A TEST OF THE SIGNALLING HYPOTHESIS – EVIDENCE FROM A NATURAL EXPERIMENT

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Abstract

The paper proposes an alternative methodology for testing signalling hypothesis based on chances to get a job in a particular class of the job market. The individuals are ranked and matched by an external mechanism, based on preferences of employers in respect to actual observable and perceived unobservable attributes of individual. This paper tests existence of a relation between the set of observable and revealed attributes and the outcome of the game, specifically: whether signals associated with attained education plays a significant role in determining chances of the individual to get a job. The proposed model is empirically tested by applying a unique dataset from a natural experiment, conducted in Poland in years 2002-2005, where a relatively large set of job market candidates are offered a chance to get a paid internship at an attractive employer, with considerably great chances of getting a permanent job thereafter. Results support the hypothesis, that in the absence of revealed attributes, employers decisions depend upon signals on education. Whenever information is available, the significance of the signals diminishes.

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I. Introduction

According to the concept of signalling hypothesis, introduced by Spence (Spence 1974), firms have incentives to pay higher wages for attained education, while individuals have incentives to acquire extra education, even in the absence of increased productivity caused by this extra schooling. As summarized by Singell and others (e.g. Singell, Seaman, Chatterji 1998) motivation of individuals to go to school is thus not limited to learning skills, but it is also driven by higher expected benefits from schooling, higher discount rate of future payoffs and enjoying learning (e.g. Hartog, 1983; Altonji, 1995). The assumed correlation of those incentives with attributes of productive worker provides an objective signal of their capabilities, that enhance return to on-the-job training, reduce the probability that individual will quit the job or reduce costs of monitoring.

The hypothesis requires asymmetric distribution of information between individual and employer regarding actual level of individual's skills. Assuming a positive correlation between performance in school and the productivity at the workplace, employers use the information on the attained education to observe the underlying potentials of the individuals, that are not observed directly.

Most of the empirical tests of signalling hypotheses are based on the relationship between wages and education in earnings equations (e.g. Willis, 1986; Murphy and Welch, 1990). The relationship between higher education and increased wages is explained either directly by increasing individual productivity as effect of additional schooling or indirectly through a positive correlation of the attributes of the productive worker with education.

The paper proposes another method of testing signalling hypothesis, alternative to explaining the differences in earnings. The signalling potential of education is measured by chances of an individual to get a job in a particular model of the job market, introduced in details in the following chapter. Briefly introducing: there exist sets of open slots (job positions) and individuals as well as an external mechanism, that matches individuals with available slots, one after another. The individual with the highest rank is designated to have a job, though the final decision of admitting or rejecting an individual is left to a firm, that makes its after revising individuals observed attributes. The matching mechanism operates as long as there are any available slots left., that observing set of signals makes its decision out of individuals that . Once all the available slots are matched, the game is over: all matched individuals have a job, while all unmatched become unemployed.

By providing an alternative method of testing signalling hypothesis, author overcomes drawback of existing literature, where the available data significantly limits opportunity to measure the effect of signalling. Additionally, by determining chances of getting a job, instead of explaining differences in wages, the presented analysis makes it more plausible to filter out the signalling effect and direct productivity-enhancing return to education, which in most studies on education are confounded (e.g. Weiss, 1995).

This paper develops a theoretical model that extracts a signal from the probability of being offered a job opportunity as a function of observed educational attainments and set of abilities revealed by an individual. The empirical analysis uses unique dataset from a natural experiment, conducted in Poland in years 2002-2005, where a relatively large set of job market candidates are offered a chance to get a paid internship at an attractive employer, with considerably great chances of getting a permanent job thereafter.

The empirical analysis is based on the operational database of the founder and manager of the program – PricewaterhouseCoopers in Poland.[1] The available dataset was unique in its detail of personal attributes and provided extensive information on how the matching process was realized. An ordered-logit analysis uses discrete levels of the highest attained stage of competition for each given individual to measure his/her chances to get a job. The differences between attained levels are used to derive a continuous signal measure that is found to depend on individual attributes, including signals from attaining higher education. The estimated coefficients on attained universities may be used to construct a time varying ranking of higher education institutions in Poland in terms of their ability to increase chances of their graduates on the job market, whereas the statistical significance was used to test signalling hypothesis.

[1] The empirical part of the paper was made possible by PricewaterhouseCoopers in Poland, Department of Marketing Communication, that provided dataset used for natural experiment.

II. Model

The approach proposed in this paper offers an alternative method of testing signalling hypothesis by measuring chances of an individual to get a job under fixed and uniformly distributed slots of available positions, conditional upon observable attributes.

The number of available slots k is limited and considerably lower than number of individuals n, so $n > k$. There exists an external mechanism, that based on a preference relation rule ranks individuals in respect to some observed ability and matches the most preferable individuals, one after another, with available slots. The matching process is repeated as long as there are available slots. Once all the available slots are matched, the competition is over: all matched individuals have a job, while all unmatched become unemployed.

The mechanism consists of two stages, which works as follows. In each iteration, in the first stage, the weakly preferred individual to all individuals that are in the pool is drawn and offered a chance to get a job, out of a relatively small subset of available slots. If individual does not accept any of the designated slots, he/she comes back to a pool. If he accepts it, he/she is pre-selected to face the second stage of selection process.

In the second stage of the process, symmetrically, firm is allowed to select one individual of the designated subset of individuals who were pre-selected in the first stage and who have accepted the job position. If individual is successful in the second stage, he/she gets a job, other way – individual comes back to a pool.

In the additional stage of selection process, where firm selects one of the set of pre-selected individuals, attributes of individuals are not entirely observed directly by the firm. Firms use the unobservable attributes to support their decision. Employers may exploit, detailed information on the attained education and ability attributes of individuals.

The wage is assumed to be the same across the slots, so neither individual nor a firm compete using monetary payoffs. Thus, even if an individual may go through the matching mechanism many times, he/she has no incentive to do so: instead he/she is induced to act as quickly as possible to accept an offered match in order to find the best available matching. Similarly, firm also wants to fill the available slots as soon as possible, to avoid a risk of losing the best available individuals, whereas the individual to avoid a risk to becoming an unemployed individual.

Formally, each individual i is described by a set containing vectors of observable attributes ψ_i and unobservable attributes ϕ_i.

For simplicity, it is assumed that there does not exist any threshold level of observable attributes, that firms setup. This assumption allows to treat the first stage of the matching process as a random process, i.e. there exists no mechanism of constructing the subset of slots, that are offered to the most preferred individual in the first stage. If all individuals were restricted to be indifferent between any two slots, the first stage of matching process would be a random event, conditional upon individual's rank. But, since individuals are allowed to reveal their preferences in respect to slots, the first stage plays an important role in allowing to get the preferred outcome of the entire game.

Let Ω stands for the set of individuals:

$$\Omega = \{I_i : 0 < i < n+1, I_i = \{\succeq_i, \psi_i, \phi_i\}\} \quad [1]$$

while A for the set of available slots:

$$A = \{\Gamma_j : 0 < j < k+1, \Gamma_j = \{\tilde{\succeq}_j : \tilde{\succeq}_j \sim \Phi_j\ (\psi_i, \hat{\phi}_i), \hat{\phi}_i(\psi_i)\}\} \quad [2]$$

After each successful matching iteration, the number of available slots k and available individuals n shrinks by one. Since the initial number of available slots is far lower than this of individuals, the Bayesian probability of getting the job after any successful matching is lower ($P_{i,t} > P_{i,t+1}\ \forall_{i,t}$). This provides, as described earlier, the incentive for an individual rather to accept one of the offered slots, than to reject all of them and wait for the next iteration.[2]

As shown, the *i*-individual preferences are exogenous, but preferences of the *j*-firm depends on the observable attributes of *i*-individual as well as on the expected non-observable attributes that are based on the observable. If one allows *j*-firm preferences $\succsim_j$ to be represented by an indirect utility function Φ_j of a regular properties, it may be shown, that under fixed and constant wage across firms and individuals and positive relationship between observed abilities and actual productivity, the firm's utility maximization problem is a symmetric to a profit maximization problem under unrestricted wages. Additionally, under general assumptions – e.g. constant marginal returns to abilities, the firm's decision should be the same in respect to a given individual.

Since the indirect utility function Φ_j depends on the observable attributes only $\Phi_j\ (\psi_i\ ,\ \hat{\phi}_i(\psi_i))$, firm's decision may be represented by setting a set of thresholds in observed attributes, that decide whether to accept or reject an individual. The indirect utility is a linear function of observable attributes, whereas the probability that a firm will hire individual depends upon the thresholds – set of critical values δ_s for each of *s* stages of the competition.

If vector of observable attributes of *i*-individual includes information on the

[2] Individuals do not know their actual rank unless it is the highest, nor the number of remaining available slots *k*. The rank is revealed to individual only if it is the highest, when the individual is offered a subset of available slots in the first stage. The ranking rule is allowed to slightly change in each iteration, so individual who rejects all offered slots in the first stage may not be ranked as the highest in the following iteration.

education attained by i-individual π_i:

$$\psi_i = \{\Theta_i, \pi_i\} \qquad [3a]$$

hence:

$$\hat{\Phi}_{j\,i}(\psi_i\,,\ \hat{\phi}_i(\psi_i)) = A\Theta_i, + B\pi_i + \varepsilon \qquad [3b]$$

where Θ_i stands for all the remaining observable information on i-individual attributes, testing the significance of the vector B of coefficients on π_i provides an evidence for accepting or rejecting the signalling hypothesis.

