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# Does it pay to study abroad? Evidence from Poland

Jacek Liwiński<sup>∇</sup>

## Abstract<sup>#</sup>

**Purpose:** This paper tries to identify the impact of international student mobility on the first wages of tertiary education graduates in Poland.

**Design/methodology/approach:** The author uses data from the nationwide tracer survey of Polish graduates (Graduate Tracer Study 2007) and regresses the hourly net wage rate in the first job after graduating from a higher education institution (HEI) on a rich set of individuals' characteristics. In order to reduce the bias due to selection to international student mobility the author includes a set of variables representing abilities and skills, characteristics of studies and international experience as control variables. The author addresses the possible selection to employment bias by using the Heckman correction with various exclusion restrictions.

**Findings:** After controlling for observed heterogeneity the author finds that Polish graduates who studied abroad for at least one month earn on average 18% more on their first job than those who studied in Poland only. However, the author also finds that this wage premium is partly explained by international economic migration after graduation. Studying abroad brings a wage premium only if it is followed by working abroad. Those who perform their first job in Poland do not obtain any wage premium from international student mobility.

**Originality/value:** The main contribution of the paper is that it identifies international economic migration after graduation as another mechanism explaining why those, who studied abroad, earn more.

**Keywords:** international student mobility, wages, wage premium, Heckman correction

**JEL Classification:** I29, J24, J31

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## Introduction

Tertiary education has been perceived in Poland as a key determinant of success in the labour market, as clearly shown by the increase of the net enrolment ratio in tertiary education from 9.8% in 1990 up to 40.9% in 2009 (GUS, 2010; GUS, 2015). However, as tertiary education becomes more and more popular, it does not signal skills as well as before. It is not surprising then, that Polish students readily decide to complete a part of their studies abroad, since they regard it as an additional investment in their professional development, which may be rewarded in the future by their employers (Vossensteyn *et al.*, 2010; Szubert and Skrętowska, 2013). They have had a special opportunity for doing this since 1998, when Poland accessed the Erasmus international exchange program. In the first year of its operation 1,426 Polish students decided to go on an exchange, and over the next 14 years the number has increased more than 10-fold, reaching 16,219 in the academic year 2012/13 (FRSE, 2014). In fact, the scale of studying abroad is even larger, since the mobility associated with the Erasmus program is only about a half of the entire international educational mobility of students in Europe (European Commission, 2014).

If we regard studying abroad as an investment in human capital, we can expect that it will bring economic benefits to students in terms of employment and wages. This follows from the theory of human capital (Becker, 1964), which assumes that acquired skills increase productivity, and that, under the assumption of perfect competition in the labour market, translates into higher wages. Furthermore, given that the decision to study abroad is a result of a selection process, in which innate abilities and acquired skills (cognitive and non-cognitive) are the key determinants of international mobility, studying abroad may give employers a signal of high abilities. So we can expect higher wages also on the grounds of the signaling theory (Spence, 1973).

As much as 89% of former Erasmus students mention the development of their personality as the basic benefit from studying abroad, but 16% of them also believe that as a result of participating in an exchange they are able to earn more (Janson *et al.*, 2009). In the Central and Eastern European (CEE) countries, the percentage of students who recognize the positive impact of studying abroad on their wages is significantly higher - in Poland it amounts to 26%. These numbers are based, however, on the participants' subjective assessment of the impact of the Erasmus program.

The studies allowing for an objective assessment of the wage premium, typically show that internationally mobile students earn more after graduation (Lianos *et al.*, 2004; Wiers-Jenssen and Try, 2005; Poot and Roskrige, 2013; Rodrigues, 2013) and that they have a steeper wage profile (Cammelli *et al.*, 2008; Kratz and Netz, 2016). Both higher wages and steeper wage profile may result from favourable selection to international student mobility and the fact that the selection bias is not fully eliminated. Kratz and Netz (2016) found evidence of two mechanisms explaining the faster wage growth. Firstly, the graduates who studied abroad are more likely to realize wage

increases through employer changes. Secondly, they are more likely to work in large and multinational companies, while these types of companies pay higher wages.

The aim of this paper is to determine whether studying abroad is correlated with the first wages of HEI graduates in Poland. The case of Poland seems to be particularly interesting as Rodrigues (2013) found that Polish students enjoy the highest wage premium from studying abroad among the sixteen European countries that she analyzed. We use data from the nationwide tracer survey of Polish graduates (Graduate Tracer Study 2007) and regress the hourly net wage rate in the first job after graduating from a HEI on a rich set of individuals' characteristics. In order to reduce the bias due to selection to international student mobility we include a set of variables representing abilities and skills, characteristics of studies and international experience as control variables. Besides we address the selection to employment bias by using the Heckman correction with various exclusion restrictions.

Our contribution to the literature is threefold. Firstly, our study is the first study to look specifically at Poland in terms of the wage premium from studying abroad. To the best of our knowledge Rodrigues (2013) the only one who has estimated this wage premium for Poland before, but our approach is different in several aspects. Our study is focused on Poland while Rodrigues (2013) conducted a comparative analysis for several European countries. Besides, we use a different source of data which allows us to focus on the first earnings after graduation rather than on earnings obtained five years after graduation, which may be affected by work experience. Finally, we apply the Heckman method to correct for selection to employment using three different instruments.

