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PAPER

Poland in an Integrated European Economy: Are Foreign Language Skills Valued by Employers in the Polish Labor Market?

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Abstract It seems self-evident that the ability to speak a language other than one's native tongue would be an economically valuable skill in many labor market situations. A large empirical literature, for example, has identified a significant positive effect on wages for immigrant workers who develop fluency in the language of their migration destination. Much less attention has been paid to possible labor market advantages from mastery of a foreign language by workers remaining in their home country. We present an empirical study of the effect of foreign language ability on the base wage of full-time workers in Poland in 2014 using a unique data set with over 100,000 survey responses. Our results confirm that English has a particularly strong quantitative effect on wage levels, and competence in French and German also enhances wages but to a lesser extent than knowledge of English. The wage effect of foreign language skills appears stronger in the private sector, in foreign-owned firms and in regions more closely integrated with foreign trade.

Keywords: Wage differentials; Human capital; Foreign language knowledge; Transitional economies; Confirmatory factor analysis

JEL Classification: I26; J24; J31; P23

1. Introduction

In an increasingly integrated global economy, it seems clear that fluency in English or other languages with commercial importance would be a potentially significant addition to a worker's human capital for those living in peripheral countries. Language skills might be especially valuable for workers in a country like Poland which has predicated its relatively successful transition strategy on increased integration with

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Western Europe and, ultimately, membership in the European Union and which has been the beneficiary of significant inflows of foreign capital. In addition, to support this transition policy Poland adopted language education objectives designed to create a multilingual workforce. While each person has his or her own reasons for learning foreign languages and experiences unique practical benefits, some of the cognitive, social, cultural and economic advantages of bi/multilingualism are universal. Language is now recognized as an economic variable[1] and the 'economics of language' has emerged as an interdisciplinary research field analyzing "the mutual effect of language-related and economic variables" (Grin, 1994, p. 25)[2].

The links between foreign language competence and the creation of value in an economic sense have been extensively studied in Grin (1994, 2002, 2003, 2006, 2014) and Grin *et al.* (2010). The authors augmented the fundamental economic models with the explicit inclusion of linguistic variables and showed that knowledge of foreign languages is beneficial to individuals, firms, and society as a whole and has a market and non-market value at the private and societal levels. At the private level, non-market benefits of language learning are mainly derived from the ability to communicate with more people, an exposure to different cultures, a linguistically rich and diverse environment, a joy of learning something new, a feeling of personal achievement, increased reputation, prestige and recognition among peers. Private market benefits of language acquisition manifest themselves in various labor market outcomes, such as employability, occupational mobility, and earnings.

In this paper we focus on the impact of foreign language competence on labor income[3] earned by workers in the Polish labor market in 2014. Hence, the core question is whether linguistic skills and earnings are linked, how, and how strongly. The question whether language itself, *ceteris paribus,* results in earnings differentials "remains, throughout the history of language economics, the single most important area of research" (Grin, 2003, p. 17). Interestingly, to date there are no specific theoretical models that could be used to explain the role of foreign languages as determinants of labor income. The most typical theoretical framework used in the works on language-based wage differentials[4] "is derived from the combination of the language economics perspective with human capital theory developed in education economics" (*ibid*., p. 46). While the theory of language-based earnings differentials is still at a state of development, their existence has been confirmed

[1] See Zhang and Grenier (2013) for a comprehensive survey and references therein.

[2] See, *e.g.,* Chiswick and Miller (2007) and Ginsburgh and Weber (2011) and references therein.

[3] In this study, the terms 'earnings,' 'wages' and 'labor income' are used interchangeably to avoid word repetition. Strictly speaking, these terms are not identical.

[4] In this study, the term 'return' is occasionally used in lieu of 'wage differential' or 'wage premia.' Grin (2003, p. 46) points out that "The term 'rate of return', in this context, is not fully appropriate. (…) the concept of rate of return presupposes that human capital is treated as an investment entailing (mostly) current expenditure in order to generate future benefits. In other words, the passage of time should be explicitly taken into account. However, the overwhelming majority of existing statistical work on the private value of second language skills eschews the question of time. Typically, information will be gathered on the current value of a range of variables for individual observations, and these values related to one another through multivariate analysis; hence, it is more appropriate to speak about 'earnings differentials'. Hence, most of the literature in this area therefore presents differentials, not rates of return."

by a vast number of empirical studies.[5] The estimated language wage differentials are generally positive, implying that employers do find these skills valuable, although the magnitudes of this effect differ widely. Most of these studies focused on the role of language on immigrant earnings and showed that immigrants significantly benefitted from knowing the dominant language of their host country, mostly in Australia, Canada, Germany, the UK and the US [see Chiswick and Miller (2015) for an overview]. Several studies examined the wage effect of mother tongue on earnings in multilingual countries such as Canada, Luxemburg, Switzerland, and Ukraine. Fewer studies estimated the wage premium associated with speaking a foreign language in a particular country: Fry and Lowell (2003), Saiz and Zoido (2005), Chiswick and Miller (2010) for the United States; Levinsohn (2007) and Casale and Posel (2011) for South Africa; Lang and Siniver (2009) for Israel; Azam *et al*. (2013) for India; Di Paolo and Tansel (2015) for Turkey; Williams (2011), Ginsburgh and Prieto-Rodriguez (2011, 2013) and Stöhr (2015) included several West European countries in their analysis. The empirical evidence is even more scant for post-communist Central and East European countries. We are aware of only a few previous studies on the relationship between foreign language skills and earnings in the Czech Republic, Hungary, Estonia, Latvia, and Poland (Galasi, 2003; Garrouste, 2008; Toomet, 2011; Fabo *et al*., 2017; Liwiński, 2018).

Our study contributes to the growing field of language economics in several ways. First, we add to the small but growing empirical literature on the returns associated with the multilingual skills of *natives* in a *monolingual* society. Our sample is drawn from the total Polish population that may also be described practically as the native-born population because immigrants constitute a tiny fraction – less than 2% – of Polish residents (Duszczyk *et al*., 2013, p. 23). And Poland still remains "an overwhelmingly monolingual country where Polish is the first language used at home for 94.5% of the population" (Wójtowicz, 2015, p. 99). Thus, we consider the native-born population in Poland and estimate the effects of foreign language competence on earnings for those people who learned a foreign language, that is, the language that is not demolinguistically dominant in the country. In this regard, our study is novel and differs from the majority of previous work because "investigating the differential association between language skills and labour market outcomes for natives and for migrants requires applying different conceptual frameworks and models" (Araújo *et al*., 2015, p.65, footnote 32).

Second, many of the limited number studies of foreign language ability of native workers refer to language *use* (typically at the workplace) rather than language *skills*. Language use is a fairly vague and unreliable definition of language competence (Grin, 2003, pp. 19-20). We investigate the extent to which, *ceteris paribus*, a better *general* knowledge of foreign languages can be associated with higher earnings. The rationale behind this approach is that "there might exist wage premia associated with the knowledge of a second language, whether individuals actually use the second language on the job or not" (Saiz and Zoido, 2005, p.523).