In order to conduct the test, the unknown values of the thresholds will be estimated using maximum likelihood for each threshold δ_s:

$$P(\delta_s < \Phi_j < \delta_{s+1}) = P(\delta_s - A\Theta_i, - B\pi_i < \varepsilon < \delta_{s+1} - A\Theta_i, - B\pi_i\ )$$

III. Natural Experiment

“Grasz o staż” (eng. „Play for internship”) is the most recognized opportunity for polish students and graduates to get an internship. It was started in 1996 and conducted since then by PricewaterhouseCoopers and the “Gazeta Wyborcza” daily. Depending on the year, a total of up to 200 internships were made available in each edition, mostly at regional quarters of global corporations, leading domestic companies, governmental and non-governmental organizations and the state administration.

In order to provide equal opportunities to students from different regions of the country, all internships are paid, with a salary sufficient to support temporary accommodation and cover costs of living out of home or study town.

The Competition targets on university students of the third, fourth, or fifth year and graduates; for many of them it opens a gateway to their first job experience related to their education. An opportunity to win an internship placement, with potentially high probability of turning it into a regular employment strongly encourage students and graduates to participate. The average chances to get internship were in the range of 10 – 20 percent. Table 1 presents descriptive statistics, including information on how the structure of participants across stages of the competition in each edition was distributed. [3]

A wide information set on profiles of preferences and attitudes against the labor market comes from a full-sample survey conducted at the entry level. Based on the questions asked, for many of the competitors, the participation in the program was a first step in their professional career. Beside winning an internship, winners are provided with a job market training and an opportunity to attend mobility training sessions to facilitate their future job search process. The inclusion of institutions of

[3] For 2002 edition, only dichotomous classification of the stages was available. Analysis does not cover data on 2003 edition.

public administration and non-governmental organizations, play a role in diversifying the internship offer and motivating a larger group of students to participate.

IV. Data

The data source for the empirical analysis was provided by PricewaterhouseCoopers in Poland, founder and organizer of the "Grasz o staz" program. The actual data used in analysis was extracted from the operational SQL based dataset. These data are unique in their detail of the individual, enhancing the ability to perform an empirical analysis. The data were collected during the 2002, 2004 and 2005 editions of the competition, including in total 4245 observations.

The operational character of the source additionally gave an opportunity to build a dataset, that allows to track the individual progress of the matching process, which may be used in further research to describe dynamically, how the game on the experiment's job market is being played.

Most of the variables used for further testing have been applied in their raw form. Though, there also exists a lot of variables that were generated based on the information provided. Particularly, the logit specification required standardization and aggregation of many of the available information. All the operations performed on the original dataset will be described in details.

Since the datasets were provided separately for each edition of the program, their merge involved generating dummy variables for each year of the edition. Similarly, information on all dichotomous attributes were turned into dummies, e.g. gender into female status, graduation from education system into absolvent status etc.[4] All geographical information were quantified as much as possible to avoid over-aggregation: place was coded using unique ZIP code, region was described by set of dummies, etc.

There was a particular attention brought to quantifying data on education. Participants of the program were students of or have graduated from more than 300 different higher education institutions, including more than 100 foreign based. The high dispersion of the schools made it necessary to focus on the most common and to treat all remaining as a homogenous group. Similar problem concerned faculties and departments. In order to bring as much information into logit specification as possible, the less popular occurrences were aggregated into wider categories, wherever possible without biasing outcome. Thus every educational attainment of all participants was described by a triple of dummies standing for school, faculty/department and major. Many contestants have graduated (or were still studying) on more than one institution and thus additional variable has been specified: number of institutions attended. To take into account effect of newly graduating students, which are particularly motivated to win an internship, as well as are firms mostly interested in hiring them, two additional variables were created: number of months to/since graduation (for all

[4] Though all the geographical information were transformed to quantitative form, the variables describing location were not included in the current analysis.

participants) and number of months remaining to graduation (for students only). Whereas the latest included only positive numbers for those who have already graduated, the first one included both negative numbers (for current students) and positive for graduated.

The attributes of technical skills were described in original dataset by discrete choices. Respondents were asked to evaluate their knowledge of six of the most popular foreign languages (English, German, French, Italians, Russian and Spanish) with possibility to list up to two additional languages, whereas all of them were separately evaluated in a scale: 0 – no skills, 1 – basic knowledge, 2 – intermediate level, 3 – advanced communication. Additionally to using this information, additional variables were generated: number of foreign languages known on at least basic level and similar variable for a number of foreign languages, known at least on an intermediate level. Beside the described above, extra variables were created to allow for joint knowledge of the pairs of languages, e.g. English and German, etc. In the latest case, the level of knowledge of one language has been multiplied by a level of knowledge of another. This allowed to distinguish for a substitution effect in learning languages, where usually respondents were focusing on an advanced communication in one language with opportunity cost of limited knowledge of another.

Similarly to evaluation of foreign languages, participants evaluated their knowledge of different aspects of computer skills. They were asked to assess their practical knowledge of 62 programs and operating systems either as basic, intermediate, advanced or none at all. In case of operating systems, the choices were: user, basic administration or advanced administration. Since in case of computer skills, one intuitively expects spill-over effects of knowledge, neither a cross-evaluation of joint knowledge of pairs of listed programs, nor a number of total programs known was calculated.

Finally, the crucial part for testing signalling hypothesis was included – the evaluation of previous professional experience. Contestants were allowed to list up to 10 different professional experiences, for each of them, providing date of beginning, date of quitting, name of the employer and description of the position. Those information were very detailed and if only appropriately quantified, were expected to provide important results. In spite of the natural difficulty and arising problems with application of such data into the quantitative analysis, the series were used after being transformed into a quantitative specification. This part of the original data processing was the most challenging and left the most doubts about its appropriateness and consistence. The only objective measure was the length of experience, calculated in months, based on span of time between starting the job and quitting it, whereas for current experience, the month when the official results of the program are revealed (in each edition it was June) was taken as the upper boundary of the time span. The other information available: name of the employer and position was quantified by associating a discrete number: form 1 to 4, depending on its significance in terms of recruiting process. The highest notes for employer's name were placed for global companies operating in Poland, regarded as the most attractive and demanding employers (such firms as: Arthur Andersen, CapGemini, Deloitte&Touche Ernst&Young, KPMG, PricewaterhouseCoopers, Procter&Gamble, Unilever, etc.). The next highest levels were associated with the most attractive domestic employers and second-rank global companies (Bank Handlowy S.A., BIG Bank Millenium, Citibank, Phillip Morris, Telekomunikacja Polska S.A., etc.). The other level was associated with other publicly recognized firms, where former experience and its evaluation can be easily checked with high confidence of their accurateness, whereas the lowest level was associated with all the remaining firms, that are not large enough to provide a transparent information, confirming the professional experience. Additionally, in case of any work provided abroad, the evaluation was upgraded by one to reward for cultural experience and other attributes of working abroad. The quality of the job was evaluated similarly to quantification of the quality of the employer, but here by assessing a perceived level of responsibility of the position. The responsibility was very widely understood, either by amount of people supervised, the material responsibility, impact on the environment or publicity. The highest evaluations were granted to e.g. upper-level managers, including CEO's, moderator of the live-broadcasted regional TV show or a first-role starring in a popular sitcom. Respectively, the lowest grades were obtained for a regular positions that does not require any level of responsibility, like picking up fruits, working as a waiter/ess, etc.

As noted earlier, this part of analysis raises the most concerns and thus its consideration in the specification of the model is tentative.

V. Results

To test the hypothesis within the proposed analytical framework an ordered logit model was estimated.

The level of competition that was attained by each participant provides dichotomous description of a natural order that may estimate an unobservable, continuous measure of the preferences of the employers. If this could be viewed as a one dimensional linear combination of the observable attributes, weighted by importance of each independent attribute on the employer's preferences, then a coefficient on the signal associated with educational institution attended by individual provides information on how brand of each university is important in terms of chances to get a job.

Any differences between estimated values provides an insightful information on how institutions differ among each other in signalling the unobserved abilities of individuals, regardless of any other observable attributes. The empirical results were provided for a large number of different model specifications, that allowed for testing different compositions of vectors of observable information on individuals Θ_i excluding signals on education.

The data were aggregated into groups containing different aspects of attributes. The detailed description of the groups is presented in Table 2. There were four groups of variables created: language skills, computer skills, professional experience and academic profile. The last of those contained information on major, department, number of universities, level of advancement in studies, etc. Joint combinations of all the groups allowed for thirteen different ways of specifying the model within each subsample, including an empty specification that did not contained any information (the only observable attribute is education signal). After testing those specifications for each subset of contestants, a total of about 1300 different specifications were estimated.

The subsets of contestants were chosen based on the results of the most aggregated data, data exhibited a relatively high dispersion in respect to such fundamental variables like: gender, graduation status (absolvent) and year of edition. In order to get rid of possible fixed effects associated with aggregation, each subset of the listed three variables were separately tested.

The inclusion of extensive dataset, that consists of very detailed, often – not popular attributes – negatively affected estimations, specifically for the more narrowly defined subsets of contestants. Most of logit estimations achieved in the widest specification of the model did not achieved convergence. This made necessitated to drop most of those “unpopular” attributes from specification and repeat estimations again.

