

UNINTENDED EFFECTS OF ANONYMOUS RESUMES

By LUC BEHAGHEL AND BRUNO CRÉPON AND THOMAS LE BARBANCHON

ONLINE APPENDIX

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FIGURE A-1. EXAMPLE OF AN ANONYMOUS RESUME

CV N° 948311C-1-9

Technicien / Technicienne de laboratoire d'analyse industrielle

Le travail d'investigation, de contrôle conformité et mon gout pour le travail en équipe on fait que tôt je me suis orientée en chimie.

EXPERIENCES PROFESSIONNELLES

11/2008 - 02/2009	Technicienne de laboratoire, CARSO rattachée au service dioxine. Extraction, purification, évaporation sur échantillons d'eaux. Préparation pour analyse.
04/2007 - 06/2007	Technicienne qualité, Michelin Stage fin de DUT. Développement d'un processus de mesure et d'essai.

FORMATION

2007	DUT Chimie des matériaux Diplôme obtenu : oui
2004	Baccalauréat STL chimie Diplôme obtenu : oui

LANGUES

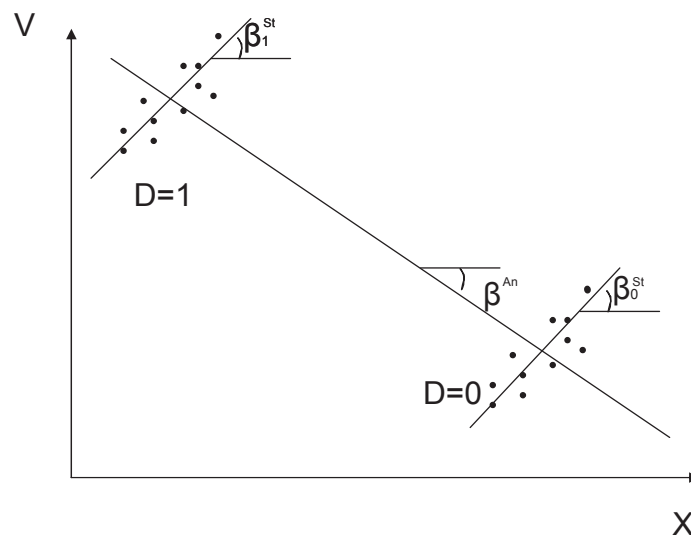
Anglais	Très bon
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COMPETENCES COMPLEMENTAIRES

Maîtrise du Pack Office, BAFA et AFPS.
Astronomie, nouvelles technologies, voyages.

Permis : B - Véhicule léger

FIGURE A-2. SIGNAL EXTRACTION WITH ANONYMOUS RESUMES



Notes: The figure illustrates signal extraction with anonymous resumes when the signal X is negatively correlated with minority status ($D = 1$). Even though the resume valuation V is positively correlated with X conditional on D (returns $\beta_1^{St} > 0$ and $\beta_0^{St} > 0$), the unconditional correlation is negative ($\beta^{An} < 0$).

TABLE A-1—SAMPLE SIZE AND RESPONSE RATES IN THE APPLICANTS' SURVEY FOR THE ANALYSIS OF THE DECISION TO PARTICIPATE AND JOHN HENRY EFFECT

	Population size (a)	# sampled for survey (b)	# of respondents (c)	Sampling rate (b/a)	Response rate (c/b)
A. Sample for Table 7 (applicants in firms inside and outside the experiment)					
Participating (control firms)	4,451	1,651	981	0.37	0.59
Refused to participate	2,389	717	397	0.30	0.55
Total	6,840	2,368	1,378	0.34	0.56
B. Sample for Table 6 (applicants in control firms with job postings after the experiment)					
During the experiment	1,903	815	420	0.43	0.52
After the experiment	2,548	836	387	0.33	0.46
Total	4,451	1,651	807	0.37	0.49

