92%	Spain	43,91%
Norway	42,47%	Cyprus	43,62%
Italy	41,28%	Norway	41,30%
Cyprus	36,80%	Italy	39,89%
Denmark	35,47%	United Kingdom	34,93%
United Kingdom	33,05%	Denmark	32,88%
Belgium	31,34%	Finland	31,73%
Finland	31,10%	France	30,22%
France	29,89%	Netherlands	28,52%
Sweden	27,86%	Sweden	27,31%
Austria	25,34%	Belgium	27,13%
Netherlands	23,78%	Austria	25,89%
Germany	9,75%	Germany	8,63%

Table 5: Probability of leaving for Men and Women

The results are presented in the above table, as shown there is no significant difference between genders which suggest that European Male and Female researchers are similar when it comes to mobility preferences. Some positions are different, mostly in the countries with lower probabilities of leaving but as mentioned, there is nothing that suggests that gender has a differentiating role in this topic. It is more interesting to analyze the results from the point of view of the first research questions which asks what are the countries with the researchers with the higher probabilities of leaving.

Not surprisingly the bottom positions are filled mostly with Eastern European countries which generally speaking presented less resources in all categories. The same can be said about the Balkans and Portugal which still represent niche areas of research at a European level. Italy and Spain are the biggest economies of the Eastern and Southern European regions, this allows the two countries to have a slightly lower probability of leaving but still places them in average spots, 11th and 13th respectively out of the 26 countries investigated.

On the opposite side, the top positions are filled by Northern European countries, even if with smaller economies like Austria, Belgium and The Netherlands which further confirms the idea that people tend to follow the money and countries where these problems are alleviated, by higher salaries, better welfare or a combination of both, have an advantage compared to countries where the thought of making ends meet is still very much present. It is a matter of remuneration but also prestige and satisfaction with one's work. Other than higher salaries, Northern European countries also offer higher research funding and better chances to increase one's network which can then lead to further quality research. It is natural therefore that the flow of researchers predominantly follows this direction.

 There are some interesting outliers which are worth analyzing. Cyprus stands out as an interesting exception. It is in fact a small, Eastern European country. Other Country-Islands (Ireland and Iceland) have significantly higher probabilities of leaving but Cyprus ranks lower. When observing the probability components an interesting fact stands out. The country has the highest salaries for researchers of all stages across all countries, this can be seen as a policy to incentivize foreign workers to come and work in Cyprus although it also has the secondary effect of making local researchers quite satisfied with the economic conditions they have home.

The United Kingdom is also placed in an odd position when compared to its reputation, Brexit cannot be used as an explanation as the indicators were built using a significant amount of data from several years before the referendum. It still is a leading country for Career Development and Network with British researchers being in the top positions for this category. It lacks though in two other components.

Both for men and women the UK ranks 9th in probability of leaving to look for Better Research Conditions. The country receives a lot of funding from the European Union (4th highest value) and its researchers report a moderately high satisfaction with the local work conditions, although not among the highest. What drags down the score though is that the country doesn't invest much in R&D compared to its GDP with lower percentages than all Northern European countries, Slovenia and Czech Republic.

To make thing worse, it also has a very low Remuneration and Job stability score, ranking 17th for both men and women. When analyzing the salaries values an interesting fact stands out. The United Kingdom pays below-average salaries for both R2 and R3 researchers although it is the second highest paying country for leading R4 scientists. This suggests that the country is particularly attractive for top researchers which in turn could be a part of the explanation why it is still a renowned research pole. The country has also the lowest scores when it comes to mean tenure representing Job Stability with values comparable to Bulgaria among the lowest in Europe.

4.1 DIFFERENCES BETWEEN BOTTOM AND TOP COUNTRIES

It is interesting to try and understand the differences between the countries with lower probabilities of leaving and the ones with a higher one, it also useful to create a profile of the more advanced research environments to define a type. This is a useful exercise to make when seen through the lenses of a policy maker, it helps understand which are the areas that most

need improvement and to try and define what the objective would be for a country who decides to try to undertake a policy process of transformation and improvement. This is not to suggest that the goal is to achieve for all countries a probability of leaving equal to zero, it is a well-known fact that brain circulation and the exchange of ideas is key for great research, it is important though to understand that there is a difference between moving because one wishes to and moving because one is forced to. This chapter is thought with this second type of mobility in mind.