The procedure of estimating parameters and checking the convergence was conducted multiple times. Each iteration leaded to a reconsideration of the most troublesome variables and eventually omitting it in further way. The presented results are those obtained for the most narrowly defined specification, so their provided an insightful analysis of responsiveness of education signals to differences in model specification.

Since a total of 63 universities was individually tested for statistical significance of their signals, only results for a sub-sample of those were presented in Table 2. The results for the most recognized universities were chosen here as well as those results that were consistently significant.

The results provided an empirical evidence for signalling hypothesis in the proposed framework of the job market. Particularly significance of the outcome of the signal does not change regarding different specification of the model, though a relatively weak robustness of the obtained specification indicates coexistence of additional issues, that may play important role. Particularly, the omitted variable problem should be concerned. Even though the dataset included very detailed information on the attributes of individuals, relatively small number of available job positions made an extensive use of many of the variables not possible in the application of an ordered-logit procedure.

The results obtained for more narrowly defined sub-samples of contestants in most occurrences increased the statistical significance of the obtained results, proving the existence of differentiated clusters of attributes within narrowly defined groups. Particularly, male students were less supposed to ace their quality of the language skills – instead the quantitative aspect – number of languages known played a more important role than in case of women.

The differences between students and graduates confirmed theoretical and intuitive predictions as exhibited an increasing role of experience factors in determining their chances to get a job, with a relatively less important role of their education.

The general result of the analysis is that as one could expect based on intuition – the less information on attributes is provided for analysis, the more variance in explanatory variable is being explained by available signals on education. However, the expansion of the number of the variables included in the analysis, as well as providing partial estimates for sub-samples provides a contradictive conclusion, that signals on education attained lacks its significance. The most narrowly defined sub-samples did not exhibit any ability to converge, thus even unabling to provide any estimates of the significance.

This conclusion supports basic assumption of the signalling hypothesis, that information asymmetry has to be present in order for employers to make an use of signals in estimating the perceived abilities. Whenever, the information is revealed, employer does not need signals on education to make recruitment decision.

VI. Final remarks

The paper tested the signalling hypothesis in the higher education in Poland, based on a natural experiment of a competition for students and graduates to win a lucrative internship at one of the most desired employers. Using data on participants' performance through a multi-stage selection process of the competition, their skills, educational background and professional experience, it has been tested, whether according to the signalling hypothesis, the brand of the school attended has significant impact on the chances to win the internship. The application of the ordered logit model in empirical part was caused by the way in which the job market has been modelled: the polychotomous outcomes of the multistage competition provided a natural estimation, that allowed to construct representation of the firm's utility.

The differences across the results were used to construct rankings of universities, in terms of their signalling possibilities. The theoretical model derived here, as an alternative method for testing signalling hypothesis, explained the contestants' abilities in terms of chances to get a job. The estimates support the predictions of the model that signalling depends on firm size and monitoring requirements and provide a continuous, predicted signal measure for second-stage earnings equations. The earnings results provide the first formal evidence of a significant positive return to a signal that differs by gender and indicate a downward bias in the return to education from excluding the signal measure.

Some of the basic concerns in testing empirical models have to be addressed. The first of them that appears to be of a particular significance for extending the obtained results for a more general conclusions is a problem of self selection.

It seems plausible to test for existence of sample pre-selection of contestants in this particular application. The program “Grasz o staz” is provided by a profit oriented organization, and thus it is intutitive to expect, that any decisions concerning its strategy is focused on optimised effects. If this is a reasonable assumption, one would expect an asymmetrical interest in participating in respect to university to exist: particularly, students of the more known institutions are more likely to be targeted by promotion of the program and thus more likely to attend it. Any promotional actions, provided by organizers at large or targeted schools may increase performance of students recruiting from those places. Similarly, peer effects are likely to arise, since communication with other participation may lead to synergy effects and help those students to have better chances to win an internship.

Though, one could propose an alternative scenario: because of asymmetric promotion of the program in respect to schools, students of the non-targeted institutions may be more likely – relatively to overall performance of their cohort - to win an internship as their participance in the contest – not enhanced by external factors is a purely endogenous self-motivation.

The effect of those or any other scenario should definitely be considered in the further work, for example by including in testing specification variables with available data on the sources of information regarding the contest and factors that brought individuals attention and supported decision of participating.

Another issue is that have been – at least partially included in the analysis are fixed effects. As noted earlier, different estimations were provided for sub-samples segregated based on gender, graduation status and year of edition. This, however only partially solves the problem, since also other variables than those three listed above may exhibit fixed effects, and more detailed specification could be alternatively proposed. Beside that, the relation between variables may not be consistent over time. Especially, in terms of exogenous shocks, with a flag example of the European Integration that opened huge opportunity to many young people to work abroad, may structurally change the mechanism of employers' preferations.

Another important source of fixed effect may come from changing specification of the abilities: introduction of new technologies – especially software skills, but one could mention languages instead, changes the definition of the expected "average" level of skills. It may lead to an overestimation of such skills in earlier editions and lead to an underestimation of the latter. This problem may also arise within the year edition – across the individuals. It seems reasonable to assume, that people from small towns or less competitive institutions will differently assess their skills in respect to their peers from large institutions. Thus an objective measurement of their skills or correction of potential bias, based on results of appropriate studies into the analysis would support judgement of presented notions.

Relate to the fixed effect is the problem with upper limit on the skills. One could argue, that for example advanced communication in English may be very widely distributed across individuals, but its accurateness can be easily checked during an interview with a differentiation leading to a selecting the right person. This unobservable bias from the available data is however naturally hard to correct.

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Table 1a. Descriptive statistics for main variables in the sample

	Total	4245	Female	2114	Male	2131
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
absolwent	0,324	0,468	0,334	0,472	0,313	0,464
female	0,498	0,500	1,000	0,000	0,000	0,000
language skills						
lang_english	2,460	0,662	2,464	0,665	2,455	0,659
lang_french	0,384	0,761	0,505	0,855	0,264	0,632
lang_german	0,982	0,940	1,007	0,981	0,957	0,896
lang_italian	0,089	0,373	0,131	0,456	0,048	0,260
lang_max	2,552	0,594	2,581	0,572	2,524	0,615
lang_oth	0,158	0,510	0,187	0,558	0,130	0,457
lang_russian	0,459	0,747	0,456	0,764	0,462	0,730
lang_spanish	0,117	0,417	0,154	0,484	0,080	0,334
laureat_status	0,995	1,437	0,866	1,375	1,124	1,486
nr_lang_avg	1,490	0,683	1,587	0,696	1,393	0,656
nr_lang_basic	2,458	0,858	2,569	0,871	2,348	0,832
professional experience						
months of #1 experience	7,451	15,584	7,284	15,142	7,618	16,013
employer of #1 experience	0,804	0,686	0,794	0,668	0,814	0,704
position of #1 experience	0,701	0,556	0,693	0,550	0,709	0,563
max employer of experience	1,342	0,837	1,343	0,821	1,341	0,853
max lenght of experience	24,0	381,9	30,7	531,9	17,3	99,0
max position of experience	0,982	0,529	0,977	0,509	0,986	0,548
education						
AE Kraków	0,018	0,133	0,021	0,143	0,015	0,124
AE Poznań	0,033	0,180	0,038	0,192	0,029	0,167
AE Wrocław	0,025	0,157	0,024	0,153	0,027	0,161
AGH Kraków	0,015	0,122	0,012	0,108	0,018	0,134
Polit. Białostocka	0,016	0,127	0,009	0,097	0,023	0,151
Politechnika Gdańska	0,004	0,065	0,004	0,065	0,004	0,065
Polit. Krakowska	0,012	0,109	0,010	0,102	0,014	0,116
Polit. Rzeszowska	0,011	0,105	0,010	0,099	0,012	0,110
Politechnika Śląska	0,023	0,149	0,007	0,081	0,038	0,192
Polit. Świętokrzyska	0,013	0,114	0,006	0,075	0,021	0,142
PWSBiA Warszawa	0,006	0,078	0,009	0,094	0,003	0,057
Szkoła Główna Handlowa	0,024	0,155	0,029	0,169	0,020	0,139
SWPS Warszawa	0,030	0,170	0,035	0,185	0,024	0,153
UAM Poznań	0,032	0,177	0,038	0,191	0,027	0,161
Uniwersytet Jagieloński	0,003	0,057	0,004	0,065	0,002	0,048
Uniwersytet Szczeciński	0,004	0,063	0,005	0,072	0,003	0,053
Uniwersytet Warszawski	0,008	0,092	0,006	0,078	0,011	0,103