Our second contribution is that we identify international economic migration as a mechanism explaining the wage premium from studying abroad. We argue that this mechanism may be especially important in the CEE countries which are the EU member states. Low wages in these countries in relation to the EU average and the free movement of workers have led to a substantial economic migration to the Western European countries. Intercultural skills gained while studying abroad may reduce the cost of international economic migration and thus provide an opportunity to obtain wage benefits.

The third contribution is that we have found evidence of unfavorable selection to international economic migration among those graduates who studied abroad. Our results suggest that the experience of studying abroad may encourage individuals to international economic migration after graduation provided that the type of their studies - in terms of the field, degree and type of institution - give them poor wage prospects.

The paper is structured into three sections. In the first one, we discuss the theoretical basis for the impact of studying abroad on earnings. The second section presents the results of previous empirical studies, while the third one presents our own empirical analysis of the wage premium from studying abroad obtained by HEI

graduates in Poland. The paper ends with a summary containing the most important conclusions.

## **1. Theoretical background**

The theoretical justification for the impact of studying abroad on graduates' wages is provided by both the theory of human capital and the signaling theory.

In terms of the human capital theory (Becker, 1964), a trip abroad for educational purposes can be treated as an investment in human capital, since it allows to acquire knowledge and skills. While studying abroad, students acquire not only academic knowledge but also the skills necessary to function in a new environment, such as communication skills, command of foreign languages, activity, courage, resourcefulness, ability to cope with stress, openness to other cultures. According to the theory of human capital, the acquired skills result in an increased productivity and this translates into a higher graduate's wage.

In turn, according to the signaling theory (Spence, 1973; Arrow, 1973; Stiglitz, 1975), a higher education graduate will receive a wage premium from studying abroad even if he or she has not acquired any knowledge or skills while abroad, because employers regard studying abroad as a signal of high innate abilities. In such a case, studying abroad would only play the role of a tool for selecting candidates according to their innate abilities, and it would not be a source of any additional knowledge or skills.

It seems that using information about studying abroad as a screening tool might be justified, provided that the process of awarding scholarships is based on student's abilities. In fact, in the early years of the Erasmus program (1998-2006), when the number of scholarships was relatively small, this condition was met in Poland - only very good students went to study abroad. Later, not only very good, but also good students were allowed to participate in the exchange program.

To sum up, in the light of both the human capital theory and the signaling theory, we can expect a positive relationship between studying abroad and graduates' wages.

## **2. Overview of empirical literature**

There are two stands of research on the wage premium of studying abroad - one based on subjective and the other on objective assessment.

The first strand includes a few evaluation studies of the Erasmus program (Bracht *et al.*, 2006; Janson *et al.*, 2009; European Commission, 2014). These studies present data from surveys conducted with former Erasmus students and their employers, in which respondents were asked to assess the impact of studying abroad on students' wages after graduation. Former Erasmus students from 26 European countries, who

were interviewed in the VALERA evaluation study in 2005-2006, most often stated that participation in the exchange helped them develop their personality (89%), less frequently they mentioned that it helped them find the first job (54%) or develop their career (53%) (Bracht *et al.*, 2006) [1]. Only 16% of them believe that the exchange helped them to earn more. Interestingly, the positive impact of studying abroad on wages is more often reported by students from the CEE countries, including Bulgaria (30%), Romania (30%), Poland (26%), the Czech Republic (26%) or Hungary (24%) (Janson *et al.*, 2009).

A positive relationship between studying abroad and the wage level is also indicated by employers. 10% of employers surveyed in the VALERA study in 2005 stated that graduates who had studied abroad received higher wages in their first jobs than other candidates with tertiary education, while in the Erasmus Impact Study conducted in 2013, the percentage of such statements was even higher – it amounted to 20% (European Commission, 2014).

Since employers require good command of foreign languages from candidates more often in the CEE countries (87%) than in the Western Europe (62%) (Janson *et al.*, 2009), one can presume that higher wage benefits from studying abroad reported by the CEE students may result from an improvement in language skills. While staying abroad, a student can both improve his or her primary foreign language which is used during lectures and classes (usually English), but also he or she can learn a second language – the one spoken in the country of his or her stay – which could be a big advantage in the labour market upon return to the home country. The results of the evaluation of the Erasmus program in Poland in the academic year 2010/2011 show that Polish students significantly improved their command of the languages spoken in the countries of their stay (Szubert and Skrzętkowska, 2013).

The second strand of literature, which is based on objective assessment of the wage premium, typically show that those studying abroad earn more after graduation (Lianos *et al.*, 2004; Wiers-Jenssen and Try, 2005; Poot and Roskrug, 2013; Rodrigues, 2013) and that they have a steeper wage profile (Cammelli *et al.*, 2008; Kratz and Netz, 2016).

Lianos *et al.* (2004) found that Greek graduates who studied in other EU countries earn 15% more after controlling for several observable characteristics with OLS. Wiers-Jenssen and Try (2005) also addressed the selection on observables with OLS and found that those Norwegian graduates who obtained their degree abroad enjoyed a wage premium of 3-4%, while those who studied for some time abroad but obtained their degree in Norway obtained no wage premium at all.

Poot and Roskrug (2013) addressed two potential sources of bias: firstly, the selection to international student mobility by including parents' education in the wage regression, and secondly, the selection to employment by applying the Heckman

correction. The results show that graduates from New Zealand who studied abroad for one year obtain a wage premium of 3-2%.