Third, our large, nationally representative data set with 106,583 observations enables

[5] The reader is referred to Gazzola *et al.* (2015) who prepared an extensive bibliography on 'Language Economics.' In particular, the list of studies on language and labor market outcomes appears on pp. 16-27.

us to analyze wage premia associated with different levels of proficiency (beginning, intermediate, and advanced) in six foreign languages (English, German, French, Italian, Spanish, and Russian) while controlling for a large number of socio-demographic factors that may affect earnings. The large number of observations also allows us to explore potential heterogeneity in language-based differentials along various dimensions, such as type of establishment, and various measures of the extent to which the individual's employment is connected to international economic activity.

Finally, to our knowledge, this is one of the few attempts to measure the returns to individual investment in acquiring language skills for workers in a transition economy ten years after accession to the multilingual EU. Existing studies for transition economies are generally restricted to data from the 1990s and early 2000s.

The rest of this study proceeds as follows: Section 2 provides details on our data and measures of language proficiency. We describe our estimation methods in Section 3 and report results in Section 4. Section 5 identifies and discusses several channels (cognitive, social, and cultural) through which knowledge of foreign languages may affect an employee's productive skills and performance. Section 6 concludes the paper.

2. Data and variables

The data used in this study are proprietary to the Sedlak & Sedlak (S&S) company. S&S was founded in 1990 and is Poland's oldest HR advisory firm providing compensation consulting services and carrying out salary surveys. The aim of the surveys is to build a comprehensive national database on salaries for as many job positions as possible. S&S collects salary data directly from companies as well as from the general population via Computer Assisted Web Interviewing (CAWI) where an online questionnaire is provided to the respondent via a link or a website.

In particular, S&S conducts a web-based Polish General Salary Survey (in Polish - Ogólnopolskie Badanie Wynagrodzeń, OBW) which, at the time of writing this article, is the largest non-governmental salary survey in Poland. The survey was launched in 2004; and since then the survey has been ongoing, that is, activated and ready to receive responses all year round. Annual databases are then created by combining the survey responses submitted from January 1 through December 31 of that year. The OBW questionnaire is located on the 'wynagrodzenia.pl' website (the domain name can be translated as 'salary.pl'). The invitations to the survey are distributed through email campaigns, text links connected to various articles published by S&S employees on the Internet, and through cooperation with partner companies, web pages, and paper magazines. The mixed methods of soliciting responses make it difficult to calculate a true response rate. However, it is known that nearly 6 million individual users visit the website each year, and more than 100 thousand participate in the survey. To ensure data reliability and quality, S&S employs a number of quantitative and qualitative checks of the survey responses along with a sophisticated data cleaning procedure. It involves plausibility analysis (that is, checking for inconsistent and/or conflicting answers), examining questionnaire completion time, analysis of outliers, etc. On average, every year about 5% of all survey responses are

excluded from the database.This study uses data from the 2014 OBW survey. After data cleaning, the total number of responses was 106,583. These include only hired workers, and do not include employers and self-employed individuals. For each respondent we have a variety of background personal (gender, age, education, total work experience), workplace (sector of employment, firm ownership, tenure, occupation, wage) and environmental (local labor market conditions) characteristics.

In the survey, respondents were asked about their knowledge of six foreign languages: English, German, Russian, French, Italian, and Spanish. For each of these languages, respondents were asked to self-evaluate their proficiency using the following pre-defined scale: no knowledge, beginner, intermediate or advanced. The last three levels correspond to A1/A2, B1/B2 and C1/C2 levels in the self-assessment grid (CEFR) used in the European Language Portfolio (http://www.coe.int/en/web/portfolio/self-assessment-grid). In our sample, English was the most popular foreign language (86.5% of all respondents had at least some knowledge of it), followed by German (35.4%) and Russian (27.0%). Sixty-four percent stated either intermediate or advanced levels of proficiency in English while this share was about 10% for German and Russian, and about 1-2% for all other languages. Finally, 54% of the survey respondents indicated that they had some level of ability in two or more of the languages covered by the survey.

3. Estimation

Our examination of the wage returns to the language skills of Polish workers is based upon the estimation of the coefficient β in the following Mincerian (1974) wage equation:

$$\ln W_i = \alpha + \beta L_i + \gamma X_i + \varepsilon_i \tag{1}$$

The dependent variable is the logarithm of individual *i*'s monthly salary W_i . Language ability is indicated by the variable L_i. X_i is a vector of control variables. In our basic specification, X_i includes gender, human capital measures (education, total labor market experience, tenure at the current employer) and region of residence. Education is captured by indicator variables for whether the individual has attained one of the following levels: a bachelor's degree, a master's degree, a doctorate, an MBA degree, or participated in a formal, non-degree educational program after graduation. To allow for non-linear wage returns to experience and tenure, we also include their squared values. Regional control variables correspond to the sixteen NUTS2 Polish administrative regions (voivodships). Interregional migration within Poland is unusually low in comparison with other European countries with the result that regional labor market disparities in wages and employment are quite persistent (Adamchik and Hyclak, 2017). Finally, ε_i is an error term that is assumed to be white noise.

It should be noted that OLS estimates of β may be hampered by at least two sources of distortion: omitted variable bias and measurement error bias (Card, 1999, 2001; Gunderson and Oreopoulos, 2010). Omitted variable bias results from the fact that people who are more proficient in foreign languages may also have greater innate

abilities (such as, cognitive abilities, motivation, attitude, willingness to work hard, entrepreneurial, managerial and organizational skills, *etc.*) as well as more favorable socio-economic and family background that would allow them to earn more even without foreign language knowledge. When those traits and other characteristics are not controlled for in the estimation procedures, it may cause OLS to overestimate the true value of β because the estimated returns can reflect the economic returns to these omitted variables as well as the pure causal effect of foreign language knowledge. Measurement error bias results from the fact that people may not accurately report their foreign language competence.[6] Random misreporting may cause OLS to underestimate the true value of β; however, if the measurement error is systematically related to the level of foreign language proficiency, then the bias can go in either direction.

The possible ways of dealing with the aforementioned biases typically include finding appropriate proxies for the unobserved factors and/or applying specific econometric techniques, such as IV. However, in this paper we cannot resort to these solutions because no suitable proxy variables, or instrumental variables, or repeated measurements are available in the dataset, and no validation studies exist in the literature.[7] We did try to construct and use an internal IV by utilizing a novel approach proposed by Lewbel (2012) [IVREG2 package in STATA]. The obtained regression coefficients seemed to be meaningful but a strong rejection of the null hypothesis of the Sargan-Hansen test (for IV-2SLS) and the Hansen J-test (for IV-GMM) cast serious doubts on the validity of the estimates (Baum, 2007). We hence proceed with OLS estimation of our model in this analysis. While no such studies exist for foreign language acquisition and wages, numerous studies for education and wages have shown that IV estimates of the returns to education are typically higher than OLS estimates (Gunderson and Oreopoulos, 2010). As such, we believe that our OLS estimates can provide a fair picture of the likely impact of foreign language proficiency on wages and may be viewed as a lower bound of the true value of causal wage returns to foreign language skills.