Table 1b. Descriptive statistics for main variables in the sample

	2004	1590	2005	1789	Graduate	1374	Student	2871
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
absolwent	0,277	0,448	0,302	0,459	1,000	0,000	0,000	0,000
female	0,513	0,500	0,513	0,500	0,515	0,500	0,490	0,500
language skills								
lang_english	2,405	0,698	2,458	0,642	2,355	0,715	2,510	0,629
lang_french	0,387	0,765	0,385	0,763	0,400	0,770	0,376	0,757
lang_german	0,961	0,946	0,924	0,907	0,865	0,904	1,038	0,951
lang_italian	0,079	0,347	0,108	0,415	0,094	0,384	0,087	0,368
lang_max	2,507	0,628	2,547	0,578	2,463	0,638	2,595	0,567
lang_oth	0,134	0,472	0,151	0,503	0,177	0,557	0,149	0,486
lang_russian	0,437	0,732	0,439	0,730	0,563	0,780	0,409	0,725
lang_spanish	0,137	0,456	0,155	0,469	0,102	0,400	0,124	0,425
laureat_status	0,768	1,368	1,348	1,520	0,932	1,392	1,025	1,458
nr_lang_avg	1,445	0,684	1,475	0,690	1,448	0,715	1,509	0,667
nr_lang_basic	2,414	0,865	2,470	0,866	2,482	0,935	2,446	0,819
professional experience								
months of #1 experience	7,222	15,77	7,736	15,568	10,981	19,178	5,762	13,204
employer of #1 experience	0,724	0,648	0,806	0,652	0,962	0,656	0,728	0,688
position of #1 experience	0,648	0,567	0,717	0,557	0,828	0,503	0,639	0,570
max employer	1,246	0,787	1,330	0,765	1,469	0,831	1,281	0,833
max lenght of experience	15,8	74,0	37,3	583,8	23,0	97,0	24,5	459,5
max position of experience	0,956	0,556	1,006	0,525	1,063	0,497	0,943	0,540
education								
AE Kraków	0,023	0,149	0,023	0,150	0,023	0,151	0,016	0,124
AE Poznań	0,036	0,186	0,048	0,213	0,028	0,164	0,036	0,187
AE Wrocław	0,034	0,181	0,030	0,171	0,029	0,168	0,024	0,152
AGH Kraków	0,018	0,134	0,020	0,139	0,008	0,089	0,018	0,135
Polit. Białostocka	0,018	0,134	0,023	0,150	0,015	0,123	0,017	0,130
Politechnika Gdańska	0,006	0,075	0,005	0,071	0,003	0,054	0,005	0,070
Polit. Krakowska	0,015	0,122	0,015	0,122	0,009	0,093	0,014	0,116
Polit. Rzeszowska	0,016	0,127	0,012	0,108	0,009	0,097	0,012	0,108
Politechnika Śląska	0,028	0,166	0,029	0,166	0,009	0,093	0,029	0,169
Polit. Świętokrzyska	0,019	0,138	0,014	0,117	0,012	0,111	0,014	0,116
PWSBiA Warszawa	0,010	0,100	0,006	0,075	0,006	0,076	0,006	0,079
Szkoła Główna Handlowa	0,030	0,171	0,031	0,174	0,020	0,139	0,027	0,162
SWPS Warszawa	0,033	0,178	0,041	0,199	0,040	0,196	0,025	0,155
UAM Poznań	0,043	0,202	0,039	0,193	0,035	0,184	0,031	0,173
Uniwersytet Jagieloński	0,006	0,075	0,003	0,053	0,002	0,047	0,004	0,062
Uniwersytet Szczeciński	0,004	0,061	0,006	0,078	0,002	0,047	0,005	0,070
Uniwersytet Warszawski	0,008	0,090	0,013	0,113	0,009	0,093	0,008	0,091

Table 2a. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Total results

specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log-Likelihood	-2910,3	-2853,4	-2983,5	-4522,1	-3020,5	-4657,0	-4696,6
pseudo-R^2	,087	,091	,054	,070	,042	,061	,040
observations	2845	2808	2818	4175	2818	4245	4192
AE Kraków	**1,338****	**1,453****	**1,251***	**0,617***	**1,407****	**0,722****	**0,473**
	(0,675)	*(0,699)*	*(0,643)*	*(0,330)*	*(0,628)*	*(0,320)*	*(0,313)*
AE Poznań	**1,537*****	**2,026*****	**1,533*****	**1,048*****	**1,822*****	**0,871*****	**0,793*****
	(0,575)	*(0,592)*	*(0,540)*	*(0,278)*	*(0,524)*	*(0,269)*	*(0,261)*
AE Wrocław	**1,295****	**1,489*****	**1,172****	**0,852*****	**1,388*****	**0,836*****	**0,654*****
	(0,579)	*(0,597)*	*(0,546)*	*(0,291)*	*(0,530)*	*(0,283)*	*(0,275)*
AGH Kraków	**1,661*****	**1,862*****	**2,005*****	**0,972*****	**2,062*****	**0,900*****	**1,166*****
	(0,570)	*(0,587)*	*(0,530)*	*(0,331)*	*(0,517)*	*(0,323)*	*(0,313)*
Polit. Białostocka	**1,499*****	**1,663*****	**2,019*****	**1,131*****	**2,184*****	**1,104*****	**1,652*****
	(0,497)	*(0,520)*	*(0,461)*	*(0,331)*	*(0,455)*	*(0,320)*	*(0,297)*
Politechnika Gdańska	**1,167***	**1,304***	**1,672*****	**0,077**	**1,661*****	**0,011**	**0,671**
	(0,686)	*(0,699)*	*(0,621)*	*(0,597)*	*(0,616)*	*(0,584)*	*(0,524)*
Polit. Krakowska	**0,814***	**1,278*****	**1,157*****	**0,812****	**1,343*****	**0,684****	**0,977*****
	(0,465)	*(0,480)*	*(0,446)*	*(0,353)*	*(0,437)*	*(0,347)*	*(0,330)*
Polit. Rzeszowska	**0,769**	**1,118****	**1,127****	**0,657***	**1,306*****	**0,716****	**0,926*****
	(0,532)	*(0,561)*	*(0,505)*	*(0,376)*	*(0,502)*	*(0,360)*	*(0,348)*
Politechnika Śląska	**0,500**	**0,887***	**1,498*****	**0,716****	**1,652*****	**0,614****	**1,353*****
	(0,451)	*(0,482)*	*(0,423)*	*(0,315)*	*(0,418)*	*(0,306)*	*(0,282)*
Polit. Świętokrzyska	**1,163*****	**1,349*****	**1,495*****	**1,053*****	**1,682*****	**1,046*****	**1,332*****
	(0,498)	*(0,527)*	*(0,475)*	*(0,346)*	*(0,467)*	*(0,334)*	*(0,321)*
PWSBiA Warszawa	**1,304***	**1,649*****	**1,361****	**1,269*****	**1,363****	**0,983****	**1,171*****
	(0,666)	*(0,692)*	*(0,643)*	*(0,477)*	*(0,638)*	*(0,461)*	*(0,462)*
Szkoła Główna Handlowa	**0,791**	**1,186****	**0,562**	**0,579***	**0,754**	**0,575***	**0,304**
	(0,529)	*(0,564)*	*(0,509)*	*(0,306)*	*(0,500)*	*(0,297)*	*(0,289)*
SWPS Warszawa	**0,587**	**1,228****	**0,637**	**1,009*****	**0,953***	**0,918*****	**0,716*****
	(0,559)	*(0,604)*	*(0,535)*	*(0,290)*	*(0,526)*	*(0,276)*	*(0,269)*
UAM Poznań	**0,189**	**0,713**	**0,123**	**0,564****	**0,421**	**0,479***	**0,340**
	(0,594)	*(0,631)*	*(0,563)*	*(0,287)*	*(0,552)*	*(0,280)*	*(0,272)*
Uniwersytet Jagieloński	**-0,321**	**0,082**	**-0,229**	**-0,116**	**-0,078**	**-0,190**	**-0,171**
	(0,979)	*(1,010)*	*(0,968)*	*(0,711)*	*(0,954)*	*(0,703)*	*(0,696)*
Uniwersytet Szczeciński	**1,160**	**1,431***	**0,858**	**1,071****	**0,930**	**1,043****	**0,782**
	(0,798)	*(0,825)*	*(0,757)*	*(0,501)*	*(0,742)*	*(0,497)*	*(0,483)*
Uniwersytet Warszawski	**-0,210**	**0,347**	**-0,252**	**-0,022**	**0,166**	**-0,130**	**-0,104**
	(0,829)	*(0,878)*	*(0,790)*	*(0,433)*	*(0,777)*	*(0,425)*	*(0,413)*
language skills	Yes		Yes	Yes		Yes	Yes
professional experience		Yes	Yes	Yes	Yes		Yes
computer skills	Yes	Yes		Yes		Yes	
education specified	Yes	Yes	Yes		Yes		

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2b. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Total results (cont.)

