Evaluating the recruiters' gender bias in graduate competencies

Paolo Mariani, Andrea Marletta

University of Milano-Bicocca

1. Brief introduction to mismatch in Labour market
2. Methodology: The use of utility scores in Conjoint Analysis combined with a re-valuation economic index
3. Application and results
4. Conclusions and future work

Mismatch in Labour market

In Labour market, skills required of the graduates for the job do not coincide with the skills offered by the graduates applying, creating a mismatch between education and the labour market.

Beyond this mismatch, another bias could be generated by gender in the recruitment process. But, if there is a huge literature in gender gap during the recruitment process about politics or academic world (Hardin et al., 2002, Van den Brink et al., 2010), here the gender bias has been considered for the respondents and not for candidates.

The aim of this study is to understand if there exists a difference in the evaluation of possible candidates for a new hiring when the recruiter is male or female.

Goals of the study

Objectives of the research:

- to identify an ideal graduate profile for several job positions
- to detect some across the-board skills, universally recognized as "best practices" for a graduate
- to achieve differences and valuations between new graduates changing the recruiters' gender
- to compare utilities for graduates in various areas of study
- to evaluate difference in wages for all profiles

Dataset description

Our choice-based experiment was run in the framework of the Electus project. As far as the Milano-Bicocca research unit is concerned, interviewees were representatives of companies registered on the Portal of Almalaurea for recruitment and linkage. Final respondents were 471.

The frequency distribution about recruiters' gender was equally balanced with male (41%) and female (59%).

Economic sectors	M	F	Total
Services for companies	63.1	61.0	62.1
Family Services	17.1	15.7	16.2
Manufacturing	12.8	16.5	14.9
Others	6.9	6.7	6.8

Employees	M	F	Total
15-19	52.4	27.2	37.5
20-49	17.3	12.7	14.5
50-249	15.7	32.6	25.6
250+	14.7	27.5	22.4

Source: Electus survey

The fixed setting for the experiment was provided by considering different professional profiles, here the attention has been focused on Administration Clerk (AC).

Other compositional aspects for gender gap

Female recruiters are younger and with an higher education, but they perform lowest roles in companies more pointed at foreign market.

Age	M	F	Total
≤ 34	13.0	33.7	25.2
$35 - 39$	16.7	23.6	20.9
$40 - 49$	35.4	26.4	30.1
$50 - 64$	32.3	15.9	22.6
≥ 65	2.6	0.4	1.3

Education level	M	F	Total
Primary	0.5	0.4	0.4
Secondary	22.9	15.9	18.8
Degree	58.3	60.1	59.5
Post-graduate	18.2	23.6	21.3

Source: Electus survey

Recruiters' role	M	F	Total
Entrepreneur	50.5	13.1	28.6
Director	16.7	8.4	11.8
Manager	21.9	40.5	32.9
Others	10.9	38.0	26.7

Market	M	F	Total
National	49.5	39.6	43.8
Both	43.2	47.4	45.7
International	7.3	13.0	10.6

Source: Electus survey

Data: Attributes and levels

Employees' characteristics, as described in new graduates curriculum vitae, consisted of the attributes, and their respective levels.

Attributes	Levels
Major	Education Sciences
	Political Sciences/Sociology
	Economics
	Law
	Statistics
	Industrial engineering
	Mathematics/Computer Sciences
	Psychology
	Foreign Languages
Degree level	Bachelor
	Master

Attributes	Levels
Final grade	Low
	Average
	High
English knowledge	Suitable to communicate with foreigners
	Inadequate to communicate with foreigners
Work experience	None
	Internship during or after completing university
	Discontinuous work during university
	One year or more of regular work experience
Willingness to travel	Willing to travel also for long periods of time
	Willing to travel only for short periods of time
	Not willing to travel

Possible profiles obtained from combining every level in a full factorial scenario were so numerous, so it was necessary to apply an ad-hoc fractional factorial design. This experimental final design results both orthogonal and balanced.