It is also worth noting that our data set does not constitute a random sample from a target population of all hired workers in Poland. Our sample may be defined as a 'voluntary response sample' because it only includes those people who voluntarily chose to participate in the survey. Compared to random samples, voluntary response samples

[6] Indeed, self-reported linguistic measures may be susceptible to misreporting. However, self-evaluations are often the *only* way to assess language skills in the general population and they have been widely used in large-scale studies on languages [e.g., special Eurobarometer surveys titled "Europeans and languages" and "Europeans and their languages" conducted for the European Commission in 2001 (No. 147), 2006 (No. 243) and 2012 (No. 386)]. There is some evidence that self-evaluations may be a generally reliable way of measuring the level of language skills. Oscarson (1984), Blanche and Merino (1989) and Ross (1998) all conclude that self-assessments are highly correlated with the outcomes from formal test of language ability. In a more recent study, Dragemark-Oscarson (2009) reports the results from the Swedish National Evaluation where correlations between self-assessed and formal scores were high (about 0.7) and where 85% of students received the score they had estimated.

[7] In a companion paper, we attempt using the 1989 educational reform in Poland as an instrumental variable. Even if the reform is a valid instrument, it will allow us to estimate the wage regression with only one endogenous language variable. For several language variables to be simultaneously included in the regression, we would need several instruments, which are not available to us.

are typically prone to different biases. We tested our data set against the official data of the Polish Central Statistical Office and found that our sample is representative across a number of socio-demographic characteristics. Hence, we can rule out the presence of a strong self-selection bias, which increases our confidence in the quality of our data set.

Finally, we understand that our self-reported and non-random data are not generally suitable for making statistical inferences. However, in 2015 the American Association for Public Opinion Research changed its position on reporting measures of precision from nonprobability samples and now allows for such reporting, provided that the measures are accompanied by "a detailed description of how the underlying model was specified, its assumptions validated and the measure(s) calculated" (AAPOR, 2015, p. 5; AAPOR, 2016, p. 1). Because of the voluntary response nature of our sample, we applied bootstrapping techniques in order to estimate the precision of estimates from the survey.[8]

To sum up, the very large size of our data set, its similarity to the official statistics for the population of all hired Polish workers, and the proven reliability and validity of self-reported linguistic measures – all these give us confidence to proceed to quantitative analysis and suggest that our findings will be reflective of meaningful phenomena and tendencies in the Polish labor market.

4. Estimation results

4.1. Wage regression with a composite 'foreign language ability' score

The goal of this study is to examine the relationship between an employee's foreign language ability and their earnings. However, we do not have accurate measures of foreign language competence. Instead, we have several proxy indicators (*i.e.*, self-reported knowledge of six foreign languages) that share correlation with the latent trait but also contain measurement error. We assume that a factor called 'foreign language ability' underlies and determines the observed levels of proficiency of the reported six foreign languages, as well as error. In other words, we believe that changes in the unobserved latent 'foreign language ability' variable would result in changes in the observed knowledge level of six foreign languages. Hence, we want to "combine" all the languages in order to generate a composite 'foreign language ability' index, to obtain estimates of this latent factor for individual observations, and to use these individual factor scores in the analysis of wages.

A popular statistical technique to analyze problems of this kind is confirmatory factor analysis (CFA). Linear relations are postulated to hold between the latent factor and observed variables:

$$L_{ij} = \mu_j + \lambda_j F_i + \varphi_{ij} \tag{2}$$

where F_i is the unobserved latent 'foreign language ability' factor for individual *i, i* =

[8] We generated 500 independent replications by randomly selecting 106,583 respondents with replacement from the original survey data set. As one might expect, given the large number of observations in our sample, the bootstrap standard errors converge on the robust standard errors so subsequent tables report just the latter statistic. Another reason was that the large number of variables included in our regressions, the huge data set, and the large number of replications (500) required a very long computation time for each bootstrap.

1, …, *n*; L_{ij} is the observed self-reported foreign language proficiency of individual *i* in six foreign languages (j = 1, …, 6); λ_j are factor weights or loadings; μ_j are the intercepts; and φ_{ij} are measurement or unique errors. The observed self-reported foreign language proficiency in each language (L_{ij}) is coded as 0-1-2-3, which corresponds to no knowledge, beginning, intermediate, and advanced knowledge. Unlike a typical Likert scale, we start our scale with a zero because a zero has its own connotation of representing nothing or an absence of the characteristic being measured. The 0-1-2-3 discrete scale is assumed to be a "reflection" of the latent 'foreign language ability' trait. The similar ordinal ability scales for foreign language proficiency were employed by Bleakley and Chin (2004), Lang and Siniver (2009), and Toomet (2011).

In the subsequent analysis, the language variable L_i in Eq. (1) is measured by the predicted latent factor values, *i.e.,* individual composite foreign language ability scores ($\hat{F}_i$). A number of methods exist for predicting latent factor scores in the CFA framework (Bollen, 1989; DiStefano *et al*., 2009). In this study, we use Bartlett's (1937, 1938) approach because this procedure produces unbiased estimates of the true factor scores (Hershberger, 2005). We use the CONFA module in STATA in order to estimate a one-factor CFA in Eq. (2) as well as individual factor scores ($\hat{F}_i$).

Panel A in Table 1 shows the results of CFA for Eq. (2): the estimated means of the data (μ_j), loadings (λ_j), and variances of the error terms (φ_{ij}). All parameters are freely estimated, with the exception of one loading that is used for identification. It is set equal to 1 and has no standard errors. This means that the contribution of each foreign language to the latent 'foreign language ability' factor is compared with this reference. The English language appears to be the major determinant of the latent factor with λ=1, followed by German (λ=0.22), French (λ=0.11), Spanish (λ=0.10), Italian (λ=0.04), and Russian (λ= -0.11). The fit of the model is good: both RMSEA and RMSR are below 0.05, and CFI seems to be touching the desirable region (from 0.9 to 1.0). Panel B of Table 1 shows the regression results when the composite 'foreign language ability' scores ($\hat{F}_i$) are used in lieu of L_i in Eq. (1). The estimated wage premium $\hat{\beta} = 0.195\,(st.err = 0.002)$. Although the metric or scale of the latent factor ($\hat{F}_i$) is arbitrary, the estimation results suggest that there is a strong statistically significant relationship between a worker's salary and his or her foreign language competence.