specification	(8)	(9)	(10)	(11)	(12)	(13)
Log-Likelihood	-2938,2	-3044,9	-4581,5	-3090,2	-4799,3	-4742,4
pseudo-R^2	,078	,045	,064	,031	,032	,031
observations	2845	2845	4192	2845	4245	4192
AE Kraków	**1,441****	**1,175***	**0,780*****	**1,312****	**0,529***	**0,596***
	(0,664)	*(0,613)*	*(0,326)*	*(0,593)*	*(0,304)*	*(0,309)*
AE Poznań	**1,785*****	**1,279*****	**1,241*****	**1,579*****	**0,633*****	**1,058*****
	(0,564)	*(0,515)*	*(0,272)*	*(0,497)*	*(0,254)*	*(0,257)*
AE Wrocław	**1,446*****	**1,136****	**0,961*****	**1,382*****	**0,658*****	**0,847*****
	(0,569)	*(0,522)*	*(0,285)*	*(0,504)*	*(0,269)*	*(0,271)*
AGH Kraków	**1,723*****	**1,831*****	**1,072*****	**1,875*****	**1,018*****	**1,252*****
	(0,561)	*(0,511)*	*(0,328)*	*(0,496)*	*(0,308)*	*(0,309)*
Polit. Białostocka	**1,572*****	**1,925*****	**1,208*****	**2,123*****	**1,591*****	**1,792*****
	(0,491)	*(0,446)*	*(0,324)*	*(0,439)*	*(0,290)*	*(0,295)*
Politechnika Gdańska	**1,270***	**1,586*****	**0,219**	**1,552*****	**0,518**	**0,713**
	(0,681)	*(0,605)*	*(0,593)*	*(0,603)*	*(0,512)*	*(0,518)*
Polit. Krakowska	**0,998****	**0,883****	**0,948*****	**1,078*****	**0,847*****	**1,143*****
	(0,459)	*(0,429)*	*(0,348)*	*(0,419)*	*(0,324)*	*(0,323)*
Polit. Rzeszowska	**0,923***	**0,916***	**0,797****	**1,131*****	**0,872*****	**1,007*****
	(0,528)	*(0,479)*	*(0,367)*	*(0,474)*	*(0,339)*	*(0,345)*
Politechnika Śląska	**0,626**	**1,271*****	**0,802*****	**1,431*****	**1,184*****	**1,500*****
	(0,449)	*(0,400)*	*(0,311)*	*(0,394)*	*(0,275)*	*(0,279)*
Polit. Świętokrzyska	**1,254*****	**1,433*****	**1,196*****	**1,614*****	**1,260*****	**1,497*****
	(0,491)	*(0,450)*	*(0,342)*	*(0,442)*	*(0,310)*	*(0,317)*
PWSBiA Warszawa	**1,352****	**1,111***	**1,253*****	**1,137***	**0,900****	**1,157*****
	(0,660)	*(0,626)*	*(0,474)*	*(0,617)*	*(0,450)*	*(0,459)*
Szkoła Główna Handlowa	**0,966***	**0,429**	**0,695****	**0,606**	**0,278**	**0,423**
	(0,526)	*(0,482)*	*(0,302)*	*(0,471)*	*(0,282)*	*(0,286)*
SWPS Warszawa	**0,892**	**0,368**	**1,118*****	**0,717**	**0,671*****	**0,916*****
	(0,555)	*(0,504)*	*(0,283)*	*(0,493)*	*(0,261)*	*(0,266)*
UAM Poznań	**0,515**	**-0,012**	**0,672*****	**0,330**	**0,275**	**0,497***
	(0,587)	*(0,533)*	*(0,284)*	*(0,518)*	*(0,266)*	*(0,268)*
Uniwersytet Jagieloński	**-0,214**	**-0,566**	**-0,006**	**-0,406**	**-0,316**	**-0,101**
	(0,970)	*(0,941)*	*(0,703)*	*(0,927)*	*(0,687)*	*(0,688)*
Uniwersytet Szczeciński	**1,289**	**0,698**	**1,069****	**0,831**	**0,733**	**0,776**
	(0,784)	*(0,730)*	*(0,494)*	*(0,705)*	*(0,480)*	*(0,478)*
Uniwersytet Warszawski	**0,125**	**-0,408**	**0,171**	**0,068**	**-0,230**	**0,200**
	(0,823)	*(0,753)*	*(0,429)*	*(0,735)*	*(0,409)*	*(0,410)*
language skills		Yes			Yes	
professional experience			Yes			Yes
computer skills	Yes		Yes			
education specified	Yes	Yes		Yes		

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2c. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Women

specification	(5)	(7)	(11)	(12)	(13)
Log-Likelihood	-1298,6	-2114,6	-1358,5	-2197,1	-2163,2
pseudo-R^2	,068	,064	,040	,044	,042
observations	1356	2081	1376	2114	2081
AE Kraków	**2,340****	**0,670**	**2,173****	**0,797***	**0,860***
	(1,153)	*(0,478)*	*(0,988)*	*(0,453)*	*(0,467)*
AE Poznań	**3,088*****	**0,971*****	**2,522*****	**0,815****	**1,336*****
	(0,979)	*(0,413)*	*(0,839)*	*(0,395)*	*(0,402)*
AE Wrocław	**2,073****	**0,832***	**1,805****	**0,827***	**1,034*****
	(1,005)	*(0,443)*	*(0,871)*	*(0,426)*	*(0,433)*
AGH Kraków	**3,312*****	**1,167****	**2,750*****	**0,969***	**1,287*****
	(1,004)	*(0,538)*	*(0,892)*	*(0,520)*	*(0,529)*
Polit. Białostocka	**2,277*****	**1,473*****	**2,082*****	**1,290*****	**1,761*****
	(0,804)	*(0,533)*	*(0,719)*	*(0,507)*	*(0,523)*
Politechnika Gdańska	**2,090****	**0,710**	**1,595***	**0,397**	**0,803**
	(0,983)	*(0,805)*	*(0,931)*	*(0,772)*	*(0,773)*
Polit. Krakowska	**1,803*****	**1,115****	**1,484****	**0,903***	**1,439*****
	(0,779)	*(0,526)*	*(0,702)*	*(0,507)*	*(0,513)*
Polit. Rzeszowska	**0,298**	**0,784**	**0,608**	**0,891**	**0,741**
	(1,050)	*(0,577)*	*(0,891)*	*(0,546)*	*(0,571)*
Politechnika Śląska	**-0,133**	**0,058**	**-0,134**	**-0,203**	**0,461**
	(1,314)	*(0,767)*	*(1,230)*	*(0,744)*	*(0,745)*
Polit. Świętokrzyska	**0,833**	**0,223**	**0,667**	**0,176**	**0,475**
	(1,112)	*(0,770)*	*(1,025)*	*(0,757)*	*(0,753)*
PWSBiA Warszawa	**1,381**	**1,670*****	**1,220**	**1,497*****	**1,491*****
	(1,040)	*(0,594)*	*(0,922)*	*(0,574)*	*(0,587)*
Szkoła Główna Handlowa	**0,900**	**0,401**	**0,953**	**0,468**	**0,516**
	(0,979)	*(0,447)*	*(0,833)*	*(0,427)*	*(0,440)*
SWPS Warszawa	**1,415**	**1,066*****	**1,325**	**1,002*****	**1,338*****
	(1,010)	*(0,422)*	*(0,853)*	*(0,400)*	*(0,412)*
UAM Poznań	**0,738**	**0,584**	**0,813**	**0,506**	**0,768***
	(1,086)	*(0,423)*	*(0,908)*	*(0,407)*	*(0,414)*
Uniwersytet Jagieloński	**0,190**	**0,744**	**-0,148**	**0,462**	**0,652**
	(1,559)	*(0,913)*	*(1,419)*	*(0,890)*	*(0,899)*
Uniwersytet Szczeciński	**0,988**	**1,161***	**1,247**	**1,087***	**1,357****
	(1,342)	*(0,642)*	*(1,142)*	*(0,634)*	*(0,647)*
Uniwersytet Warszawski	**0,732**	**0,355**	**0,522**	**-0,079**	**0,953**
	(1,510)	*(0,719)*	*(1,295)*	*(0,689)*	*(0,702)*
language skills		Yes		Yes	
professional experience	Yes	Yes			Yes
computer skills					
education specified	Yes		Yes		

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2d. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Male