Notes: This table is restricted to firms that posted vacancies during and after the experiment. Candidates to non-participating firms were sampled among those firms. This explains why the population size of non-participating firms (2,389) is lower than that in Table 1, although we consider candidates both during and after the experiment. Indeed only 84 non-participating firms are included here. Similarly, only control firms that also posted vacancies after the experiment (around 200) are included here. Note also that all candidates to those control firms are included (this table is not restricted to the first pool of candidate sent to the recruiter). This is why the number of candidates in control firms during the experiment (1,903) is not significantly lower than that in Table 1, although this table considers fewer job vacancies. Finally, Table 6 only uses responding candidates in firms that have responding candidates during and after the experiment, so as to have a balanced panel of firms. This explains why only 807 candidates are considered as respondents (instead of 981). However, the results of Table 6 are qualitatively unchanged if one uses 981 responding candidates and an unbalanced panel of firms.

TABLE A-2—CANDIDATES' CHARACTERISTICS

	All	Participating			Non-participating			Diff-test p-value d-e
		a	Majority	Minority	Majority	Minority	Diff-test p-value b-c	
			b	c	d	e		
Women	0.457	0.561	0.425	0.534	0.317	0.000	0.067	
Under 26 years old	0.214	0.268	0.310	0.188	0.131	0.236	0.383	
Over 50 years old	0.078	0.104	0.118	0.045	0.064	0.600	0.671	
Deprived neighborhood (1)	0.240		0.484		0.506			
Immigrant (2)	0.218		0.449		0.455			
Child of immigrant (3)	0.171		0.337		0.370			
Minority: (1), (2) or (3)	0.481		1.000		1.000			
African- or Muslim-sounding name	0.209	0.017	0.451	0.026	0.388	0.000	0.000	
Professional degree	0.268	0.206	0.194	0.286	0.348	0.706	0.542	
High school diploma	0.188	0.210	0.246	0.134	0.190	0.335	0.334	
Upper education degree	0.465	0.553	0.479	0.469	0.385	0.065	0.388	
Relevant experience (years)	4.156	4.494	3.558	4.618	3.813	0.001	0.244	
Long-term unemployed	0.421	0.298	0.317	0.469	0.538	0.603	0.425	
Reservation wage is min wage	0.505	0.468	0.640	0.538	0.401	0.000	0.314	
Nb of observations	1,471	572	696	86	117			

Source: Candidates' survey. **Notes:** The first column present mean values of each variable on the population of candidates applying to vacant jobs eligible to the program (control, treatment or non-participating firms; firms without randomization have no candidates sent through the PES). Columns (b) and (c) compare majority and minority candidates applying to vacancies participating to the program (p-value of the test for identity in the last column). Columns (d) and (e) compare majority and minority candidates applying to vacancies not participating to the program. Survey sampling weights are used.

	Control	Treatment	Diff-test p-value
	a	b	a-b
Administrative data			
Firm with fewer than 100 employees	30.9	29.0	0.56
Firm with 100 to 200 employees	15.1	15.6	0.85
Firm with more than 200 employees	54.0	55.5	0.69
Non-market services	24.7	23.2	0.64
Market services	55.6	54.4	0.74
Manufacturing	13.8	16.9	0.23
Construction	3.4	3.6	0.90
Upper occupations	9.9	6.3	0.07
Intermediary occupations	24.4	26.0	0.63
Skilled white or blue collar	55.3	58.7	0.34
Unskilled white or blue collar	10.4	9.0	0.53
Indefinite duration contract	66.5	62.6	0.26
Contract for more than 6 months	86.0	82.2	0.16
Nb of resumes sent by the PES	5.5	5.5	0.90
Observations	385	366	
Firm survey			
Involves teamwork	85.2	75.4	0.01
Frequent customer contact	71.9	67.9	0.41
<i>Recruiters' characteristics</i>			
Woman	63.8	57.8	0.18
College graduate	59.0	62.1	0.48
French as mother tongue	97.8	97.6	0.90
Immigrant	2.6	2.4	0.86
Immigrant or daughter of immigrant	11.4	10.0	0.62
At least one friend (out of 5) with Muslim or Afr. name	24.6	22.0	0.55
At least one colleague (out of 5) with Muslim or Afr. name	27.5	27.0	0.88
Observations	229	212	

Source: PES administrative file (upper panel) and firm survey (lower panel). **Notes:** First three columns present mean values of each variable on the population of firms assigned to treatment and control as well as the p-value of the test of identity.