4.2. Wage regression with all six foreign languages

We next turn to an examination of the potential wage returns to ability in all six of the languages available in our data. We also allow for a nonlinear effect of language ability at the advanced or intermediate level rather than imposing a 0-1-2-3 linear hierarchy as in the previous section. In the OLS regressions reported in Tables 2 and 3 the language variable L_i in Eq. (1) is measured by 12 dummy variables (0-1) indicating advanced or intermediate ability in each of six foreign languages, with the reference group being workers with a beginning level understanding or no knowledge of that language.

Table 2 reports the OLS estimates with varying controls included in the vector X_i in Eq. (1). The basic model in Column (1) includes controls for gender, education, experience,

tenure and region described in Section 3. The regression in Column (2) adds extended controls for city size (Warsaw, large cities, medium cities and small cities), for industry of employment, for the type of firm (private, state-owned, public sector of non-profit), for majority foreign-owned firms, and for the department in which the individual works. Finally, the regression in Column (3) adds dummy variables for the worker's position in the firm, ranging from top management to ordinary worker. Some researchers argue that job characteristics may be endogenous and should not be included in wage equations. On the other hand, if job characteristics affect earnings, then excluding such variables may result in biased estimates. As Table 2 shows, although there are differences between the estimates of β, the overall pattern of findings is robust to the inclusion of job characteristics.

In Table 2, there are two sets of estimates reported for each language variable. Rows "a" report the OLS estimates of β in Eq. (1) along with robust standard errors. Rows "b" report the percentage effects ($\hat{p}$) associated with $\hat{\beta}$ and their standard errors. Halvorsen and Palmquist (1980) and Kennedy (1981) pointed out that in semilogarithmic regression equations the coefficient of a dummy variable, multiplied by 100, is not the usual percentage effect of that variable on the dependent variable. Kennedy (1981) proposed an approximate unbiased estimator of the percentage impact of a dummy variable regressor on the level of the dependent variable in a semilogarithmic regression equation:

$$\hat{p} = 100\left(\exp\left(\hat{\beta} - 0.5\hat{V}(\hat{\beta})\right) - 1\right) \tag{3}$$

where $\hat{V}(\hat{\beta})$ is the OLS estimate of the variance of $\hat{\beta}$. Garderen and Shah (2002) developed a convenient approximation for the unbiased estimator of the variance of $\hat{p}$, which can be reported together with Kennedy's approximate unbiased estimator of the percentage change:

$$\tilde{V}(\hat{p}) = 100^2 \exp(2\hat{\beta})\left(\exp\left(-\hat{V}(\hat{\beta})\right) - \exp\left(-2\hat{V}(\hat{\beta})\right)\right) \tag{4}$$

Hence, Rows "b" in Table 2 report $\hat{p}$ and $\sqrt{\tilde{V}(\hat{p})}$.

The results in Table 2 show large positive correlations between wages and advanced knowledge of English. As compared to the reference category (no or little English), workers with advanced knowledge of English earn 61.9% more [Column (1)], 33.9% more [Column (2)] and 23.4% more [Column (3)]. Advanced knowledge of German and French as well as intermediate knowledge of English are also positively related to individual wages with very similar magnitudes of estimated coefficients which, however, are substantially smaller than those found for advanced English. For instance, in Specification 3, those with advanced German earn 9.9% higher wages, those with advanced French earn 10.2% higher wages, and those with intermediate English earn 8.8% higher wages than those in the respective reference groups. Intermediate German, intermediate French, Italian (both levels), Spanish (both levels), and advanced Russian do not exhibit statistically significant relationships with worker wages, and intermediate Russian has a statistically significant negative effect on earnings in all of the regressions reported in the table. Adding extended controls and the indicators of position within the

firm in Columns (2) and (3) serve to lower the estimated coefficients on the language variables but there remains a substantial wage effect of English, French and German. Clearly part of the wage effect from knowledge of foreign languages stems from the effect of language ability on selection into firms in higher paying industries and locations and into positions at higher pay levels within the firm.

One reason for both direct and indirect wage effects of foreign language ability on earnings would be the enhanced productivity of multilingual workers in a business climate where Poland is highly integrated with the multilingual European Union and Polish firms compete in an increasingly integrated global economy. To examine evidence for such a productivity basis for the language effects noted above, we divide the sample into three sub-samples by the type of firm, the ownership of the firm, and regional intensity of intra-industry international trade. These results are reported in Table 3. In Columns (1) and (2), we divide the sample by the type of employer identified by the survey respondents. In Column (1), the sample consists of those working for privately-owned businesses while in Column (2) – of those working in state-owned enterprises, government agencies or non-profit organizations. In Columns (3) and (4), we report language estimates for Polish workers in firms with majority foreign ownership and firms with control by Polish owners. In Columns (5) and (6) we present results for samples of workers divided by their region of residence and the regional intensity of intra-industry trade. Uminski (2014) argues that entry into the EU intensified trade links and foreign direct investment inflows in Poland. One effect of this has been an increase in the cross-border fragmentation of production that can be measured by indices of intra-industry trade. Uminski calculates the Grubell-Lloyd index for each of the 16 Polish voivodships (NUTS2 regions) in 2011 and we use these data to classify the 8 voivodships with above average indices as areas with high regional intra-industry trade.

Similar to Table 2, Table 3 reports two sets of estimates (Row “a” and Row “b”) for each language variable. The results in Columns (1) and (2) show a marked difference in estimated wage effects. The coefficients for advanced and intermediate knowledge of English and advanced knowledge of German and French are substantially larger in the private sector regression. For instance, as compared to those with no or little English, workers with advanced knowledge of English earn 61.2% higher wages in the private sector and 29.1% higher wages in the public sector. The premia for intermediate English are 24.1% and 11.6%, respectively. These results suggest that the extra productivity associated with foreign language ability is most pronounced for workers in the more competitive private sector where the interface with the rest of Europe and the global economy is higher. In particular, government agencies and non-profit organizations are likely to have a largely local market for their services in which the productivity advantage of multilingual workers is likely to be much smaller. Again the differences between Columns (3) and (4) are striking. The wage returns to advanced and intermediate knowledge of English are much bigger for those working in foreign-owned establishments with the estimated payoff to advanced knowledge at 68.5% (versus 37.6% in Polish-owned firms) while the coefficient on intermediate knowledge shows a 30.2% wage advantage in foreign firms (versus 16.4% in Polish-owned firms).

Polish workers in foreign-owned firms with advanced and intermediate knowledge of German have substantially higher wage gains than those in Polish firms (16.4% versus 9.6%, and 3.8% versus no return, respectively). A comparison of the results reported in Columns (5) and (6) of Table 3 shows that the effect of advanced and intermediate English ability on wages is substantially higher for those workers in regions of the country with more intense intra-industry trade linkages. However, the wage returns to advanced French and German are rather similar in both sets of regions. Again we note the statistically significant negative wage effect of intermediate ability in Russian across all the subsample regressions reported in Table 3.