specification	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Log-Likelihood	-1573,465	-1659,044	-2407,517	-1686,392	-2550,091	-2510,230	-1573,465
pseudo-R^2	-	-	-	-	-	-	-
observations	1469	1455	1458	2101	1458	2131	2105
AE Kraków	**0,459**	**0,491**	**0,567**	**0,645**	**0,703**	**0,712**	**0,403**
	(0,939)	*(0,929)*	*(0,820)*	*(0,468)*	*(0,802)*	*(0,458)*	*(0,436)*
AE Poznań	**0,801**	**1,058**	**0,652**	**1,197*** **	**0,995**	**1,055*** **	**0,726** **
	(0,826)	*(0,803)*	*(0,706)*	*(0,389)*	*(0,682)*	*(0,376)*	*(0,356)*
AE Wrocław	**0,890**	**0,864**	**0,520**	**0,907** **	**0,883**	**0,943*** **	**0,512**
	(0,811)	*(0,787)*	*(0,702)*	*(0,393)*	*(0,677)*	*(0,381)*	*(0,364)*
AGH Kraków	**0,709**	**0,781**	**0,843**	**0,860** **	**1,135***	**0,906** **	**0,928*** **
	(0,772)	*(0,758)*	*(0,663)*	*(0,431)*	*(0,646)*	*(0,417)*	*(0,394)*
Polit. Białostocka	**1,955*** **	**1,778*** **	**2,145*** **	**1,077*** **	**2,377*** **	**1,124*** **	**1,566*** **
	(0,696)	*(0,701)*	*(0,618)*	*(0,420)*	*(0,612)*	*(0,406)*	*(0,371)*
Politechnika Gdańska	**1,247**	**1,869** **	**1,737** **	**0,339**	**1,858** **	**0,286**	**0,987**
	(0,922)	*(0,925)*	*(0,834)*	*(0,848)*	*(0,834)*	*(0,820)*	*(0,724)*
Polit. Krakowska	**0,879**	**0,719**	**0,628**	**1,347***	**0,918**	**1,562** **	**1,513** **
	(1,296)	*(1,285)*	*(1,047)*	*(0,776)*	*(1,039)*	*(0,767)*	*(0,718)*
Polit. Rzeszowska	**1,049**	**1,325***	**1,474*** **	**0,647**	**1,684*** **	**0,697**	**1,096*** **
	(0,701)	*(0,701)*	*(0,617)*	*(0,510)*	*(0,606)*	*(0,486)*	*(0,453)*
Politechnika Śląska	**0,660**	**1,033***	**1,352*** **	**0,829** **	**1,557*** **	**0,783** **	**1,294*** **
	(0,553)	*(0,569)*	*(0,487)*	*(0,376)*	*(0,477)*	*(0,365)*	*(0,333)*
Polit. Świętokrzyska	**1,547*** **	**1,544*** **	**1,536*** **	**1,252*** **	**1,697*** **	**1,256*** **	**1,328*** **
	(0,614)	*(0,628)*	*(0,549)*	*(0,417)*	*(0,536)*	*(0,401)*	*(0,377)*
PWSBiA Warszawa	**2,829*** **	**3,113*** **	**2,533*** **	**1,568***	**2,433** **	**0,994**	**1,208**
	(1,176)	*(1,161)*	*(1,092)*	*(0,906)*	*(1,082)*	*(0,861)*	*(0,887)*
Szkoła Główna Handlowa	**1,194**	**1,703*** **	**0,608**	**0,674**	**0,864**	**0,671**	**0,266**
	(0,731)	*(0,719)*	*(0,636)*	*(0,431)*	*(0,615)*	*(0,420)*	*(0,403)*
SWPS Warszawa	**2,221** **	**2,158** **	**1,143**	**0,947**	**1,083**	**1,032**	**0,409**
	(1,037)	*(1,007)*	*(0,907)*	*(0,664)*	*(0,881)*	*(0,656)*	*(0,633)*
UAM Poznań	**0,540**	**0,823**	**0,012**	**0,539**	**0,198**	**0,546**	**0,181**
	(0,875)	*(0,865)*	*(0,738)*	*(0,408)*	*(0,721)*	*(0,397)*	*(0,376)*
Uniwersytet Jagieloński	**0,035**	**0,496**	**-0,632**	**-1,145**	**-0,327**	**-1,003**	**-1,234**
	(1,395)	*(1,389)*	*(1,325)*	*(1,160)*	*(1,314)*	*(1,149)*	*(1,141)*
Uniwersytet Szczeciński	**1,966**	**1,693**	**0,979**	**0,829**	**0,695**	**0,823**	**0,231**
	(1,218)	*(1,139)*	*(1,083)*	*(0,798)*	*(1,017)*	*(0,795)*	*(0,790)*
language skills	Yes		Yes	Yes		Yes	Yes
professional experience		Yes	Yes	Yes	Yes		Yes
computer skills	Yes	Yes		Yes		Yes	
education specified	Yes	Yes	Yes		Yes		

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2e. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Male (cont.)

specification	(8)	(9)	(10)	(11)	(12)	(13)
Log-Likelihood	-1573,465	-1659,044	-2407,517	-1686,392	-2550,091	-2510,230
pseudo-R^2	-	-	-	-	-	-
observations	1469	1455	1458	2101	1458	2131
AE Kraków	**0,464**	**0,488**	**-**	**0,590**	**0,425**	**0,424**
	(0,912)	*(0,801)*	-	*(0,778)*	*(0,428)*	*(0,429)*
AE Poznań	**1,019**	**0,430**	**1,312*****	**0,817**	**0,570**	**0,899*****
	(0,796)	*(0,691)*	*(0,378)*	*(0,664)*	*(0,346)*	*(0,348)*
AE Wrocław	**1,054**	**0,586**	**1,012*****	**0,982**	**0,539**	**0,718****
	(0,780)	*(0,684)*	*(0,384)*	*(0,657)*	*(0,355)*	*(0,356)*
AGH Kraków	**0,890**	**0,838**	**1,077*****	**1,107***	**0,923*****	**1,099*****
	(0,747)	*(0,648)*	*(0,421)*	*(0,628)*	*(0,386)*	*(0,388)*
Polit. Białostocka	**1,967*****	**2,175*****	**1,196*****	**2,442*****	**1,555*****	**1,730*****
	(0,682)	*(0,600)*	*(0,411)*	*(0,593)*	*(0,361)*	*(0,369)*
Politechnika Gdańska	**1,485**	**1,457***	**0,640**	**1,578***	**0,840**	**1,000**
	(0,906)	*(0,800)*	*(0,848)*	*(0,806)*	*(0,707)*	*(0,723)*
Polit. Krakowska	**0,965**	**0,858**	**1,410***	**1,160**	**1,767*****	**1,564****
	(1,288)	*(1,034)*	*(0,761)*	*(1,030)*	*(0,697)*	*(0,701)*
Polit. Rzeszowska	**1,216***	**1,169****	**0,835***	**1,430*****	**0,924****	**1,212*****
	(0,683)	*(0,595)*	*(0,483)*	*(0,584)*	*(0,441)*	*(0,446)*
Politechnika Śląska	**0,810**	**1,054****	**0,982*****	**1,252*****	**1,103*****	**1,469*****
	(0,539)	*(0,465)*	*(0,370)*	*(0,455)*	*(0,324)*	*(0,329)*
Polit. Świętokrzyska	**1,554*****	**1,498*****	**1,417*****	**1,640*****	**1,268*****	**1,489*****
	(0,594)	*(0,524)*	*(0,410)*	*(0,512)*	*(0,363)*	*(0,372)*
PWSBiA Warszawa	**2,631****	**2,091***	**1,511***	**2,043***	**0,577**	**1,191**
	(1,149)	*(1,074)*	*(0,888)*	*(1,063)*	*(0,835)*	*(0,855)*
Szkoła Główna Handlowa	**1,463****	**0,342**	**0,842****	**0,606**	**0,221**	**0,413**
	(0,703)	*(0,617)*	*(0,422)*	*(0,598)*	*(0,394)*	*(0,396)*
SWPS Warszawa	**2,144****	**1,204**	**1,114***	**1,120**	**0,435**	**0,498**
	(0,997)	*(0,889)*	*(0,649)*	*(0,867)*	*(0,628)*	*(0,623)*
UAM Poznań	**0,761**	**-0,096**	**0,700***	**0,125**	**0,169**	**0,344**
	(0,846)	*(0,720)*	*(0,402)*	*(0,701)*	*(0,368)*	*(0,371)*
Uniwersytet Jagielloński	**0,250**	**-0,648**	**-0,878**	**-0,358**	**-1,087**	**-0,986**
	(1,370)	*(1,303)*	*(1,155)*	*(1,291)*	*(1,128)*	*(1,135)*
Uniwersytet Szczeciński	**1,662**	**0,931**	**0,728**	**0,674**	**0,254**	**0,100**
	(1,132)	*(1,091)*	*(0,778)*	*(1,005)*	*(0,789)*	*(0,764)*
language skills		Yes			Yes	
professional experience			Yes			Yes
computer skills	Yes		Yes			
education specified	Yes	Yes		Yes		

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2f. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Student 2005