Rodrigues (2013), using data from two surveys of university graduates from 19 European countries and the propensity score matching (PSM) method to control for selection on observables, showed that international student mobility had a positive impact on wages in five of the countries covered by the analysis [2]. Interestingly, this impact was found to be strongest in Poland, where the wage premium from studying abroad in the period of tertiary education amounted to 16% after five years of the graduation.

Cammelli *et al.* (2008), on the other hand, having analysed data on graduates of Italian universities, found that the wage premium from participation in international student exchange programmes reached 4% one year after graduation and 11% after five years. However, they did not address the selection issue. In another study for Italy based on AlmaLaurea data, Caroleo and Pastore (2017) also report individuals who studied abroad obtain a wage premium of 6-7% five years after graduation. Kratz and Netz (2016) report a similar result for graduates of German universities. They found former participants of international exchange programs to have a steeper wage curve and the wage premium from studying abroad to reach 5% after one year and 15% after five years of graduation. But after controlling for individual observable characteristics the wage premium decreased to 3% and 10%, respectively, and only the latter was statistically significant at 5%. Besides, Kratz and Netz (2016) found evidence of two mechanisms explaining this wage premium. They argue that higher wage growth of those graduates who studied abroad partly results from their higher likelihood of realizing wage increases through employer changes, and partly from their higher likelihood of working in large and multinational companies.

The authors of the above mentioned studies used OLS or PSM to control for heterogeneity on observables, but their estimates may still be biased due selection on unobservable characteristics. Thus, the results cannot be claimed to be casual. Messer and Wolter (2007) were the only ones who tried to address this problem by employing the instrumental variable (IV) method. Their OLS regression showed that studying abroad was positively correlated with graduates' first wages in Switzerland - each semester was associated with wages higher by 3%. But after employing the IV method, they concluded that the positive correlation is not casual and it resulted from unobserved heterogeneity only. Although promising, the approach is criticized for using mother's education as an instrument. Kratz and Netz (2016) argue that it is unlikely that mother's educational attainment affects her child's propensity to studying abroad and at the same time it does not impact the child's wages through any other channel. Possible other channels through which mothers' educational achievement may affect descendants' wages are job-related networks, job-related informational support and the transmittance of cultural capital.

### **3. Methodology**

The aim of the empirical analysis is to identify the impact of studying abroad on wages of Polish higher education graduates in the first job after graduation. We also want to test for the hypothesis that international economic mobility of HEI graduates is a mechanism explaining the wage benefits from studying abroad.

#### **Data**

The analysis is based on data from the nationwide tracer survey of Polish graduates conducted by the Central Statistical Office of Poland (GUS) in the years 2006-2007. The focus of the survey was on the economic activity of graduates of various school types over the period of the first three years after the completion of formal education, with a special focus on the first job after graduation. The nationwide survey was conducted on a sample of 20,251 persons who completed their formal education between 1 January 1998 and 31 December 2005 (at basic vocational schools, technical upper secondary schools, general upper secondary schools, post-secondary non-tertiary schools, higher education institutions) [3]. The population was limited to individuals who did not exceed 27 years of age at the time of graduation and the break between the next-to-last and the last stage of education was not longer than 12 months.

The database provides information on the fact and duration of studying abroad at various stages of education - from primary school to tertiary education. There are also some variables in the database which can represent innate abilities as well as skills acquired as a result of parents' investments. These variables include: the average grade on the certificate of completion of the last school, each parent's education level, participation in various types of extracurricular activities during formal education (e.g. foreign language classes, IT classes, sports and tourism, artistic and technical activities, scouting).

The empirical analysis refers to the determinants of the wage level of higher education graduates in the first job after graduation from a HEI, provided that the respondent undertook employment within a year after the graduation. Consequently, the following respondent categories have been dropped from the database: 1) individuals who did not undertake or complete studies at a HEI, 2) individuals who did not work within the first year after ending formal education, 3) the self-employed and family members supporting them, since none of these groups was asked about earnings, 4) hired workers who did not disclose their wages. Eventually, the sample used for the analysis comprised 1902 observations.



## Identification strategy

The fundamental methodological problem that needs to be addressed while analyzing the impact of studying abroad is the endogeneity of this variable in the wage regression, which results in a biased estimator of the wage premium. Many empirical studies report that participants of international exchange programs are a selected group. First, they come from families of a higher social and economic status, represented by parents' educational attainment (Cammelli *et al.*, 2008; Salisbury *et al.*, 2009; Orr *et al.*, 2011; Wiers-Jenssen, 2011; Kratz, 2012; Rodrigues, 2013). Second, they are likely to have previous experience with travelling abroad (Saarikallio-Torp and Wiers-Jenssen, 2010; Finger, 2011; Weenink, 2014; Lörz *et al.*, 2015). Third, they have high abilities and skills demonstrated by educational achievements, good command of foreign languages and educational pro-activeness (Souto Otero and McCoshan, 2006, Salisbury *et al.*, 2009; Lörz and Krawietz, 2011; Rodrigues, 2013; Lörz *et al.*, 2015). Fourth, they expect high benefits from studying abroad in terms of experience to be gained in an international environment and improved command of foreign languages (Krupnik and Krzaklewska, 2006; Brooks and Waters, 2010; Saarikallio-Torp and Wiers-Jenssen, 2010; Lörz *et al.*, 2015).