TABLE A-4—BALANCING TEST: CANDIDATES' CHARACTERISTICS

	Treatment	Control	Diff-test
	a	b	p-value
			a-b
Candidates' Survey			
Women	0.510	0.483	0.580
Under 26 years old	0.285	0.291	0.866
Over 50 years old	0.130	0.094	0.178
Deprived neighborhood (1)	0.224	0.241	0.557
Immigrant (2)	0.215	0.218	0.926
Child of immigrant (3)	0.169	0.157	0.661
Minority: (1), (2) or (3)	0.492	0.474	0.649
African- or Muslim-sounding name	0.228	0.225	0.922
Professional degree	0.223	0.181	0.243
High school diploma	0.204	0.247	0.224
Upper education degree	0.521	0.514	0.873
Relevant experience (years)	3.991	4.090	0.746
Long-term unemployed	0.326	0.290	0.324
Reservation wage is min wage	0.572	0.533	0.366
Nb of observations	608	660	
Coding of resumes			
Adequate skills	0.619	0.480	0.001
Adequate work experience	0.634	0.538	0.018
Interrupted work history	0.336	0.324	0.751
Uncertain rating	0.544	0.531	0.779
Nb of observations	554	586	

Source: Candidates' survey and resumes coding. **Notes:** First three columns present mean values of each variable on the population of candidates applying to vacant jobs assigned to treatment and control as well as the p-value of the test of identity.

TABLE A-5—IMPACT OF ANONYMOUS APPLICATIONS ON MINORITY APPLICANTS, BY QUALITY OF ANONYMIZATION

	Interview rate				
Intercept	0.094*** (0.016)	0.105*** (0.020)	0.107*** (0.020)	0.097*** (0.019)	0.110*** (0.023)
Anonymous (T)	-0.046** (0.020)	-0.051** (0.024)	-0.048* (0.025)	-0.045* (0.023)	-0.051* (0.028)
Has studied abroad (I)		-0.053 (0.039)			
T x I		0.022 (0.045)			
Has worked abroad (I)			-0.049 (0.039)		
T x I			0.011 (0.045)		
Speak Arabic (I)				-0.033 (0.044)	
T x I				0.001 (0.047)	
Resume imperfectly anonymized (Score)					-0.043 (0.035)
T x Score					0.008 (0.041)
Vacant job controls	Yes	Yes	Yes	Yes	Yes
Observations	696	617	636	649	597

Source: Candidates' survey. **Notes:** This table restricts the sample to minority candidates.

In the first column, we estimate the average treatment effect controlling for vacant job characteristics (note that there are almost no difference with estimates in Table 4, where we do not control for any covariates). In the following columns, we introduce one-by-one some characteristics of the resumes to explore treatment effect heterogeneity. In columns 2 to 4, the characteristics analyzed are easy to read from the resume. In the last column, we compute a score of minority status based on all signals available in the resume. When the score is over a certain threshold, the resume is said imperfectly anonymized. Survey sampling weights are used. Samples are smaller in columns 2 to 5, because not all resumes were available as hard copy and, as already discussed, coding is thus partial. Standard errors are clustered at the vacant job level.

TABLE A-6—ROBUSTNESS ANALYSIS: INTERACTION BETWEEN FOREIGN BACKGROUND AND RESIDENCE STATUS

	Interview rates		Hiring rates	
	Baseline	Interaction	Baseline	Interaction
	(1)	(2)	(3)	(4)
Intercept	.116*** (.026)	.116*** (.026)	.021** (.009)	.021** (.009)
Minority (I or D)	-.024 (.031)		.002 (.012)	
Immigrant (or child of) (I)		-.034 (.035)		.006 (.015)
Deprived neighborhood (D)		.017 (.050)		.002 (.023)
I × D		-.019 (.062)		-.013 (.028)
Anonymous (T)	.061 (.040)	.061 (.040)	.031 (.019)	.031 (.019)
T × (I or D)	-.107** (.045)		-.037* (.021)	
T × I		-.111** (.048)		-.053** (.023)
T × D		-.148** (.061)		-.038 (.029)
T × I × D		.197** (.079)		.088** (.042)
Nb. of obs.	1268	1268	1268	1268