The starting point of this analysis is to go back and see what drove people to move, using the Weights previously calculated of the importance of the motive a researcher gave for their last move between 2005 and 2016. This is important because when people are forced to move, they leave to obtain what they don't have home, it is a more primal need than self-realization which is what stimulates researchers from better research environments. In doing so, I took the top 9 countries from Table 5 as an example of good research environments, ones which people don't feel forced to leave, and analyzed what researchers from these countries were looking for when they left. The reason why I chose 9 countries is that they were the same ones between men and women, from number 10 they started to differ. I then repeated the same process for the bottom 17 countries. This allowed to compare what are the differences in motives between someone that wants to leave for self-realization purposes and someone that has to leave for lack of alternatives.

Analyzing the results one clear fact stands out, Better Research Conditions is the most important differentiator between the two groups. This is observable already after comparing the maximum value among the top 9 countries, therefore the country with the highest incentive to leave for this matter between the healthy research environments, with the values of the bottom 17. For men, 12 out of the bottom 17 countries have a higher value then the top 9 maximum, for women 8 out of 17 do, the other categories of motives don't come close to

these proportions. Before further considerations it is interesting to point out that there is a significant difference in gender by looking at these numbers, the consideration to make is different though from the one that the intuition suggests. It would seem like female researcher from the bottom 17 countries are less dissatisfied with their local research conditions as a lower amount of countries are above the maximum of the top 9 countries compared to men. When looking at the sample though the opposite is revealed to be true, within the bottom 17 countries female have a higher minimum value, a higher maximum and a higher average therefore the entire interval is simply shifted upwards and higher values correspond to a higher incentive to leave. This draws to the conclusion that female researchers from the bottom 17 countries are more dissatisfied than male researcher of the local research conditions. This is true for the research conditions but also for Career & Network, women from the bottom 17 countries are significantly more dissatisfied with this aspect as well.

CATEGORY	BRC_M	BRC_F	C&N_M	C&N_F
MAX	79,17%	96,72%	83,91%	93,75%
MIN	50,00%	64,42%	56,82%	66,67%
AVERAGE	68,75%	76,81%	71,77%	80,94%

Table 6: Max, Min and Average values of the motives for leaving for the bottom 17 countries.
BRC: Better Research Condition; C&N: Career & Network, M: Male; F: Female

After having analyzed the differences in gender a return to the investigation of the differences between countries is due. As mentioned, moving for Better Research Conditions becomes significantly more important when one is forced to then when one wishes to. Other than the previously described approach of the top 9 maximum value this also becomes evident when comparing the average values between the top 9 and the bottom 17 with the latter having a +6% for men and +10% for women.

GROUP	BRC_I_M	BRC_I_F	R&J_I_M	R&J_I_F
AVG. TOP 9	62,19%	66,44%	32,09%	27,16%
AVG. BOTTOM 17	68,75%	76,81%	35,77%	39,13%

Table 7: Average of top 9 and bottom 17 countries.

Following this approach another major difference shows up. Remuneration & Job Stability becomes an important differentiation point, this difference though is much more evident for women then for men. The difference in averages between the top 9 and the bottom 17 is only +3% for men, this jumps to +12% for women. What this tells us is that men from the top 9 countries and the bottom 17 are similarly motivated to leave for financial purposes, on the other hand women from the bottom 17 are significantly more incentivized to leave then their top 9 counterparts, this suggests a disparity in payment between genders in the bottom 17 countries.

Comparing the two approaches, maximum among top 9 and comparing averages of top 9 and bottom 17, it is important to point out that one doesn't differ from the other. The results are consistent with the Better Research Conditions motive, with both approaches this shows up as an important difference between top 9 and bottom 17. Regarding Remuneration & Job stability the maximum among top 9 approach doesn't work as there is an outlier in the top 9 having a significantly higher percentage than the remaining 8, removing this outlier Remuneration and Job Stability also becomes a differentiating factor with the maximum top 9 approach.