specification	(5)	(7)	(9)	(10)	(11)	(13)
Log-Likelihood	-1330,5	-1670,3	-1375,2	-1723,0	-1688,9	-1744,4
pseudo-R^2	,052	,056	,040	,046	,046	,034
observations	985	1223	1006	1248	1223	1248
AE Kraków	**2,145*** **	**0,858***	**1,868*** **	**1,060** **	**1,237*** **	**1,185*** **
	(0,777)	*(0,469)*	*(0,742)*	*(0,494)*	*(0,506)*	*(0,485)*
AE Poznań	**2,235*** **	**0,983*** **	**1,770*** **	**0,916*** **	**1,493*** **	**1,201*** **
	(0,647)	*(0,350)*	*(0,617)*	*(0,393)*	*(0,403)*	*(0,381)*
AE Wrocław	**1,813*** **	**0,828** **	**1,619*** **	**0,935** **	**1,292*** **	**1,191*** **
	(0,682)	*(0,416)*	*(0,649)*	*(0,452)*	*(0,460)*	*(0,441)*
AGH Kraków	**1,984*** **	**0,964** **	**1,595*** **	**0,979** **	**1,322*** **	**1,109*** **
	(0,673)	*(0,436)*	*(0,639)*	*(0,471)*	*(0,479)*	*(0,464)*
Polit. Białostocka	**3,090*** **	**2,534*** **	**2,913*** **	**2,634*** **	**2,910*** **	**2,770*** **
	(0,632)	*(0,453)*	*(0,607)*	*(0,485)*	*(0,499)*	*(0,480)*
Politechnika Gdańska	**2,744*** **	**2,131*** **	**2,650*** **	**2,190*** **	**2,553*** **	**2,383*** **
	(0,765)	*(0,685)*	*(0,741)*	*(0,695)*	*(0,716)*	*(0,689)*
Polit. Krakowska	**2,065*** **	**1,651*** **	**1,663*** **	**1,555*** **	**1,985*** **	**1,668*** **
	(0,568)	*(0,487)*	*(0,560)*	*(0,513)*	*(0,517)*	*(0,497)*
Polit. Rzeszowska	**2,078*** **	**1,486*** **	**1,854*** **	**1,528*** **	**1,911*** **	**1,737*** **
	(0,650)	*(0,547)*	*(0,659)*	*(0,558)*	*(0,583)*	*(0,551)*
Politechnika Śląska	**2,217*** **	**1,938*** **	**1,917*** **	**1,843*** **	**2,276*** **	**1,950*** **
	(0,474)	*(0,384)*	*(0,532)*	*(0,420)*	*(0,434)*	*(0,413)*
Polit. Świętokrzyska	**1,811*** **	**1,254*** **	**1,987*** **	**1,599*** **	**1,813*** **	**1,951*** **
	(0,601)	*(0,535)*	*(0,645)*	*(0,558)*	*(0,571)*	*(0,549)*
PWSBiA Warszawa	**2,616*** **	**2,820*** **	**2,357*** **	**2,832*** **	**3,051*** **	**2,847*** **
	(0,847)	*(0,802)*	*(0,908)*	*(0,827)*	*(0,812)*	*(0,797)*
Szkoła Główna Handlowa	**1,264*** **	**0,658**	**1,044***	**0,692**	**1,072*** **	**0,872** **
	(0,475)	*(0,407)*	*(0,621)*	*(0,441)*	*(0,453)*	*(0,434)*
SWPS Warszawa	**1,336*** **	**1,376*** **	**1,077***	**1,297*** **	**1,660*** **	**1,397*** **
	(0,501)	*(0,421)*	*(0,649)*	*(0,444)*	*(0,462)*	*(0,431)*
UAM Poznań	**1,104*** **	**0,691***	**1,014**	**0,703**	**1,094*** **	**0,902** **
	(0,472)	*(0,404)*	*(0,679)*	*(0,443)*	*(0,448)*	*(0,430)*
Uniwersytet Jagielloński	**2,520***	**2,117***	**2,202**	**1,967***	**2,507*** **	**2,165** **
	(1,340)	*(1,090)*	*(1,454)*	*(1,108)*	*(1,056)*	*(1,050)*
Uniwersytet Szczeciński	**1,015**	**0,968**	**0,949**	**0,994**	**1,415** **	**1,250** **
	(0,651)	*(0,603)*	*(0,860)*	*(0,628)*	*(0,633)*	*(0,615)*
Uniwersytet Warszawski	**0,460**	**0,266**	**0,497**	**0,281**	**0,792**	**0,581**
	(0,643)	*(0,535)*	*(0,899)*	*(0,566)*	*(0,567)*	*(0,551)*
language skills		Yes	Yes			
professional experience	Yes	Yes		Yes		Yes
computer skills				Yes		
education specified	Yes		Yes		Yes	

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2g. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Graduate 2004					Graduate 2005	
specification	(7)	(10)	(11)	(13)	(11)	(13)
Log-Likelihood	-310,5	-329,5	-336,0	-351,9	-708,1	-721,2
pseudo-R^2	,150	,121	,080	,061	,038	,034
observations	430	440	430	440	534	541
AE Kraków	**0,387**	**0,222**	**0,164**	**0,296**	**0,395**	**0,819**
	(0,830)	*(0,827)*	*(0,779)*	*(0,767)*	*(0,665)*	*(0,640)*
AE Poznań	**0,296**	**-0,116**	**0,530**	**0,406**	**0,205**	**0,338**
	(0,838)	*(0,838)*	*(0,783)*	*(0,770)*	*(0,606)*	*(0,598)*
AE Wrocław	**-0,208**	**-0,522**	**-0,178**	**-0,258**	**0,973***	**1,156****
	(0,918)	*(0,905)*	*(0,862)*	*(0,849)*	*(0,566)*	*(0,557)*
AGH Kraków	**-21,105**	**-21,309**	**-21,279**	**-21,328**	**1,067**	**1,204**
	(36850,090)	*(34451,870)*	*(38758,930)*	*(35170,780)*	*(0,835)*	*(0,835)*
Polit. Białostocka	**0,493**	**0,354**	**0,720**	**0,792**	**1,133***	**1,163***
	(0,888)	*(0,888)*	*(0,853)*	*(0,840)*	*(0,621)*	*(0,605)*
Politechnika Gdańska	**-19,647**	**-20,056**	**-21,376**	**-21,328**	**-21,618**	**-21,741**
	(55568,160)	*(55378,290)*	*(55579,780)*	*(55609,880)*	*(66267,750)*	*(46857,980)*
Polit. Krakowska	**-21,390**	**-21,726**	**-21,446**	**-21,328**	**1,385***	**1,478***
	(32119,210)	*(33754,560)*	*(34816,200)*	*(35170,780)*	*(0,800)*	*(0,772)*
Polit. Rzeszowska	**1,519**	**0,806**	**0,963**	**0,696**	**1,408***	**1,495***
	(1,107)	*(1,077)*	*(1,055)*	*(1,030)*	*(0,775)*	*(0,765)*
Politechnika Śląska	**-0,532**	**-0,675**	**-0,421**	**-0,373**	**1,418***	**1,547****
	(1,271)	*(1,265)*	*(1,243)*	*(1,226)*	*(0,780)*	*(0,778)*
Polit. Świętokrzyska	**2,303*****	**1,982****	**2,093****	**2,062****	**0,838**	**0,843**
	(0,994)	*(0,977)*	*(0,965)*	*(0,932)*	*(0,702)*	*(0,656)*
PWSBiA Warszawa	**0,130**	**0,110**	**0,061**	**0,024**	**2,346***	**2,618***
	(1,354)	*(1,323)*	*(1,325)*	*(1,266)*	*(1,380)*	*(1,371)*
Szkoła Główna Handlowa	**-1,203**	**-0,637**	**-1,370**	**-0,593**	**-0,064**	**0,138**
	(1,224)	*(0,990)*	*(1,192)*	*(0,947)*	*(0,668)*	*(0,657)*
SWPS Warszawa	**0,260**	**0,276**	**0,009**	**0,348**	**0,553**	**0,733**
	(0,860)	*(0,816)*	*(0,824)*	*(0,771)*	*(0,524)*	*(0,510)*
UAM Poznań	**0,166**	**-0,030**	**0,039**	**0,026**	**0,850**	**0,908**
	(0,820)	*(0,806)*	*(0,770)*	*(0,757)*	*(0,556)*	*(0,551)*
Uniwersytet Jagieloński	**-20,591**	**-20,776**	**-21,476**	**-21,328**	**-21,795**	**-21,741**
	(52391,800)	*(53426,110)*	*(55692,840)*	*(55609,880)*	*(66267,750)*	*(66267,190)*
Uniwersytet Szczeciński	**-21,106**	**-21,377**	**-21,023**	**-21,328**	**-0,319**	**-0,032**
	(78762,150)	*(78644,250)*	*(78762,150)*	*(78644,250)*	*(1,312)*	*(1,303)*
Uniwersytet Warszawski	**0,842**	**0,479**	**0,829**	**0,696**	**-1,345**	**-1,127**
	(1,095)	*(1,080)*	*(1,047)*	*(1,030)*	*(1,174)*	*(1,164)*
language skills	Yes					
professional experience	Yes	Yes		Yes		Yes
computer skills		Yes				
education specified			Yes		Yes	

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2h. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Female student

specification	(10)	(12)	(13)
Log-Likelihood	-1434,2	-1484,3	-721,2
pseudo-R^2	,050	,030	,034
observations	1387	1407	541
AE Kraków	**1,058*** *(0,571)*	**1,200**** *(0,539)*	**0,819** *(0,640)*
AE Poznań	**1,658***** *(0,428)*	**1,464***** *(0,408)*	**0,338** *(0,598)*
AE Wrocław	**1,132**** *(0,505)*	**1,035**** *(0,485)*	**1,156**** *(0,557)*
AGH Kraków	**1,377***** *(0,592)*	**1,150**** *(0,577)*	**1,204** *(0,835)*
Polit. Białostocka	**1,902***** *(0,558)*	**1,745***** *(0,542)*	**1,163*** *(0,605)*
Politechnika Gdańska	**1,082** *(0,809)*	**1,132** *(0,791)*	**-21,741** *(46857,980)*
Polit. Krakowska	**1,798***** *(0,551)*	**1,513***** *(0,532)*	**1,478*** *(0,772)*
Polit. Rzeszowska	**0,589** *(0,683)*	**0,794** *(0,627)*	**1,495*** *(0,765)*
Politechnika Śląska	**0,668** *(0,773)*	**0,566** *(0,748)*	**1,547**** *(0,778)*
Polit. Świętokrzyska	**0,472** *(0,888)*	**0,427** *(0,872)*	**0,843** *(0,656)*
PWSBiA Warszawa	**1,606***** *(0,649)*	**1,506***** *(0,642)*	**2,618*** *(1,371)*
Szkoła Główna Handlowa	**0,937**** *(0,472)*	**0,910**** *(0,454)*	**0,138** *(0,657)*
SWPS Warszawa	**1,547***** *(0,464)*	**1,402***** *(0,436)*	**0,733** *(0,510)*
UAM Poznań	**0,826*** *(0,451)*	**0,777*** *(0,434)*	**0,908** *(0,551)*
Uniwersytet Jagieloński	**1,301** *(0,940)*	**0,933** *(0,926)*	**-21,741** *(66267,190)*
Uniwersytet Szczeciński	**1,745***** *(0,705)*	**1,648***** *(0,682)*	**-0,032** *(1,303)*
Uniwersytet Warszawski	**1,030** *(0,769)*	**0,628** *(0,753)*	**-1,127** *(1,164)*
language skills		Yes	
professional experience	Yes		Yes
computer skills	Yes		
education specified			