Source: Candidates' survey. **Notes:** In this table, we decompose our minority indicator in its two main components: foreign background (immigrant or child of immigrant) and residence status. In column 1 (3), we recall our baseline difference-in-difference estimation for the interview (hiring) rates. In column 2 and 4, we distinguish candidates with foreign background (row 3), those residing in deprived neighborhood (row 4) and those who cumulate both (row 5). For example, in the control group, candidates with foreign background but not residing in deprived neighborhood have an interview rate that is -3.4 points lower than majority candidates. The effects of anonymization on the interview (hiring) rates of candidates with only one "discriminatory" characteristics are not statistically different whether the candidate has a foreign or lives in a deprived neighborhood: -11.1 vs. -14.8 points (-5.3 vs. -3.8 points). OLS estimation without any covariates. Survey sampling weights are used. Standard errors are clustered at the vacant job level.

TABLE A-7—ROBUSTNESS ANALYSIS: DIFFERENT MEASURES OF FOREIGN STATUS

	Immigrant or child of immigrant	Immigrant	Child of immigrant	Muslim- or African- sounding names
Interview rates				
Intercept	0.116*** (0.026)	0.111*** (0.022)	0.109*** (0.022)	0.116*** (0.023)
Minority (D)	-0.024 (0.031)	-0.016 (0.030)	-0.013 (0.030)	-0.029 (0.030)
Anonymous (T)	0.061 (0.040)	0.037 (0.034)	0.037 (0.032)	0.031 (0.034)
T × D	-0.107** (0.045)	-0.075* (0.041)	-0.087** (0.040)	-0.063 (0.041)
Observations	1,268	1,268	1,268	1,268
Hiring rates				
Intercept	0.021** (0.009)	0.025*** (0.008)	0.019*** (0.007)	0.022*** (0.008)
Minority (D)	0.002 (0.012)	-0.008 (0.011)	0.007 (0.013)	-0.000 (0.012)
Anonymous (T)	0.031 (0.019)	0.018 (0.016)	0.022 (0.015)	0.022 (0.016)
T × D	-0.037* (0.021)	-0.015 (0.019)	-0.027 (0.020)	-0.024 (0.020)
Observations	1,268	1,268	1,268	1,268

Source: Candidates' survey. **Notes:** Survey sampling weights are used. Standard errors are clustered at the vacant job level. We verify the robustness of our analysis when we change how the foreign status is measured. In the first column, we recall our baseline estimate where an individual is considered foreign when he is immigrant or child of immigrant. In column 2 (3), foreign status is restricted to immigrant (to child of immigrant). In column 4, we consider as foreigners candidates with Muslim- or African-sounding first names. In each column, a candidate belongs to the minority if he has a foreign status or if he lives in a deprived neighborhood.

TABLE A-8—ROBUSTNESS ANALYSIS: DIFFERENT SPECIFICATIONS

	Baseline	Basic controls	Controls resume coding	(3) + vacancy effects	Without sampling weight	Probit
	(1)	(2)	(3)	(4)	(5)	(6)
Interview rates						
Intercept	.116*** (.026)	.137 (.114)	.157 (.116)		.135*** (.020)	
Minority	-.024 (.031)	-.012 (.032)	-.016 (.032)	.010 (.053)	-.028 (.026)	-.023 (.030)
Anonymous (T)	.061 (.040)	.061 (.038)	.054 (.037)		.058* (.033)	.048 (.032)
T × minority	-.107** (.045)	-.094** (.045)	-.087** (.044)	-.096 (.075)	-.073* (.040)	-.089*** (.026)
Nb. of obs.	1268	1268	1268	1268	1268	1268
Hiring rates						
Intercept	.021** (.009)	.095 (.074)	.079 (.075)		.035*** (.011)	
Minority	.002 (.012)	.001 (.013)	.001 (.013)	.012 (.025)	-.002 (.014)	.002 (.014)
Anonymous (T)	.031 (.019)	.026 (.018)	.021 (.018)		.022 (.017)	.026* (.016)
T × minority	-.037* (.021)	-.026 (.021)	-.024 (.021)	-.038 (.038)	-.026 (.021)	-.025* (.011)
Nb. of obs.	1268	1268	1268	1268	1268	1268