To create a profile of a good research environment it is important to keep focusing on the motives why people leave, for both the top 9 and the bottom 17 countries an environment with good research conditions which offers many opportunities for career development and networking seems to be ideal as shown by the fact that they are the categories with the highest percentages of why people leave. As mentioned there isn't a significant difference in terms of Career & Network between the top and bottom countries although it is an issue which is felt more strongly by females then males, a suggestion for development on this topic would be to increase salaries for female researchers in the bottom countries, there is a difference in Better Research conditions and the bottom countries need to improve on this matter. Finally, it is an

issue that is felt less strongly by researchers but there is room for improvement by the bottom countries also when it comes to Remuneration and Job Stability.

5. RESEARCH LIMITATIONS

As many others, this research also has a few aspects that negatively impact the overall quality of the work and the results. Some choices that were made could be discussed and argued as not ideal ones, they don't fall under the scope of this paragraph since in fact they were the consequence of an evaluation of pros and cons. The research limitations fall out of any of these considerations and are intrinsic to the work.

The first limitation, or better put simplification, is that the whole population of researchers was considered and a distinction between field of sciences wasn't applied. This doesn't significantly affect the final results as considering every fields still gives a good understanding of the investigated topic, repeating the analysis dividing it by field of science would mean a deeper investigation of the topic.

Another issue to point out is that a very general view when it comes to ranking the countries was adopted. Macro metrics, like the % of R&D expenses compared to the GDP, were used to order the research landscapes from best to worst. This doesn't take into consideration the presence of specialized research clusters, certain institutes or a specific topic which characterizes the research scene of a country which represent centers of excellence that attract a great number of researchers and is closer to what the real research landscape in Europe looks like.

There is also a second problem with the way the rankings were built. Three self-reported measurements were used to cover different aspect of different indicators, they indicate what researchers felt about a certain topic which is a good way of getting to a statistic but it has the problem that it's not objective, researchers cannot compare the conditions between all

countries and ponder how much more satisfied they are in one place or the other. This is an important limitation but it was done as no alternatives were found, used in the Better Research Conditions this issue was corrected by giving a lower percentage to this statistic, in Career & Network and Culture & Personal it had to have a 50% weight since it was the only measurement to represent one of the two sides of the category. It is also true though that this type of statistic by definition can be used to cover the Personal side without it being a significant limitation.

Finally, in the step of calculating the Home and Abroad values in order to get to the probability there is one significant simplification. The Abroad value is obtained by multiplying the Weight representing the importance the country gives to the topic with the score of every other country and by doing the average. This gives an average satisfaction level of a researcher leaving its home state and that is precisely the idea, by staying home you would be this happy, by not staying home and going anywhere else you would be this happy. The problem lays in this "anywhere else", it suggests that the researcher would leave and could end in any state randomly with each state having the same probability of being chosen. The reality is different, if a researcher wants to leave it will more likely end in countries which will better satisfy its needs and less in others, even if still not to be excluded.

6. CONCLUSION

The findings seem to be consistent with the hypothesis formulated at the beginning of this work. As mentioned, gender does not seem to have an impact on the mobility preferences of researchers, this finding is consistent with the work of (Fonseca et. al, 2019) colleagues which suggests there isn't a disparity in gender between researchers that move out of a country, and researchers that stay. The outcome is similar but there is a difference in how strongly the

single issues are felt between genders with female researcher in the bottom countries of Table 5 having the worst working conditions.

When it comes to nationality the interesting thing to point out is that the size of the economy doesn't seem to have an impact on the probability of a researcher leaving but the numbers point out to a distinction between North and South Europe. Within the area bigger economies tend to rank higher than smaller economies, but this as well is not always the case as, especially in the top positions, smaller economies like Belgium and Austria ranked better than countries like France or the United Kingdom. This distinction between North and South Europe was also pointed out by (McInroy et. al, 2018) and his colleagues and the analysis provided in this paper further confirms it.

All of this tells us there are still strong differences between member states that EU policies weren't able to eliminate. Researchers from Southern European countries tend to leave more and most of times it's because the conditions at home do not offer enough value for them to stay, the MORE study defines this as escape mobility. On the other hand, most researchers from Norther European countries tend to leave after they've evaluated the pros and cons of the possibilities offered to them, this presupposes the existence of a choice and outlines a different mobility situation defined by MORE as expected mobility. Gender does not seem to have an impact on this matter. Things change though when analyzing the motives why people leave. It becomes evident that women in the bottom countries have worse working conditions than their male counterparts, as mentioned though this doesn't seem to translate in higher amounts of women leaving.

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