All of the above factors may influence not only a decision to study abroad but also the wage level and consequently, if they are not controlled for in the wage equation, the estimator of the wage premium from studying abroad will be biased. In order to address this problem, a number of variables were included in the regression to control for students' abilities and skills, as well as their previous international experience.

The following wage equation was formulated:

$$(1) \quad \ln w_i = SA_i\beta_1 + A_i\beta_2 + HEI_i\beta_3 + IE_i\beta_4 + E_i\beta_5 + X_i\beta_6 + \varepsilon_i$$

where dependent variable ( $w_i$ ) represents the first net hourly rate earned by graduates in the first job after completing a HEI [4].

Independent variables include:

- **studying abroad** ( $SA_i$ ): equal to 1 if the respondent studied abroad for at least one month, and 0 otherwise.
- variables representing individual's **abilities and skills** ( $A_i$ ): grade on the graduation diploma, each parent's education level, the participation in various types of extracurricular activities during formal education (e.g. foreign language classes, IT classes, sports and tourism, artistic and technical activities, scouting), volunteering, internship,

- **characteristics of studies ( $HEI_i$ ):** type of HEI (public, non-public), form of studies (full-time, part-time), the professional degree obtained from a HEI (Bachelor, Master), field of study,
- variables representing other individual's **international experience** with respect to education or paid work ( $IE_i$ ): learning abroad at primary school, learning abroad at secondary school, working abroad in the course of formal education.
- **characteristics of the first job ( $E_i$ ):** firm size, firm ownership (public, private), economic sector (agriculture, industry, services), occupation,
- other variables ( $X_i$ ): gender, age when graduated, place of residence, region (voivodeship), year of graduation.

A complete list of variables included in the wage equation is presented in Table A1 in appendix. The above linear regression model was estimated using OLS with robust standard errors.

#### 4. Results

Table 1 presents the OLS estimates of the wage regression. To analyze the impact of each group of explanatory variables on the wage premium from studying abroad, a few specifications of the model were estimated. The first specification, apart from the basic control variables (gender, age when first employed, place of residence, region, year of graduation), included studying abroad only, and then gradually other groups of explanatory variables were added to the model.

[TABLE 1 ABOUT HERE]

If the basic control variables only are included in the model, the wage premium from studying amounts to 33% (specification 1). This premium is gradually decreasing, as subsequent groups of control variables – i.e. abilities and skills, characteristics of studies, and characteristics of graduate's first employment – are added one by one to the model (specifications 2-5). This demonstrates a favourable selection to international student mobility. Those studying abroad are more able, enrol the types of studies that are more valued by employers and work in companies that pay higher wages. There seems to be no selections in terms of other international experiences as the inclusion of this group of variables does not affect the wage premium. In specification 5 the wage premium from studying abroad is still high – it amounts to 18% – and strongly significant. It is worth noting that this result is very close to the one obtained by Rodrigues (2013), who found that the wage premium from studying abroad amounts to 16,4% in Poland.

In order to analyze in more detail which characteristics of individuals and their first job contribute most to explaining the wage premium, in Table A2 in appendix we

added explanatory variables one by one. We found that most of the wage premium is explained by grades, extracurricular activities while studying at HEI, parents' education, field of study, occupation and economic sector of employer. Contrary to Kratz and Netz (2016) we do not find any evidence that those who studied abroad earn more because they are employed by large companies. Our results show that the firm size does not matter.

One can expect that studying abroad increases intercultural competences, which can be useful at work in the country of student's origin. But intercultural competences, like language skills, may also facilitate international economic migration. As Polish economic migrants can earn higher wages in the Western European countries than in Poland, we can expect that a part of the wage premium from studying abroad can be explained by doing their first job abroad. This is confirmed by our results. If we control for performing the first job abroad, then the premium from studying abroad drops to 11% and becomes weakly significant (specification 6). To allow for the possibility that there are heterogeneous returns to studying abroad conditional on working abroad, we additionally interact these two variables. It turns out that studying abroad brings a wage premium only if it is followed by working abroad (specification 7). Those who perform their first job in Poland do not obtain any wage premium from studying abroad. Thus, working abroad seems to be an important mechanism explaining the wage premium from studying abroad.

It is interesting that the individuals with international student mobility experience who work in Poland are different from those who work abroad in terms of selection to studying abroad. Table A3 in appendix shows that those working in Poland are positively (self-)selected to studying abroad on their abilities and skills as well as on the type of studies. As these two groups of variables are added to the wage equation one by one the wage premium from studying abroad gradually decreases. In contrast, those working abroad are weakly positively selected on their abilities and strongly negatively selected on the type of studies. Thus, it seems that studying abroad may encourage graduates to international economic migration provided that the type of their studies - in terms of the field, degree and type of institution - gives them poor wage prospects.

## **5. Robustness checks**

We have done two robustness checks. Firstly, we estimated the model for a longer period of studying abroad, and secondly we used the Heckman correction for selection to employment.

The database allows us to identify the fact of studying abroad not only for at least one month, but also for at least one semester. As a robustness check, we estimated the model using this second definition of studying abroad. The results presented in Table 2 show that studying abroad for at least one semester brings a slightly higher wage premium than studying for at least one month - for the full specification of the

model the premium amounts to 23% (specification 5). But when we interact studying abroad model with performing the first job abroad, the wage premiums from studying for at least one month and at least one semester are almost identical (Tables 1 and 2). So, regardless of its length, studying abroad brings the wage benefits to those only who work abroad after graduation.