Source: Candidates' survey. **Notes:** The table provides different estimations of the difference-in-gap equation: $Y_{ij} = \alpha_0 + \alpha_D D_i + \alpha_{An} An_j + \delta D_i \times An_j + \varepsilon_{ij}$. The first column considers estimation of the equation using sampling weights. It provides the reference results also reported in Table 4. The second column adds the following control variables (listed in Tables 2 and 3): firm size and industries, occupations and type of contracts offered, candidates' gender, age, education, experience, unemployment status and dummies for each 15 PES' local branches. The third column adds covariates coded on a subsample of 1,140 resumes (indicators for interrupted labor market histories, adequate work experience, adequate skills, and uncertain rating). The fourth columns adds vacancy fixed effects. The fifth uses the same specification as in the first column, but without sampling weights. The sixth column reports marginal effects of a probit estimation based on the specification of the first column. Survey sampling weights are used (except in column 5). Standard errors are clustered at the vacant job level.

TABLE A-9—ROBUSTNESS ANALYSIS OF FIRMS' PARTICIPATION: DIFFERENT SPECIFICATIONS

	Baseline	With controls	Without sampling weight	Logit
	(1)	(2)	(3)	(4)
Interview rates				
Intercept	0.210*** (0.059)	0.200*** (0.047)	0.140*** (0.028)	
Minority	-0.137** (0.062)	-0.115** (0.049)	-0.049 (0.033)	-0.142** (0.061)
Participating (P)	-0.070 (0.063)	-0.056 (0.052)	0.007 (0.033)	-0.058 (0.050)
P × minority	0.143** (0.069)	0.113** (0.057)	0.044 (0.040)	0.190* (0.104)
R^2	0.162	0.220	0.138	
Nb. of obs.	1,378	1,378	1,378	1,378
Hiring rates				
Intercept	0.129*** (0.042)	0.128*** (0.037)	0.101*** (0.024)	
Minority	-0.095** (0.045)	-0.092** (0.040)	-0.065** (0.026)	-.076** (.036)
Participating (P)	-0.083* (0.044)	-0.078** (0.037)	-0.042 (0.027)	-.060** (0.030)
P × minority	0.087* (0.049)	0.076* (0.040)	0.046 (0.030)	.091 (0.077)
R^2	0.090	0.136	0.061	
Nb. of obs.	1,378	1,378	1,378	1,378

Source: Candidates' survey. **Notes:** The table provides different estimations of the difference-in-gap equation: $Y_{ij} = \alpha_0 + \alpha_D D_i + \alpha_1 P_j + \alpha_2 D_i \times P_j + \epsilon_{ij}$. The first column considers estimation of the equation using sampling weights. It provides the reference results also reported in Table 7. The second column adds the whole set of variables listed in Tables 2 and 3 as control variables (firm size and industries, occupations and type of contracts offered, candidates' gender, age, education, work experience and unemployment status). The third column estimates the previous equation without sampling weights. The fourth column reports marginal effects of a logit estimation. Survey sampling weights are used (except in the third column). Standard errors are clustered at the vacant job level.