Why do English, German and French exhibit positive effects on wages while Italian, Spanish and Russian do not? Nowadays, English has an especially prominent status in multilingual European economic space. No other language can currently compete with English to accomplish the three activities of modern business communication: networking, knowledge sharing and relationship management (Linn, 2016a, pp. 40-52). English has been described as the *de facto* extraterritorial *lingua franca* of Europe (Seidlhofer, 2010, 2011; Doughty, 2013; Linn, 2016a, 2016b). Germany has been the major trading partner of Poland since 1990, with the 25-30% share in Poland's exports and imports (GUS, 2017a, Tables 1 and 25). Germany and France are the key suppliers of foreign capital to Poland with about 17% and 14% of total FDI in the country, respectively. Germany is dominant among firms with foreign capital carrying out business activities in Poland: in 2016 there were 5,401 firms with German capital, that is, one-fifth of the total number of 24,780 entities with foreign capital. French capital was employed in a much smaller number of firms – 1,227 entities, or 5% of the total number (GUS, 2017b, Table 6). One of the reasons explaining the insignificant effects of Italian and Spanish on wages could be a traditionally low share of Italian- and Spanish-speaking countries in the Polish business and commerce. With respect to Russia, there was a dramatic change in Poland's major trading partners. After World War II, during 1950-1990 the USSR was the main trading partner of Poland, with 30-40% of both exports and imports. At the beginning of the 1990s, Germany replaced Russia as the main trading partner, and in 2016 the share of Russia dropped to 5.8% in the Polish imports and to 2.8% in the Polish exports (GUS, 2017a, Tables 1 and 25).

A study by Fabo *et al*. (2017) analyzed the demand for foreign language skills in the Visegrad Group (the Czech Republic, Hungary, Poland and Slovakia). The authors examined about 74,000 job advertisements published on leading online job boards in 2015. Foreign languages were demanded in 33-75% of the job advertisements in the region, out of which 52% required English skills, 12% asked for German ability and 2% or fewer specified skills in French, Italian, Spanish or Russian. English was the most demanded foreign language skill particularly in Poland where it was listed in 64% of the job advertisements (for comparison, 49% in Slovakia, 39% in Hungary, and 28% in the Czech Republic). In order to better understand the relationship between language knowledge and employment status, Araújo *et al*. (2015, p. 85) applied logistic regression to the sample of native-born Polish adults (17,683 observations) and found that for those 25-40 years-old only English and German significantly influenced the chances of

employment. Assessing the usefulness of foreign languages for personal and professional development, 65% of respondents in Poland cited English, 31% German, and only 8% Russian, 3% French, 2% Spanish, and 1% Italian (EC, 2012, Table QE1a on p. 70).

5. Discussion

5.1. Foreign language competence and productive skills

Why do multilingual speakers tend to outearn monolinguals in the workplace regardless of whether they actually use a foreign language on the job or not? Recent research has identified several channels – cognitive, social, and cultural – through which knowledge of foreign languages may affect an employee's productive skills and performance. A brief, non-exhaustive and non-technical description of such channels appears below.

Cognitive effects

The cognitive benefits of 'the multilingual brain' have been well-researched in psychology. Experimental evidence shows that knowledge of foreign languages improves memory[9] and attention[10], boosts creativity and innovation[11], heightens the ability to monitor the environment[12], enhances decision-making skills[13] as well as the ability to task-switch/multi-task[14], and affects the way an individual perceives reality[15]. Adesope *et al*. (2010) conducted a meta-analysis of 63 studies (involving 6,022 participants) that examined the

[9] The collective evidence from a number of studies suggests that multilingualism tends to contribute to 'cognitive reserve' (see, *e.g.,* Craik *et al*., 2010; Bialystok *et al.*, 2012).

[10] According to Sorace (2007, p. 194), advantages of multilingualism "are particularly evident in tasks that involve cognitive flexibility and the control of attention; bilinguals seem to be better at selectively paying attention, at inhibiting irrelevant information and at switching between alternative solution to a problem."

[11] The EC (2009, pp. 7, 19) Report on this subject matter concludes that there is an increasing body of evidence revealing "a greater potential for creativity amongst those who know more than one language, when compared with monolinguals" and that multilingualism leads to "a higher capacity for generating new (creative and innovative) processes."

[12] Albert Costa, who conducted a study comparing German-Italian bilinguals with Italian monolinguals on monitoring tasks, explains that "Bilinguals have to switch languages quite often – you may talk to your father in one language and to your mother in another language. It requires keeping track of changes around you in the same way that we monitor our surroundings when driving" (Bhattacharjee, 2012).

[13] Multilingualism seems to improve decision-making skills by reducing decision-making biases. Keysar *et al.* (2012) find that people make more rational decisions when they think through a problem in a non-native language. The authors write, "Emotions and affect play an important role in decision making and in considerations of risk. (…) An emotional reaction sometimes induces a less systematic decision. Making a decision in a foreign language could reduce the emotional reaction, thereby reducing bias" (p. 667). Costa *et al.* (2014) also find that the impact of various heuristic biases in decision making is diminished when the problems are presented in a foreign language.

[14] Multilingual people can easily switch from one language system to another, and this 'juggling' skill seems to translate into the ability to switch among multiple tasks (see, for example, Prior and Gollan, 2011; Hernández *et al.*, 2013; Wiseheart *et al.,* 2016*).*

[15] Athanasopoulos *et al.* (2015) analyze whether the grammatical patterns of the language affect people's worldview. The authors find that German monolinguals tend to look at the event as a whole (that is, the action but also the goal of the action), whereas English monolinguals tend to focus only on the action. Interestingly enough, German-English bilingual speakers seem to switch between these perspectives based on the language context they were given the task in.

cognitive correlates of bilingualism and conclude that "bilingualism is reliably associated with several cognitive outcomes, including increased attentional control, working memory, metalinguistic awareness, and abstract and symbolic representation skills" (p. 207).

Social (communication) effects

In a global marketplace, more and more companies expand their business activities beyond national borders and break into new markets. Brannen *et al*. (2014, p. 495) state that "As firms internationalize and enter new markets, whether as "born globals" or more traditionally, they must navigate across countless language boundaries including national languages. Operating internationally means having to interact with transcontinental intermediaries, distinct government agencies and foreign institutions, which reside in different language environments." In these companies, foreign language skills are regarded as a priority because multilingual employees will be able to communicate and negotiate with foreign producers and consumers in their native language. In particular, several studies identified a clear link between foreign language skills and exporting performance of a firm[16] so that language barriers are often viewed as trade barriers[17].