[TABLE 2 ABOUT HERE]

As the wage regression can be estimated for the employed only, our OLS estimates may suffer from a selection to employment bias. To correct for this we apply the approach proposed by Heckman (1979) by using a two-step procedure. In the first step we estimate the probability of a graduate being employed using a probit regression. On this basis the inverse Mills ratio is calculated. In the second step we estimate the Mincerian wage equation including this term as an additional explanatory variable, which allows to correct for sample selection bias.

We used three variables as exclusion restrictions. The first one is the model of family in which a graduate was brought up as. The variable takes value of 1 if one of the graduate's parents was employed while the other was not and did housework only, and 0 otherwise. Thus, the variable captures a sort of cultural capital in the form of being used to a certain lifestyle. The second exclusion restriction is having a child born in the calendar year of completing formal education or earlier. This variable was used to identify economic inactivity due to the need to take care of small children. As females are more likely to take care for small children we interacted this variable with gender. Thirdly, we tried a similar variable to the one proposed by Card (1999), which was the distance to the nearest school. We used for this purpose information about commuting to the last HEI completed. We created a dummy variable equal to 1 if the last HEI completed was located outside of the place in which the respondent resided before he/she started studying in that HEI. This means that the respondent had either to commute or to move temporarily to the place where his/her last HEI was located. Unfortunately, we do not know the distance or the time necessary to commute to school.

All the three instruments are, as expected, negatively correlated with the probability of finding a job and they all may be regarded as strong instruments since the value of  $\chi^2$  in the Wald test of independence of equations is far above 10, which is the threshold recommended by Staiger and Stock (1997), and the main and selection equations are independent at 0.01%.

Table 3 shows that the results do not change qualitatively when we correct them for selection to employment. This is the case both when we use the above three variables separately and when we use them jointly, in one specification.

[TABLE 3 ABOUT HERE]

## 6. Conclusions

Our goal is to identify the impact of studying abroad on wages of Polish HEI graduates in the first job after graduation. After controlling for a rich set of individual characteristics representing abilities and skills, type of studies, other international experience and characteristics of the first job, we find that Polish graduates who studied abroad for at least one month earn 18% more on their first job than those who studied in Poland only. The wage premium is higher for a longer period of studying abroad. Besides, the results do not change qualitatively when we use the Heckman correction for selection to employment.

Consistent with literature we find that those studying abroad are on average positively selected in terms of their abilities and skills as well as the type of studies, but above that the jobs they perform are on average better remunerated. We find that these three groups of factors explain approximately a half of the wage premium from studying abroad as when we include these groups of variables in the wage equation the wage premium drops from 33% to 18%. However, as we still do not control for several unobservable characteristics, we cannot claim to have estimated the casual effect of studying abroad, but we are confident that we have substantially reduced the selection bias. In fact, our final estimate is very close to the one obtained by Rodrigues (2013), who found that the wage premium from studying abroad amounts to 16,4% in Poland.

The selection on skills and abilities may be a result of public and private decisions as regards spending money on international student mobility. In the public sphere, the key factor may be the selection criteria used by HEIs for granting international exchange scholarships, where good academic performance is rewarded. As for the private sphere, there is some evidence showing that parents tend to invest more in educating the more able children [5]. The financial status of the household is also an important aspect, because studying abroad, even if subsidized from public funds, requires supplementary private financing [6].

As for the positive selection on the characteristics of the first job we find that it is due to selection on occupation and economic sector of employer only. Contrary to Kratz and Netz (2016) we do not find any evidence that those who studied abroad earn more because they are employed by large companies.

Our main contribution to the literature is that we identify international economic migration after graduation as another mechanism explaining why those, who studied abroad, earn more. We find that studying abroad brings a wage premium only if it is followed by working abroad. Those who perform their first job in Poland do not obtain any wage premium from studying abroad at all.

Besides, we have found evidence of unfavorable selection to international economic migration among those graduates who studied abroad. Our results suggest that the experience of studying abroad may encourage individuals to international

economic migration after graduation provided that the type of their studies - in terms of the field, degree and type of institution - give them poor wage prospects.

One should also have in mind some limitations of our results. Firstly, the wage premium from studying abroad can still be biased due to unobservable heterogeneity. Secondly, the results refer to all individuals studying abroad, which means that they cover both the participants of international exchange programs, like Erasmus, as well as those who completed regular studies abroad. Unfortunately, the data do not allow for a separate analysis of each of these two categories. Thirdly, our data refer only to the first wage after graduation so we could not analyze how the wage premium from studying abroad evolves over time after graduation.