Table A-10—: Firms' participation

Dependent variable	Participation	
	(1)	(2)
Mean of dep. var.	0.623 (0.012)	0.618 (0.022)
Firm with 100 to 200 employees	-0.001 (0.035)	0.014 (0.061)
Firm with more than 200 employees	0.018 (0.026)	0.010 (0.045)
Non-market services	-0.001 (0.032)	-0.075 (0.052)
Manufacturing	0.010 (0.042)	-0.085 (0.069)
Construction	0.066 (0.072)	0.095 (0.126)
Upper occupations	0.037 (0.054)	0.076 (0.083)
Intermediary occupations	0.015 (0.041)	-0.026 (0.070)
Skilled white or blue collar	-0.052 (0.037)	-0.031 (0.064)
Indefinite duration contract	-0.012 (0.031)	-0.049 (0.046)
Temporary contract for more than 6 months	-0.048 (0.038)	-0.057 (0.059)
Involves teamwork		-0.019 (0.045)
Frequent customer contact		-0.045 (0.039)
<i>Recruiters' characteristics</i>		
Woman		-0.070* (0.038)
College graduate		0.067 (0.042)
French as mother tongue		-0.032 (0.087)
Immigrant		0.005 (0.110)
Child of immigrant		-0.082 (0.069)

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... table A-10 continued

Dependent variable	Participation	
	(1)	(2)
At least one friend (out of 5) with Muslim or Afr. name		-0.057 (0.050)
At least one colleague (out of 5) with Muslim or Afr. name		0.017 (0.045)
Local PES branch fixed effects	Yes	Yes
Observations	1,613	721
R-squared	0.277	0.484

Source: PES administrative file and firm survey. **Notes:** We estimate linear probability models of the firms' decision to participate. The reference group is made up of firms with fewer than 100 employees selling services in the market sector and posting a vacancy for an unskilled position. Column 1 relies on characteristics available in the administrative file (exhaustive population). In column 2, we add covariates obtained from the firm survey (restricting the sample to respondents). Thus survey sampling weights are used in column 2. Robust standard errors are in parentheses. We compute the F-test of the joint nullity of the coefficients in column 1 (resp. in column 2) related to size 0.73 (0.97), industries 0.83 (0.28), occupations 0.04 (0.44) and contracts 0.39 (0.52). In column 2, we also compute the test related to work type 0.39 and recruiters' characteristics 0.22.

TABLE A-11—EFFECTS OF DIFFERENT ELEMENTS OF THE RESUME ON THE INTERVIEW DECISION

	Standard application		Test	Anonymous	Test
	Majority	Minority	p-value	All candidates	p-value
	$\beta^0(St)$	$\beta^1(St)$	$\beta^0(St) = \beta^1(St)$	$\beta(An)$	$\beta^0(St) = \beta^1(St) = \beta(An)$
	(1)	(2)	(3)	(4)	(5)
Minority effect (α)		-0.014 (0.090)			
High overall rating	0.078 (0.066)	0.074* (0.038)	0.961	0.044 (0.044)	0.853
Has interrupted work history	-0.090 (0.060)	0.038 (0.046)	0.070*	-0.044 (0.040)	0.156
Adequate skills	0.120** (0.056)	0.044 (0.045)	0.304	0.032 (0.040)	0.428
Adequate work experience	-0.056 (0.059)	0.007 (0.049)	0.416	0.031 (0.035)	0.444
High uncertainty	0.064 (0.055)	0.076 (0.047)	0.862	-0.098** (0.050)	0.024**
Nb of candidates	252	334		554	
Nb of vacant jobs		283		270	

Source: Candidates' survey and resumes' coding. **Notes :** Robustness analysis for Table 8. We estimate the effects of resumes' signals on the interview rate in a model with vacant job fixed effect. Standard errors are clustered at the vacant job level. Columns 1 and 2 show returns to signals x when resumes bear names (estimation of $I_{ij} = (1 - D_i) \times X_i \beta^0(St) + \alpha D_i + D_i \times X_{ij} \beta^1(St) + c_j + \nu_{ij}$, where i indexes candidates, j indexes vacant jobs and D indicates minority status), and column 4 when resumes are anonymous (estimation of $I_{ij} = X_i \beta(An) + c_j + \nu_{ij}$). Column 1 concerns majority candidates (results for $\beta^0(St)$), column 2 minority candidates (results for α and $\beta^1(St)$). In column 3, we report the p-value of the test of equality in returns between columns 1 and 2. In column 5, we report the p-value of the test of equality between columns 1, 2 and 4. For example, when nominative resumes display an interruption in labor market history of the candidate, the interview rate of majority candidates decreases by 9 points and that of minority candidates increases by 3.8 points.