Furthermore, knowledge of foreign languages broadens access to multilingual business information worldwide. In the era of global connectivity, businesses are often faced with diverse national informational systems, and translations are often unavailable. More than 7,000 languages are spoken in the world; and there are now over 250 languages represented on the Internet (OECD, 2013, p. 100). Cross-border access to economic and political information is crucial for companies when finding out about other businesses, existing or potential business partners elsewhere in the EU or worldwide, setting up branches, conducting cross-border trade, or providing cross-border services.

Finally, in a modern increasingly multicultural and multiethnic workplace, fluency in foreign languages means that an employee will be able to communicate, interact and connect with co-workers, both in formal and informal settings. Multinational companies increasingly bring together people from around the world to work in teams (virtual or face-to-face) on common projects. Research and empirical data have shown that language-related issues can impact (either negatively or positively) on group cohesiveness, interpersonal relations and trust as well as on working atmosphere and knowledge-sharing, all of which in turn can impact on team performance.[18] It is worth noting that the ability to communicate informally is just as important as formal communication for promoting awareness of others' activities, building valuable interpersonal ties, developing trust, and establishing shared identity and context (Yuan

[16] The UK National Centre for Languages (CiLT) surveyed about 2000 exporting SMEs from 29 European countries and found that a significant amount of business was lost because of inadequate language skills. On the other hand, the study finds that SMEs which had a languages strategy and invested in staff with language skills achieved 44% more export sales than those which did not (Hagen *et al.,* 2006, p.7*).* The EC (2008) report "Languages mean business" concludes that multilingualism opens doors to new markets and new business opportunities, and that a wide range of languages will be needed in the future.

[17] See, *e.g.,* Melitz (2008), Lohmann (2011), Isphording and Otten (2013).

[18] See, *e.g.,* Kassis-Henderson (2005, 2010), Lauring and Selmer (2010), Kassis-Henderson and Louhiala-Salminen (2011), and a special issue of the Journal of International Business Studies (2014, Volume 45, Issue 5).

et al., 2013, p. 910). Fluent bi/multilingual speakers will be able to freely socialize with their peers, while less fluent employees may experience anxiety in informal social settings and may hold back from participating in colloquial, spontaneous conversations.

Cultural effects

"The limits of my language mean the limits of my world" (Wittgenstein). Language is a constituent of culture, hence, multilingualism and multiculturalism are intertwined and inseparable. Foreign language education is no longer viewed strictly in terms of the acquisition of communicative competence, but also in terms of intercultural communicative competence (Della Chiesa *et al*., 2012). Multilingual employees are able to better understand foreign culture. Opening up to a different culture allows multilinguals to see the world from different perspectives, increases their cultural awareness and sensitivity, makes them more adaptable to cultural differences in foreign business environments, and more appreciative of foreign partners' actions and opinions.[19]

Several reasons (derived from basic labor economics) were put forth to explain why firms may be willing to pay more to bi/multilingual employees than to their comparable monolingual counterparts. First, *ceteris paribus*, bi/multilingual employees can be more productive than monolingual ones, typically because they can carry out duties that monolinguals cannot (see, *e.g*., Grenier, 1984, p. 38). Second, since foreign language skills can be directly observed at hiring, it may lead to a better matching between the language attributes of a worker and the linguistic characteristics of a job (see, e.g., Grin, 2003, p. 18). In turn, good job matches are believed to redistribute workers from the lower to the upper part of the match quality distribution which determines wages. Third, foreign language competence may be considered by employers as a signal of a worker's unobserved cognitive ability and motivation. In this case, a wage premium may arise because foreign languages signal generally higher productivity even if a worker's job responsibilities do not directly require knowledge of foreign languages (see, *e.g.*, Stöhr, 2015, p. 87). To sum up, foreign language knowledge is now viewed as a form of human capital[20] that enhances an employee's performance and productivity in the workplace and, hence, contributes to value creation.[21] The importance of multilingual staff for companies was stressed in an article in *The Financial Times* (Hill, 2013). At the *FT* roundtable, both executives and consultants agreed that companies benefited from the

[19] See, *e.g.*, Über Grosse (2004), Frederiksson *et al.* (2006), Grin and Faniko (2012), British Council (2013).

[20] "Language skills are an important form of human capital. They satisfy the three basic requirements for human capital: they are embodied in the person; they are productive in the labour market and or in consumption; and they are created at a sacrifice of time and out-of-pocket resources" (Chiswick and Miller, 2007, p. 314. Also see Chiswick, 2008, pp. 4-5). "Particular language skills could (…) be interpreted, in the same way as other types of skills, as an area in which individuals and societies could profitably invest, as a *source* of economic advantage" (Grin, 2002, p. 13).

[21] Multilingualism in professional settings, and more specifically in the corporate world, is analyzed in numerous academic papers as well as in trade and professional periodical publications. See, *e.g.,* two special issues on multilingualism at work in the Journal of Multilingual and Multicultural Development (2013, Issue 6) and in the Multilingua: Journal of Cross-Cultural and Interlanguage Communication (2014, No. 1-2). Also, Grin *et al.* (2010), Gunnarsson (2010, 2013), Berthoud *et al.* (2013), Angouri (2014).

diverse background and skills of multilingual employees and would benefit more in future. Their advice to business was "Hire more multilingual employees, because these employees can communicate better, have better intercultural sensitivity, are better at co-operating, negotiating, compromising. But they can also think more efficiently." The growing importance of foreign language skills has prompted researchers to develop new concepts – 'cosmopolitan capital,' 'intercultural capital,' 'transnational linguistic capital,' and 'transnational cultural capital' – in order to emphasize this very specific aspect of human capital (Carlson *et al*., 2017). Whatever the name is, this form of human capital refers to foreign language skills and can be acquired via different forms of foreign language learning.

5.2. The current state of multilingualism in the Polish society

Several surveys were carried out in Poland (either separately or among the EU countries) to assess foreign language skills in the general population and its socio-demographic subgroups. The Polish Academy of Science conducted a national survey on foreign language competences in 1993 and 2013 (Wysmułek and Oleksiyenko, 2015). According to its results, the proportion of respondents able to speak at least one foreign language well enough to have a conversation did not change much during the past 20 years – 41% in 1993 and 43% in 2013. In 2013, the youngest generation (21-25 years of age) exhibited the highest proportion (70%) of those who could speak at least one foreign language. This share was lower (60%) for the 26-35 age group, 35% for the 36-45 age group, and about 30% for all older age groups. Overall, in 2013 the majority of respondents (54%) cited English as their first foreign language, 28% cited Russian and 15% cited German. However, the distribution varied for different age groups: the predominant majority of younger people spoke English while the majority of older generations spoke Russian.

Another survey on foreign language competences was conducted by the European Commission in 2005 and 2012 (EC, 2005; EC, 2012). The findings for Poland were disappointing: the proportion of respondents able to speak at least one foreign language well enough to have a conversation decreased by 7 percentage points (to 50%), at least two foreign languages – decreased by 10 percentage points (to 22%), at least three foreign languages – decreased by 9 percentage points (to 7%). Only 11% used their first foreign language daily, 24% often but not daily and 59% occasionally. Assessing the usefulness of foreign languages for personal development, 65% of respondents cited English, 31% German, 8% Russian, but 14% said that foreign languages were not useful at all. The Polish people were most likely to be discouraged from learning another language because it was too expensive (38% of responses), they did not have a reason or incentive to do so (26%), or they lacked the time (20%).