## Notes

1. The study covered, among others, 4589 former students who had participated in the Erasmus exchange program in the academic year 2000/2001 and 312 employers (including 25% indicated by the students) from 26 EU countries.
2. She used data from two projects: 1) the REFLEX project, carried out in 2005 in fourteen countries (Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Italy, Japan, The Netherlands, Norway, Portugal, Spain, United Kingdom) on a sample of 70,000 respondents who graduated in the academic year 1999/2000, and 2) the HEGESCO project, conducted in 2008 in five other European countries (Lithuania, Poland, Hungary, Slovenian and Turkey), with a gross sample size of 30,000 graduates in the academic year 2002/2003.
3. A description of the system of education in Poland can be found in Eurydice (2006).
4. For the sake of comparability of the initial earnings of graduates who started their first job in different years (1998-2005), initial hourly rates were adjusted by the Consumer Price Index, with 2005 as the base year.
5. According to Becker and Tomes (1976), parents seeking to maximize the utility of investing in children, provide able children with human capital, while those less able with other capital types (financial, physical).
6. In the academic year 2010/11, , the total costs of the stay abroad exceeded the amount of the grant for 96% of Polish students going on international exchanges under the Erasmus program, while for 64% of students, these costs were at least two times higher than the grant. Therefore, 78% of students benefited from financial support of the family during their stay abroad and 64% relied on their own savings (Szubert and Skrętowska, 2013).

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## Tables (to be included in the main text)

**Table 1. OLS estimates of the HEI graduate's first wage equation**

<i>Model specification</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Studying abroad ( $\geq 1$ month)	0.327*** (0.068)	0.258*** (0.068)	0.217*** (0.069)	0.222*** (0.070)	0.181*** (0.069)	0.113* (0.066)	0.060 (0.070)
First job abroad						1.004*** (0.080)	0.917*** (0.088)
Studying abroad x first job abroad							0.540** (0.223)
Abilities and skills		yes	yes	yes	yes	yes	yes
Characteristics of studies			yes	yes	yes	yes	yes
International experience				yes	yes	yes	yes
Characteristics of the first job					yes	yes	yes
Number of observations	1902	1902	1902	1902	1902	1902	1902
R2	0.089	0.113	0.148	0.152	0.195	0.260	0.262
p-value of F-statistics	0	0	0	0	0	0	0

Notes: Each specification includes additionally: gender, age at employment, place of residence, region (voivodship), year of graduation; \*\*\*/\*\*/\* stand for 1%, 5% and 10% significance, respectively; standard errors in brackets

Source: Author's own analyses based on unit data from the nationwide tracer survey of Polish graduates conducted in 2007.

**Table 2. OLS estimates of the HEI graduate's first wage equation**

<i>Model specification</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Studying abroad ( $\geq 1$ semester)	0.384*** (0.079)	0.304*** (0.080)	0.265*** (0.081)	0.260*** (0.081)	0.232*** (0.080)	0.128* (0.077)	0.057 (0.082)
First job abroad						1.000*** (0.081)	0.916*** (0.088)
Studying abroad x first job abroad							0.543** (0.227)
Abilities and skills		yes	yes	yes	yes	yes	yes
Characteristics of studies			yes	yes	yes	yes	yes
International experience				yes	yes	yes	yes
Characteristics of the first job					yes	yes	yes
Number of observations	1902	1902	1902	1902	1902	1902	1902
R2	0.089	0.113	0.148	0.153	0.196	0.259	0.262
p-value of F-statistics	0	0	0	0	0	0	0

Notes: Each specification includes additionally: gender, age at employment, place of residence, region (voivodship), year of graduation; \*\*\*/\*\*/\* stand for 1%, 5% and 10% significance, respectively; standard errors in brackets

Source: Author's own analyses based on unit data from the nationwide tracer survey of Polish graduates conducted in 2007.

**Table 3. OLS and Heckit estimates of the HEI graduate's first wage equation**

<i>Model specification</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	Heckit	Heckit	Heckit	Heckit	Heckit	Heckit	Heckit	Heckit
Studying abroad ( $\geq 1$ month)	0.216***	0.080	0.213**	0.082	0.214**	0.083	0.214**	0.083	0.212**	0.081
	(0.082)	(0.063)	(0.084)	(0.066)	(0.084)	(0.066)	(0.084)	(0.066)	(0.084)	(0.066)
First job abroad		0.900***		0.886***		0.892***		0.889***		0.887***
		(0.108)		(0.109)		(0.110)		(0.110)		(0.109)
Studying abroad x first job abroad		0.593**		0.613**		0.604**		0.608**		0.607**
		(0.257)		(0.247)		(0.250)		(0.252)		(0.250)
Abilities and skills	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Characteristics of studies	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
<i>Selection equation</i>										
Model of family			yes	yes					yes	yes
Having a small child					yes	yes			yes	yes
Commuting to HEI							yes	yes	yes	yes
Number of observations	1902	1902	2730	2730	2730	2730	2730	2730	2730	2730
R2	0.147	0.216								
p-value of F-statistics	0	0								
chi2			51.98	31.63	49.52	29.84	47.58	27.55	40.84	22.22
Prob > chi2			0	1.87e-08	0	4.69e-08	0	1.53e-07	1.65e-10	2.43e-06

Notes: Each specification includes additionally: gender, age at employment, place of residence, region (voivodship), year of graduation; \*\*\*/\*\*/\* stand for 1%, 5% and 10% significance, respectively; standard errors in brackets

Source: Author's own analyses based on unit data from the nationwide tracer survey of Polish graduates conducted in 2007.