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2i. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Male student

specification	(1)	(2)	(3)	(4)	(5)	(6)
Log-Likelihood	-1332,3	-1329,1	-1402,2	-1627,8	-1425,4	-1665,6
pseudo-R^2	,124	,117	,068	,108	,053	,099
observations	1230	1220	1220	1448	1220	1464
AE Kraków	**0,413**	**0,501**	**0,520**	**0,433**	**0,627**	**0,327**
	(0,841)	*(0,847)*	*(0,752)*	*(0,566)*	*(0,735)*	*(0,556)*
AE Poznań	**0,920**	**1,254***	**0,544**	**1,266*****	**0,893**	**1,082*****
	(0,713)	*(0,705)*	*(0,639)*	*(0,419)*	*(0,616)*	*(0,410)*
AE Wrocław	**0,990**	**1,107**	**0,336**	**0,834***	**0,761**	**0,930****
	(0,713)	*(0,701)*	*(0,641)*	*(0,437)*	*(0,617)*	*(0,427)*
AGH Kraków	**0,600**	**0,872**	**0,736**	**0,709**	**1,114***	**0,677**
	(0,678)	*(0,681)*	*(0,606)*	*(0,454)*	*(0,592)*	*(0,444)*
Polit. Białostocka	**1,638*****	**1,445****	**2,153*****	**1,284*****	**2,455*****	**1,408*****
	(0,705)	*(0,708)*	*(0,616)*	*(0,511)*	*(0,606)*	*(0,494)*
Politechnika Gdańska	**0,883**	**1,241**	**1,528***	**0,290**	**1,649****	**0,178**
	(0,902)	*(0,903)*	*(0,812)*	*(0,867)*	*(0,809)*	*(0,846)*
Polit. Krakowska	**0,702**	**0,810**	**0,662**	**0,373**	**0,818**	**0,344**
	(0,620)	*(0,611)*	*(0,557)*	*(0,559)*	*(0,535)*	*(0,549)*
Polit. Rzeszowska	**0,714**	**0,915**	**1,141****	**0,307**	**1,339*****	**0,328**
	(0,651)	*(0,642)*	*(0,577)*	*(0,559)*	*(0,563)*	*(0,552)*
Politechnika Śląska	**0,329**	**0,636**	**1,189*****	**0,518**	**1,373*****	**0,525**
	(0,462)	*(0,467)*	*(0,410)*	*(0,403)*	*(0,400)*	*(0,393)*
Polit. Świętokrzyska	**1,197****	**1,209****	**1,479*****	**0,917***	**1,602*****	**1,011****
	(0,523)	*(0,525)*	*(0,475)*	*(0,481)*	*(0,462)*	*(0,466)*
PWSBiA Warszawa	**2,034***	**1,923***	**1,950***	**1,418**	**1,651**	**0,606**
	(1,220)	*(1,160)*	*(1,138)*	*(1,097)*	*(1,122)*	*(1,016)*
Szkoła Główna Handlowa	**0,846**	**1,266*****	**0,474**	**0,581**	**0,684**	**0,471**
	(0,542)	*(0,524)*	*(0,510)*	*(0,474)*	*(0,489)*	*(0,466)*
SWPS Warszawa	**0,292**	**0,555**	**0,330**	**0,437**	**0,503**	**0,521**
	(0,644)	*(0,633)*	*(0,568)*	*(0,511)*	*(0,553)*	*(0,493)*
UAM Poznań	**0,255**	**0,406**	**-0,074**	**0,093**	**0,041**	**0,132**
	(0,638)	*(0,635)*	*(0,574)*	*(0,513)*	*(0,565)*	*(0,497)*
Uniwersytet Jagieloński	**-0,493**	**-0,390**	**-0,516**	**-1,257**	**-0,263**	**-1,103**
	(1,258)	*(1,278)*	*(1,239)*	*(1,195)*	*(1,233)*	*(1,185)*
Uniwersytet Szczeciński	**1,626**	**1,146**	**0,877**	**0,772**	**0,532**	**0,922**
	(1,022)	*(0,920)*	*(0,956)*	*(0,839)*	*(0,877)*	*(0,842)*
Uniwersytet Warszawski	**0,194**	**0,474**	**-0,255**	**-0,160**	**-0,006**	**-0,114**
	(0,799)	*(0,801)*	*(0,746)*	*(0,645)*	*(0,739)*	*(0,636)*
language skills	Yes		Yes	Yes		Yes
professional experience		Yes	Yes	Yes	Yes	
computer skills	Yes	Yes		Yes		Yes
education specified	Yes	Yes	Yes		Yes	

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets

Table 2j. Coefficients of an Ordered-Logit Model for Testing Signaling Hypothesis

Male student (cont.)

specification	(8)	(9)	(10)	(11)	(12)	(13)
Log-Likelihood	-1631,1	-1453,1	-1761,8	-1743,4	-1682,7	-1782,8
pseudo-R^2	,103	,044	,047	,044	,090	,035
observations	1444	1230	1464	1448	1464	1464
AE Kraków	**0,226**	**0,381**	**0,346**	**0,356**	**0,188**	**0,230**
	(0,552)	*(0,718)*	*(0,501)*	*(0,495)*	*(0,539)*	*(0,490)*
AE Poznań	**1,354*** **	**0,678**	**0,667***	**0,972*** **	**1,145*** **	**0,789** **
	(0,412)	*(0,599)*	*(0,378)*	*(0,375)*	*(0,396)*	*(0,363)*
AE Wrocław	**0,958** **	**0,818**	**0,602**	**0,713***	**1,062*** **	**0,801** **
	(0,431)	*(0,597)*	*(0,394)*	*(0,393)*	*(0,416)*	*(0,384)*
AGH Kraków	**0,821***	**0,956***	**0,973*** **	**1,245*** **	**0,820***	**1,126*** **
	(0,452)	*(0,576)*	*(0,404)*	*(0,401)*	*(0,437)*	*(0,394)*
Polit. Białostocka	**1,412*** **	**2,483*** **	**2,071*** **	**2,195*** **	**1,441*** **	**2,185*** **
	(0,510)	*(0,592)*	*(0,429)*	*(0,444)*	*(0,486)*	*(0,427)*
Politechnika Gdańska	**0,553**	**1,426***	**0,908**	**1,151**	**0,392**	**0,983**
	(0,880)	*(0,791)*	*(0,729)*	*(0,742)*	*(0,850)*	*(0,733)*
Polit. Krakowska	**0,531**	**0,694**	**0,725**	**0,858***	**0,402**	**0,786***
	(0,553)	*(0,523)*	*(0,472)*	*(0,467)*	*(0,538)*	*(0,459)*
Polit. Rzeszowska	**0,513**	**1,187** **	**0,683**	**0,917***	**0,508**	**0,841***
	(0,558)	*(0,548)*	*(0,492)*	*(0,495)*	*(0,542)*	*(0,485)*
Politechnika Śląska	**0,789***	**1,148*** **	**1,070*** **	**1,351*** **	**0,653***	**1,179*** **
	(0,405)	*(0,384)*	*(0,340)*	*(0,342)*	*(0,385)*	*(0,332)*
Polit. Świętokrzyska	**1,012** **	**1,568*** **	**1,256*** **	**1,338*** **	**1,063*** **	**1,325*** **
	(0,475)	*(0,444)*	*(0,412)*	*(0,414)*	*(0,455)*	*(0,402)*
PWSBiA Warszawa	**1,209**	**1,319**	**0,260**	**0,870**	**0,589**	**0,299**
	(1,045)	*(1,097)*	*(0,974)*	*(1,013)*	*(0,963)*	*(0,930)*
Szkoła Główna Handlowa	**0,794***	**0,506**	**0,147**	**0,454**	**0,685**	**0,326**
	(0,462)	*(0,478)*	*(0,437)*	*(0,431)*	*(0,455)*	*(0,423)*
SWPS Warszawa	**0,774**	**0,436**	**0,515**	**0,572**	**0,689**	**0,629**
	(0,508)	*(0,542)*	*(0,447)*	*(0,448)*	*(0,477)*	*(0,433)*
UAM Poznań	**0,266**	**0,056**	**-0,152**	**0,040**	**0,316**	**0,001**
	(0,503)	*(0,553)*	*(0,451)*	*(0,453)*	*(0,490)*	*(0,445)*
Uniwersytet Jagieloński	**-1,143**	**-0,350**	**-0,952**	**-0,795**	**-0,943**	**-0,757**
	(1,188)	*(1,216)*	*(1,152)*	*(1,159)*	*(1,172)*	*(1,147)*
Uniwersytet Szczeciński	**0,689**	**0,634**	**0,471**	**0,147**	**0,769**	**0,279**
	(0,816)	*(0,871)*	*(0,831)*	*(0,783)*	*(0,805)*	*(0,780)*
Uniwersytet Warszawski	**-0,015**	**0,092**	**-0,380**	**-0,198**	**0,102**	**-0,162**
	(0,643)	*(0,721)*	*(0,602)*	*(0,599)*	*(0,627)*	*(0,590)*
language skills		Yes			Yes	
professional experience			Yes			Yes
computer skills	Yes		Yes			
education specified	Yes	Yes		Yes		

* (**, ***) – statistically significant at 5% (2,5%, 1%) level; standard errors in brackets