The two surveys mentioned above mainly focused on the number of self-reported foreign languages known by an individual, irrespective of proficiency levels. A study by Araújo *et al*. (2015) analyzed both the number of foreign languages and proficiency in 25 EU countries in 2011. In this regards, Poland exhibited the worst results both in the EU and among the Visegrad Group (the Czech Republic, Hungary, Poland, and Slovakia). In

Poland, only 13% of individuals who knew one or more foreign languages declared that they knew at least one of them at the proficient level. This share was 17% in the Czech Republic, 24% in Hungary, 36% in Slovakia, and 25% on average in the EU. The study also reported the share of proficient individuals in the total population, that is, among those who knew and did not know foreign languages. Again, Poland remained among the worst performing countries with only 8%, while the EU average was 16%.

Given the accelerated pace of globalization and the rapid growth of emerging economies, language skills are becoming crucial. Poland needs to develop its citizens' foreign language competence in far greater numbers and in a wider range of languages in order to increase its competitiveness and to enjoy the full benefits of both the European and global integration.

6. Summary and conclusions

We find robust evidence that ability to speak a foreign language is an important component of a worker's human capital in Poland, using a very large sample of individual respondents to a 2014 salary survey and controlling for a large number of wage determinants. Our results provide very consistent estimates of a positive relationship between knowledge of foreign languages (especially English, and also German and French) and wage levels. The correlations between language ability and wages are substantially bigger for those working in sectors of the economy more closely linked to the European Union and the global economy (such as, in private firms, in foreign-owned businesses, and in regions of the country with a high rate of intra-industry trade with the rest of Europe). This suggests that the growing integration of Poland with the European Union in particular and the growing importance of global business in general are important reasons for the relative high value placed on foreign language skills in the Polish labor market. As such, our results provide support for the language training policy initiatives of the Polish government and the European Union. There appear to be important productivity advantages to having a workforce with the ability to communicate effectively in commercially important languages that grow in significance in sectors of the economy with closer links to international business.

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Table 1. Confirmatory factor analysis and the wage equation with a composite 'foreign language ability' index

Panel A. Eq. (2): Confirmatory factor analysis			
Language variables (0-1-2-3 scale)	Means (μ_j) coef. (std. err.)	Loadings (λ_j) coef. (std. err.)	Var[φ_{ij}] coef. (std. err.)
English	1.717*** (0.003)	1 (.)	0.447*** (0.020)
German	0.472*** (0.002)	0.217*** (0.008)	0.516*** (0.002)
French	0.098*** (0.001)	0.110*** (0.005)	0.155*** (0.001)
Italian	0.042*** (0.001)	0.041*** (0.002)	0.071*** (0.000)
Spanish	0.056*** (0.001)	0.099*** (0.004)	0.084*** (0.000)
Russian	0.405*** (0.002)	-0.105*** (0.005)	0.541*** (0.002)
Factor cov: ability-ability		0.485*** (0.020)	
		Fit indices	
RMSEA		0.041	
RMSR		0.008	
CFI		0.879	
Panel B. Eq. (1): Wage regression with a composite 'foreign language ability' index			
β		0.195*** (0.002)	
R^2		0.401	
Number of observations		106,583	

NOTES TO TABLE 1: The basic regression in Eq. (1) includes controls for gender, education, experience, tenure, and region of residence (see Section 3 for the description of variables). Coefficient estimates for the control variables are not reported but are available from the authors upon request. The two absolute fit indices – the root mean square error of approximation (RMSEA) and the root mean square residual (RMSR) – assess the differences between the original sample variance-covariance matrix and the predicted model-implied variance-covariance matrix. For both indices, values less than 0.05 indicate good model fit. The comparative fit index (CFI) compares the predicted model-implied variance-covariance matrix with a more restricted baseline model (often called a null model) where all correlations between observed variables are set to zero. CFI values of 0.90 and above represent good model fit. *Significant at the 0.10 level or better. **Significant at the 0.05 level or better. ***Significant at the 0.01 level or better.

Table 2. OLS estimates of wage returns to ability in six languages (all workers)

Language variable	Estimate	Basic	Basic + Extended controls	Basic + Extended controls + Position at the firm
(A)	(B)	(1)	(2)	(3)
Advanced English	a	0.482 (0.031) ***	0.292 (0.022) ***	0.210 (0.016) ***
	b	61.9 (8.7) ***	33.9 (5.1) ***	23.4 (3.4) ***
Intermediate English	a	0.170 (0.016) ***	0.128 (0.012) ***	0.084 (0.008) ***
	b	18.5 (3.3) ***	13.6 (2.4) ***	8.8 (1.5) ***
Advanced German	a	0.170 (0.016) ***	0.130 (0.013) ***	0.094 (0.010) ***
	b	18.5 (3.3) ***	13.9 (2.6) ***	9.9 (1.9) ***

Language variable	Estimate	Basic	Basic + Extended controls	Basic + Extended controls + Position at the firm
(A)	(B)	(1)	(2)	(3)
Intermediate German	a	0.018 (0.008) **	0.021 (0.006) ***	0.006 (0.005)
	b	1.8 (1.4)	2.1 (1.1) **	0.6 (0.9)
Advanced French	a	0.146 (0.012) ***	0.117 (0.013) ***	0.097 (0.008) ***
	b	15.7 (2.4) ***	12.4 (2.5) ***	10.2 (1.5) ***
Intermediate French	a	0.024 (0.009) ***	0.042 (0.009) ***	0.024 (0.008) ***
	b	2.4 (1.6)	4.3 (1.6) ***	2.4 (1.4) *
Advanced Italian	a	0.042 (0.058)	0.040 (0.046)	0.033 (0.021)
	b	4.1 (10.5)	4.0 (8.3)	3.3 (3.8)
Intermediate Italian	a	-0.033 (0.042)	-0.020 (0.033)	-0.021 (0.024)
	b	-3.3 (7.0)	-2.0 (5.6)	-2.1 (4.1)
Advanced Spanish	a	0.042 (0.024) *	0.026 (0.026)	0.013 (0.038)
	b	4.3 (4.3)	2.6 (4.6)	1.2 (6.7)
Intermediate Spanish	a	-0.029 (0.018)	-0.024 (0.016)	-0.015 (0.012)
	b	-2.9 (3.0)	-2.4 (2.7)	-1.5 (2.0)
Advanced Russian	a	-0.017 (0.016)	0.018 (0.012)	-0.005 (0.013)
	b	-1.7 (2.7)	1.8 (2.1)	-0.5 (2.2)
Intermediate Russian	a	-0.060 (0.008) ***	-0.019 (0.004) ***	-0.033 (0.004) ***
	b	-5.8 (1.3) ***	-1.9 (0.7) ***	-3.2 (0.7)
Number of observations		106,583	98,783	98,783
R2		0.412	0.544	0.656