## Appendix

**Table A1. Independent variables included in the wage equation**

<i>Independent variable</i>	<i>Value classes</i>
<i>Main equation</i>	
Studying abroad (SA <sub>i</sub> )	1 – the respondent studied abroad for at least one month; 0* – otherwise
Working abroad	1 – the first job after graduation was performed abroad; 0* – otherwise
<i>1. Skills and abilities (A<sub>i</sub>)</i>	
Grade on the graduation diploma	1* – low (ranging 2.0-3.5); 2 – medium (ranging 3.5-4.5); 3 – high (ranging 4.5-6.0).
Father's education	1* – primary or less; 2 – basic vocational; 3 – secondary (comprehensive, vocational, post-secondary); 4 – tertiary; 5 – unknown
Mother's education	1* – primary or less; 2 – basic vocational; 3 – secondary (comprehensive, vocational, post-secondary); 4 – tertiary; 5 – unknown
Extracurricular activities: language classes	1 – participation in extracurricular organised foreign language classes at the last stage of schooling; 2* – no participation
Extracurricular activities: IT classes	1 – participation in extracurricular organised IT classes at the last stage of schooling; 2* – no participation
Extracurricular activities: sports and tourism	1 – participation in extracurricular organised sports or tourist activities at the last stage of schooling; 2* – no participation
Extracurricular activities: artistic activities	1 – participation in extracurricular organised artistic activities at the last stage of schooling; 2* – no participation
Extracurricular activities: technical activities	1 – participation in extracurricular organised technical classes at the last stage of schooling; 2* – no participation
Extracurricular activities: scouting	1 – participation in scout meetings at the last stage of schooling; 2* – no participation
Volunteering	1 – yes; 2* – no.
Internship	1 – yes; 2* – no.
<i>2. Characteristics of studies (HEI<sub>i</sub>)</i>	
Type of HEI	1* – public; 2 – non-public
Form of studies	1* – full time; 2 – evening or part time
Degree	1* – Bachelor; 2 – Master
Field of study	1* – teacher education, pedagogy; 2 – foreign languages; 3 – humanities; 4 – art; 5 - business administration and marketing; 6 - social sciences; 7 – economics; 8 – law; 9 – administration; 10 – natural sciences; 11 - physical sciences; 12 – mathematics, statistics; 13 – information technology; 14 – engineering and technology; 15 – production and processing; 16 – architecture and construction; 17 – agriculture, forestry,

	fishery; 18 – services; 19 – healthcare, social services; 20 – military/police; 21 – security and safety; 22 – general programs; 23 – other; 24 – unknown.
<i>3. Other international experience (IE<sub>i</sub>)</i>	
Learning abroad at primary school for at least one semester	1 – yes; 2* – no.
Learning abroad at secondary school for at least one semester	1 – yes; 2* – no.
Working abroad in the course of formal education	1 – yes; 2* – no.
<i>4. Characteristics of the first job (E<sub>i</sub>)</i>	
Company size	1* – up to 9 employees; 2 – 10-49 employees; 3 – 50-249 employees; 4 – 250 employees or more.
Company ownership sector	1* – public; 2 – private; 3 – public-private.
Company economic sector	1 – agriculture; 2 – industry; 3* – services.
Occupation on the first job	Binary variables for major (one digit) groups of occupations according to ISCO-08.
<i>5. Other variables (X<sub>i</sub>)</i>	
Gender	1* – woman; 2 – man
Age when graduated	continuous variable
Place of residence	1* – rural; 2 – town ≤ 100,000 inhabitants; 3 – town >100,000 inhabitants
Region (voivodship)	1* – Dolnośląskie; 2 – Kujawsko-Pomorskie; 3 – Lubelskie; 4 – Lubuskie; 5 – Łódzkie; 6 – Małopolskie; 7 – Mazowieckie; 8 – Opolskie; 9 – Podkarpackie; 10 – Podlaskie; 11 – Pomorskie; 12 – Śląskie; 13 – Świętokrzyskie; 14 – Warmińsko-mazurskie; 15 – Wielkopolskie; 16 – Zachodniopomorskie
Year of graduation	Continuous variable (1998-2005)
<i>Exclusion restrictions</i>	
Model of family	1 – one of parents was employed while the other was not and did housework only; 2* – otherwise
Having a small child when graduating from HEI	1 – having a child born in the calendar year of graduation from HEI or earlier; 2* – otherwise
Commuting to the last HEI completed	1 – the last HEI completed was located outside the place in which the respondent resided before he/she started studying in that HEI; 2* – otherwise

Note: asterisks indicate the base category.

Source: authors' own elaboration.

**Table A2. OLS estimates of the HEI graduate's first wage equation**

<i>Model specification</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Studying abroad ( $\geq 1$ month)	0.327** (0.068)	0.298** (0.068)	0.309** (0.067)	0.298** (0.068)	0.318** (0.068)	0.258** (0.068)	0.259** (0.068)	0.247** (0.068)	0.227** (0.069)	0.217** (0.069)	0.222** (0.070)
<i>Abilities and skills</i>											
Grade point average		yes				yes	yes	yes	yes	yes	yes
Father's and mother's education			yes			yes	yes	yes	yes	yes	yes
Extracurricular activities				yes		yes	yes	yes	yes	yes	yes
Volunteering, internship					yes	yes	yes	yes	yes	yes	yes
<i>Characteristics of studies</i>											
Type of degree							yes			yes	yes
Type of HEI x form of studies								yes		yes	yes
Field of study									yes	yes	yes
<i>International experience</i>											yes
<i>Characteristics of the first job</i>											
occupation											
firm size											
firm ownership											
economic sector											
Number of observations	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902
R2	0.089	0.097	0.099	0.097	0.091	0.113	0.114	0.124	0.135	0.148	0.152
p-value of F-statistics	0	0	0	0	0	0	0	0	0	0	0