Conjoint Analysis

Conjoint analysis (CA) is a technique widely used to investigate consumer choice behaviour. In particular, in this study CA refers to the stated preference model used to obtain part-worth utilities. The aim of this model consists in estimating a utility function U_k for the characteristics describing several profiles. The U_k is defined as follow:

$$U_k = \sum_{s=0}^{n} \beta_s x_{sk} \tag{1}$$

where x_{0k} is equal to 1 and n is the number of all level of attributes which define the combination of a given profile, x_{sk} is the dummy variable that refers to the specific attribute level. As a result, the utility associated with k alternatives (U_k) is obtained by summing the terms $\beta_s x_{sk}$ over all attribute levels, where β_s is the partial change in U_k for the presence of the attribute level s, holding all other variable constants.

Index of Relative Importance

The range of the utility values for each attribute from highest to lowest, provides an indicator of how important the attribute is compared to the others. The larger the utility ranges the more important is the role that the attributes play. For any attribute j, the relative importance can be computed by dividing its utility range by the sum of all utility ranges as follows:

$$I_j = \frac{\max(W_j) - \min(W_j)}{\sum_{j=1}^{J} [\max(W_j) - \min(W_j)]}, \tag{2}$$

where J is the number of attributes and W_j is the set of part-worth utilities referring to the various levels of attribute j.

The economic re-valuation index

Part-worth utilities of levels obtained from CA represents the starting point to re-evaluate the proposed Gross Annual Salary for new hirings. Economic re-evaluation is carried out through relative importance of attributes in non-standard CA using Mariani-Mussini coefficient of economic valuation MI_{ij}. The general formulation of MI_{ij} is:

$$MI_{ij} = \frac{U_i - U_b}{U_b} * I_j \tag{3}$$

where U_i is the total utility associated with the profile i, U_b the total utility associated with a baseline profile and I_j is the relative importance for the attribute j. Given the salary associated with the baseline profile π, the coefficient can be expressed, in monetary terms, as:

$$V_{ij} = MI_{ij} * \pi \tag{4}$$

Ideal profile for new graduates

Ideal profiles for each job vacancy are shown. They are similar each other except for Field of Study. This reveals the existence of some cross or specialized competencies.

Competencies	AC	HR	ICT	MKT	CRM
Field of Study	Economics	Psychology	Comp.Sci	Economics	Economics
Degree level	Bachelor	Bachelor	Master	Master	Master
Degree Mark	High	High	High	High	Medium
English Knowledge	Suitable	Suitable	Suitable	Suitable	Suitable
Work experience	Regular	Regular	Regular	Regular	Regular
Willingness to travel	Long	Long	Long	Short	Short

Administrative Clerk (AC); Marketing assistant (MKT); Human Resources assistant (HR);
Customer Relationships Manager (CRM); Information and Communication Technology professional (ICT)

- Specialized competence: Field of Study
- Cross competence: English Knowledge, Work experience
- Quasi-cross competence: Degree Mark, Willingness to travel
- Not-binding competence: Degree level

Best profile and importance indexes of competences for AC

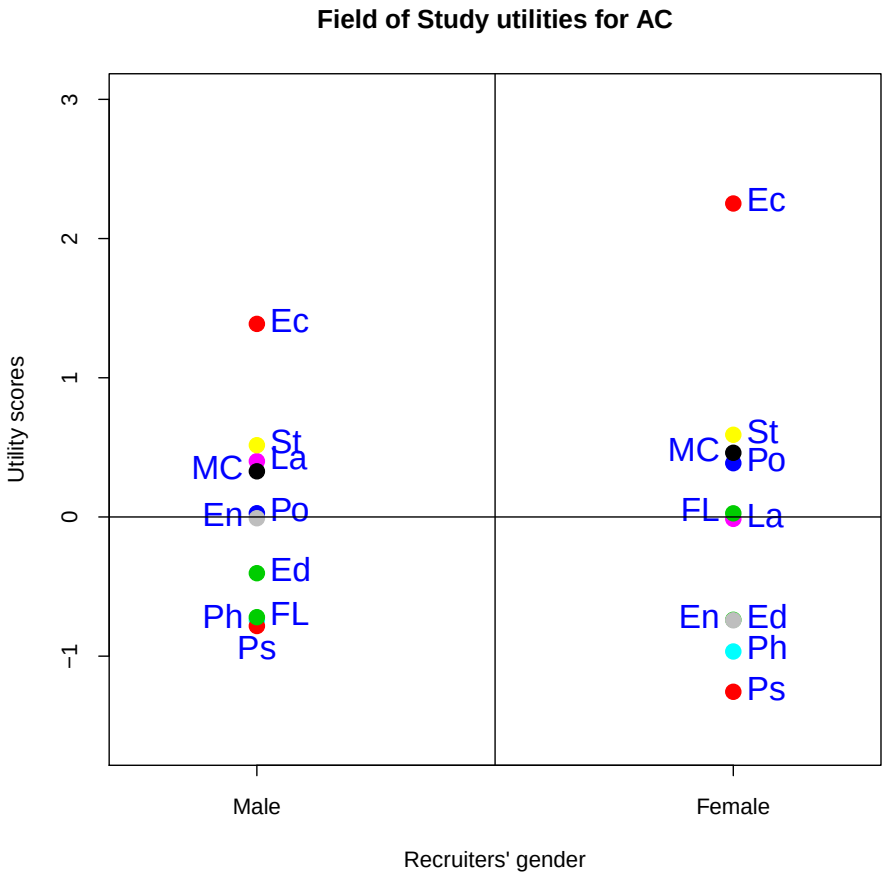
	Respondent's gender			
	Male		Female	
Competence	**Best**	**Importance**	**Best**	**Importance**
Field of Study	Economics	40.47%	Economics	59.21%
English Knowledge	Suitable	20.81%	Suitable	12.62%
Relevant work experience	Regular	16.12%	Regular	13.72%
Degree Mark	High	14.30%	High	10.72%
Willingness to travel	Long	4.17%	Long	3.20%
Degree level	Bachelor	4.13%	Bachelor	0.53%