NOTES TO TABLE 2: All language variables are binomial (0-1) with the reference group being workers with a beginning level understanding or no knowledge of that language. The basic regression includes controls for gender, education, experience, tenure, and region of residence (see Section 3 for the description of variables). See Section 4.2 for the description of additional variables included in Columns (2) and (3). Coefficient estimates for the control variables are not reported but are available from the authors upon request. The number of observations in Columns (2) and (3) is reduced due to missing values. Row "a": OLS estimates of the coefficient on a dummy language variable in Eq. (1), robust standard errors in parentheses. Row "b": The percentage effect associated with β, standard errors in parentheses. *Significant at the 0.10 level or better. **Significant at the 0.05 level or better. ***Significant at the 0.01 level or better.

Table 3. Sector differences in OLS estimates of wage returns to language (basic model, all workers)

Language variable	Esti-mate	Private sector firm	State owned, public sector or non-profit firm	Majority foreign-owned firm	Majority Polish-owned firm	High regional intra-industry trade	Low regional intra-industry trade
(A)	(B)	(1)	(2)	(3)	(4)	(5)	(6)
Advanced English	a	0.478 (0.029) ***	0.256 (0.030) ***	0.522 (0.022) ***	0.320 (0.032) ***	0.509 (0.035) ***	0.405 (0.047)***
	b	61.2 (8.1) ***	29.1 (6.7) ***	68.5 (6.4) ***	37.6 (7.6) ***	66.3 (10.1) ***	49.8 (12.2) ***
Intermediate English	a	0.216 (0.018) ***	0.110 (0.019) ***	0.264 (0.016) ***	0.152 (0.018) ***	0.227 (0.026) ***	0.169 (0.024)***
	b	24.1 (3.9) ***	11.6 (3.7) ***	30.2 (3.6) ***	16.4 (3.6) ***	25.4 (5.6) ***	18.4 (4.9) ***
Advanced German	a	0.159 (0.017) ***	0.078 (0.026)***	0.152 (0.015) ***	0.092 (0.019) ***	0.167 (0.021) ***	0.176 (0.024)***
	b	17.2 (3.5) ***	8.1 (4.9) *	16.4 (3.0) ***	9.6 (3.6) ***	18.1 (4.3) ***	19.2 (5.0) ***
Intermediate German	a	0.022 (0.008) **	0.005 (0.010)	0.037 (0.010) ***	0.002 (0.008)	0.024 (0.006) ***	0.005 (0.016)
	b	2.2 (1.4)	0.5 (1.7)	3.8 (1.8) **	0.2 (1.4)	2.4 (1.1) **	0.5 (2.8)
Advanced French	a	0.147 (0.014) ***	0.088 (0.018) ***	0.088 (0.032) **	0.118 (0.018) ***	0.148 (0.011) ***	0.112 (0.024)***
	b	15.8 (2.8) ***	9.2 (3.4) ***	9.1 (6.1)	12.5 (3.5) ***	15.9 (2.2) ***	11.8 (4.6) ***
Intermediate French	a	0.044 (0.014) ***	0.046 (0.016) **	0.048 (0.016) **	0.014 (0.014)	0.018 (0.010)	0.036 (0.026)
	b	4.5 (2.5) *	4.7 (2.9)	4.9 (2.9) *	1.4 (2.5)	1.8 (1.8)	3.6 (4.7)
Advanced Italian	a	0.061 (0.056)	-0.090 (0.038) **	0.055 (0.045)	-0.062 (0.038)	0.081 (0.072)	-0.094 (0.060)
	b	6.1 (10.3)	-8.7 (6.0)	5.5 (8.2)	-6.1 (6.2)	8.2 (13.5)	-9.1 (9.5)
Intermediate Italian	a	-0.008 (0.042)	-0.115 (0.024) ***	-0.008 (0.042)	-0.069 (0.028)**	-0.014 (0.056)	-0.088 (0.014)***
	b	-0.9 (7.2)	-10.9 (3.7) ***	-0.9 (7.2)	-6.7 (4.5)	-1.5 (9.6)	-8.4 (2.2) ***
Advanced Spanish	a	0.027 (0.024)	-0.002 (0.046)	0.034 (0.029)	0.042 (0.042)	0.044 (0.026)	0.038 (0.065)
	b	2.7 (4.3)	-0.3 (7.9)	3.4 (5.2)	4.2 (7.6)	4.5 (4.7)	3.7 (11.7)

Language variable	Esti-mate	Private sector firm	State owned, public sector or non-profit firm	Majority foreign-owned firm	Majority Polish-owned firm	High regional intra-industry trade	Low regional intra-industry trade
(A)	(B)	(1)	(2)	(3)	(4)	(5)	(6)
Intermediate Spanish	a	-0.042 (0.022)	0.031 (0.048)	-0.062 (0.020) ***	-0.005 (0.023)	-0.036 (0.022)	-0.006 (0.034)
	b	-4.1 (3.7)	3.0 (8.6)	-6.0 (3.3) *	-0.5 (4.0)	-3.6 (3.7)	-0.7 (5.9)
Advanced Russian	a	0.004 (0.018)	-0.034 (0.009) ***	-0.009 (0.020)	0.005 (0.014)	-0.024 (0.018)	0.002 (0.030)
	b	0.4 (3.1)	-3.3 (1.5) **	-0.9 (3.4)	0.5 (2.4)	-2.4 (3.0)	0.2 (5.2)
Intermediate Russian	a	-0.044 (0.006)***	-0.031 (0.014) **	-0.026 (0.010) **	-0.044 (0.010)***	-0.064 (0.011)***	-0.050 (0.010)***
	b	-4.3 (1.0) ***	-3.1 (2.4)	-2.6 (1.7)	-4.3 (1.7) ***	-6.2 (1.8) ***	-4.9 (1.6) ***
Number of observations		83,763	22,820	34,551	72,032	75,620	30,963
R^2		0.451	0.300	0.506	0.330	0.412	0.376

NOTES TO TABLE 3: All language variables are binomial (0-1) with the reference group being workers with a beginning level understanding or no knowledge of that language. The basic regression includes controls for gender, education, experience, tenure, and region of residence (see Section 3 for the description of variables). Coefficient estimates for the control variables are not reported but are available from the authors upon request. Row "a": OLS estimates of the coefficient on a dummy language variable in Eq. (1), robust standard errors in parentheses. Row "b": The percentage effect associated with β, standard errors in parentheses. *Significant at the 0.10 level or better. **Significant at the 0.05 level or better. ***Significant at the 0.01 level or better.