**Table A2. Continued**

<i>Model specification</i>	(12)	(13)	(14)	(15)	(16)
Studying abroad ( $\geq 1$ month)	0.207**	0.221**	0.220**	0.208**	0.181**
	(0.068)	(0.070)	(0.070)	(0.070)	(0.069)
<i>Abilities and skills</i>					
Grade point average	yes	yes	yes	yes	yes
Father's and mother's education	yes	yes	yes	yes	yes
Extracurricular activities	yes	yes	yes	yes	yes
Volunteering, internship	yes	yes	yes	yes	yes
<i>Characteristics of studies</i>					
Type of degree	yes	yes	yes	yes	yes
Type of HEI x form of studies	yes	yes	yes	yes	yes
Field of study	yes	yes	yes	yes	yes
<i>International experience</i>	yes	yes	yes	yes	yes
<i>Characteristics of the first job</i>					
occupation	yes				yes
firm size		yes			yes
firm ownership			yes		yes
economic sector				yes	yes
Number of observations	1,902	1,902	1,902	1,902	1,902
R2	0.189	0.154	0.155	0.155	0.195
p-value of F-statistics	0	0	0	0	0

Notes: Each specification includes additionally: gender, age at employment, place of residence, region (voivodship), year of graduation;

\*\*\*/\*\*/\* stand for 1%, 5% and 10% significance, respectively; standard errors in brackets

Source: Author's own analyses based on unit data from the nationwide tracer survey of Polish graduates conducted in 2007.

**Table A3. OLS estimates of the HEI graduate's first wage equation**

<i>Model specification</i>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Studying abroad ( $\geq 1$ month)	0.208** (0.069)	0.173** (0.069)	0.189** (0.068)	0.180** (0.069)	0.201** (0.069)	0.136** (0.069)	0.135* (0.069)	0.125* (0.069)	0.097 (0.070)	0.084 (0.070)	0.089 (0.071)
First job abroad	0.899** (0.088)	0.917** (0.087)	0.916** (0.087)	0.898** (0.087)	0.901** (0.088)	0.934** (0.087)	0.940** (0.087)	0.905** (0.087)	0.931** (0.087)	0.906** (0.087)	0.895** (0.087)
Studying abroad x first job abroad	0.500** (0.227)	0.511** (0.226)	0.484** (0.226)	0.494** (0.227)	0.479** (0.227)	0.471** (0.226)	0.489** (0.226)	0.510** (0.225)	0.512** (0.226)	0.572** (0.226)	0.571** (0.226)
<i>Abilities and skills</i>											
Grade point average		yes				yes	yes	yes	yes	yes	yes
Father's and mother's education			yes			yes	yes	yes	yes	yes	yes
Extracurricular activities				yes		yes	yes	yes	yes	yes	yes
Volunteering, internship					yes	yes	yes	yes	yes	yes	yes
<i>Characteristics of studies</i>											
Type of degree							yes			yes	yes
Type of HEI x form of studies								yes		yes	yes
Field of study									yes	yes	yes
<i>International experience</i>											yes
<i>Characteristics of the first job</i>											
occupation											
firm size											
firm ownership											
economic sector											
Number of observations	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902	1,902
R2	0.157	0.167	0.169	0.165	0.159	0.183	0.186	0.192	0.206	0.216	0.219
p-value of F-statistics	0	0	0	0	0	0	0	0	0	0	0



**Table A3. Continued**

<i>Model specification</i>	(12)	(13)	(14)	(15)	(16)
Studying abroad ( $\geq 1$ month)	0.078 (0.069)	0.089 (0.071)	0.089 (0.071)	0.080 (0.071)	0.060 (0.070)
First job abroad	0.929** (0.086)	0.900** (0.087)	0.894** (0.087)	0.891** (0.088)	0.917** (0.088)
Studying abroad x first job abroad	0.523** (0.221)	0.557** (0.226)	0.580** (0.226)	0.579** (0.227)	0.540** (0.223)
<i>Abilities and skills</i>					
Grade point average	yes	yes	yes	yes	yes
Father's and mother's education	yes	yes	yes	yes	yes
Extracurricular activities	yes	yes	yes	yes	yes
Volunteering, internship	yes	yes	yes	yes	yes
<i>Characteristics of studies</i>					
Type of degree	yes	yes	yes	yes	yes
Type of HEI x form of studies	yes	yes	yes	yes	yes
Field of study	yes	yes	yes	yes	yes
<i>International experience</i>	yes	yes	yes	yes	yes
<i>Characteristics of the first job</i>					
occupation	yes				yes
firm size		yes			yes
firm ownership			yes		yes
economic sector				yes	yes
Number of observations	1,902	1,902	1,902	1,902	1,902
R2	0.257	0.221	0.221	0.221	0.262
p-value of F-statistics	0	0	0	0	0

Notes: Each specification includes additionally: gender, age at employment, place of residence, region (voivodship), year of graduation; \*\*\*/\*\*/\* stand for 1%, 5% and 10% significance, respectively; standard errors in brackets

Source: Author's own analyses based on unit data from the nationwide tracer survey of Polish graduates conducted in 2007.