Source: Electus survey

The gender bias is present not in the detection of the best profile but in terms of importance indexes. The best competencies for each attribute are equal generating the same best profile, but there is a lot of difference in computing the importance indexes of the attributes.

Field of study part-worth utilities for AC

Part-worth utilities for Field of Study attribute are displayed for male and female recruiters for AC figure. Economics studies represents the best profile considering but there is no perfect correlation between two rankings.



	Ranking	
Field of Study	**Male**	**Female**
Economics	1	1
Statistics	2	2
Law	3	6
Mathematics	4	3
Political Sc.	5	4
Engineering	6	8
Educational Sc.	7	7
Languages	8	5
Philosophy	9	9
Psychology	10	10
Correlation $(\rho)=$	0.854	

Source: Electus survey

Monetary re-valuation for AC

Since U_b is the ideal profile, all values for V_{ij} will be negative and the salary associated is $\pi = 24.000€$. Relevant differences are present between recruiters males and females.

Competencies	Male	Female
Field of Study		
Philosophy and Literature	-2.661,6	-5.539,2
Educational Sciences	-2.236,8	-5.148,0
Political Sciences	-1.699,2	-3.211,2
Economics	0,0	0,0
Law	-1.233.60	-3.900,0
Statistics	-1.089,6	-2.860,8
Engineering	-1.744,8	-5.152,8
Computer Sciences	-1.322,4	-3.081,6
Psychology	**-2.712,0**	**-6.038,4**
Foreign Languages	-2.632,8	-3.830,4
Degree level		
Bachelor's	0,0	0,0
Master's	**-28,8**	0,0
Degree mark		
Low	**-338,4**	**-196,8**
Medium	-38,4	-60,0
High	0,0	0,0

Competencies	Male	Female
English Knowledge		
Suitable	0,0	0,0
Inadequate	**-717,6**	**-273,6**
Work experience		
No experience	**-429,6**	**-324,0**
Internship	-297,6	-189,6
Occasional	-360,0	-271,2
Regular	0,0	0,0
Willingness to travel		
Unwilling to travel	-14,4	-16,8
Short period	**-28,8**	**-16,8**
Long period	0,0	0,0

In bold the maximum values in € for each competence

Source: Electus survey

Conclusions and Future Research

- The research was presented in order to detect enterpreneurs' preferences and obtain ideal profiles using part-worth utilities from CA
- Existence of different kind of attributes declared as cross, specialized or not-binding: *Field of Study* proves to be the more relevant with substantial differences for levels of this attribute
- Interesting results regarding differences in importance indexes despite no gender bias in the detection of the best profile
- Clear differences in wages between male and female recruiters (but pay attention to the compositional aspects)
- Future research could concern monetary confidence intervals based on individual partial utilities