PRACE NAUKOWE UNIWERSYTETU EKONOMICZNEGO WE WROCŁAWIU
RESEARCH PAPERS OF WROCŁAW UNIVERSITY OF ECONOMICS 2019, vol. 63, nr 7

ISSN 1899-3192
e-ISSN 2392-0041

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THE ROLE OF EDUCATION IN THE DETERMINATION OF EARNINGS IN POLAND – INTERGENERATIONAL DIFFERENCES

ROLA WYKSZTAŁCENIA W KSZTAŁTOWANIU PŁAC W POLSCE – RÓŻNICE MIĘDZYGENERACYJNE

DOI: 10.15611/pn.2019.7.13
JEL Classification: J31, I24

Summary: Recent decades have brought about a significant increase of earnings differenti in many countries. Poland is an interesting example of transformations in this regard, in particular due to the intergenerational changes of human capital resources. The aim of the article is an analysis of earnings determinants differentiation in Poland depending on the age of the employees, in particular, to what extent are the earnings differentiated by the level of education, and to what extent by the occupational record (total job tenure and at a given employer). The parameters of the Mincerian equation (1974) with the use of data derived from the Structure of Earnings Survey conducted by Central Statistical Office in 2016 were determined in the study. The results indicate that the human capital gained during the performance of professional work is of relatively small importance in comparison to the education and that this significance decreases in further age groups.

Keywords: wages, human capital theory, education, job tenure.

Summary: Ostatnie dekady w wielu krajach przyniosły znaczny wzrost zróżnicowania wynagrodzeń. Polska stanowi ciekawy przykład przemian w tym zakresie, w szczególności ze względu na międzypokoleniowe zmiany zasobów kapitału ludzkiego. Celem artykułu jest analiza zróżnicowania determinant wynagrodzeń w Polsce w zależności od wieku pracownika. Zbadano, w jakim stopniu wynagrodzenia są różnicowane przez poziom wykształcenia, a w jakim przez staż pracy (ogółem i u danego pracodawcy). W badaniu oszacowano parametry równania Mincera z wykorzystaniem danych pochodzących z Badania Struktury Wynagrodzeń

przeprowadzonego przez GUS w 2016 r. Wyniki wskazują, iż kapitał ludzki powstający w trakcie wykonywania pracy zawodowej ma stosunkowo małe znaczenie w porównaniu z wykształceniem, a znaczenie to maleje w kolejnych grupach wieku.

Słowa kluczowe: wynagrodzenia, teoria kapitału ludzkiego, wykształcenie, staż zawodowy.

1. Introduction

Since the 1960s, an increase in earnings dispersion [Katz, Murphy 1992] has been observed in many countries. The most visible change is an increase in their dependence on the acquired level of education, both in highly and less-developed countries [Helpman 2016]. In the US, the relative earnings increase of elderly, low-qualified employees (with a job tenure of at least of 20 years), in comparison to younger employees with the same qualifications, was observed, which suggests that job tenure explained the differences in earnings [Katz, Murphy 1992; Autor, Katz, Kearney 2008].

In the US, the increase in earnings differences is mainly explained by the growth in demand for high competencies related to technological progress, especially computerization, the slower growth in the supply of highly-qualified labour and the erosion of labour market institutions, including a decline in the real minimum wage. An increase in earnings dispersion has also been observed in European countries. However, it did not evolve in the same way and also appeared on a generally smaller scale, which can be associated with the typically greater role of labour market institutions in, e.g. Germany [Antonczyk, DeLeire, Fitzenberger 2018].

In Poland, the circumstances of earnings evolution are different and to a large degree related to intergenerational changes in human capital resources. In the early period of transition, the demand for high qualifications clearly increased, which was followed by growth in the supply of highly-qualified workers. This increase resulted from the growth in the gross enrolment rate and the simultaneous large demographic expansion of young people entering the labour market. These tendencies only changed at the turn of 2010 and 2011 [*Colleges and their finances*… 2016]. The initial increase in the rate of return from higher education was impeded, which decreased the level of relative wages of better educated young individuals. Moreover, contrary to other countries, an erosion of minimum wages has not been observed. Therefore a reduction in the wages of low-qualified individuals should not be expected, especially those belonging to an older generation. In the case of young people, the development of non-labour code forms of employment led to a real change in employment protection levels (especially before 2017, when a minimum hourly wage rate applicable was introduced).

Any examination of individual differences in earnings in the context of age and education requires reference to basic theories which assume a connection between these variables: mainly the theory of human capital, as well as derived theories,

e.g. the signalling theory. However, in view of many mechanisms overlapping to different degrees and contrarily interactive directions, the determination of real relations regarding the Polish economy remains an empirical issue, not a theoretical one.

The aim of this article is to answer the question about the dispersion of earnings determinants in Poland depending on the age of the employee. The authors want to determine, in particular, to what extent earnings are differentiated by the level of education, as well as by job tenure (overall and at a given employer). These objectives are achieved through an estimation of the parameters of the Mincerian equation, along with the method of least squares, using data from the Structure of Earnings Survey conducted by the Central Statistical Office in October 2016.

The article comprises four parts. In the first part, theoretical grounds for shaping human capital are discussed. The second part of the article presents the discussion on potential relations between human capital resource, formal education and earnings development. In the next part, an attempt to explain the connection between the age of the employee and remuneration is undertaken. In the fourth part, an econometric study is presented, in which classical linear regression model parameters for individual cohorts are estimated. The article finishes with a summary and conclusions.

2. Human capital and its determinants

The theory of human capital assumes that education is one of the investments capable of increasing the ability to perform work, resulting in a specific resource for an individual, namely, his/her human capital. Human capital has been described as an attribute of an individual, comprising his/her abilities, knowledge, skills and acquired way of becoming engaged in production processes, in turn increasing his/her productivity. Human capital thus generates income. The attempt to define human capital may emphasize the characteristics of an individual, yet it can also accentuate the investment aspect, indicating the expenditures made, or the production aspect, i.e. mainly paying attention to the product which can be achieved by it. As a result of the selection of a specific attempt, measurements for individuals, social groups or countries are made accordingly [Kwon 2009].

Human capital may be of a general character, meaning that it is of use in many applications, as well as of a specific one in a different meaning, e.g. usable in a household and in gainful employment (New Household Economics) [Chiswick 2003; Mincer 1974], in different places of employment, and in the country where its acquisition took place and outside it [Chiswick 1978]. Strictly general capital is applicable when performing work in various places and of a differing nature, while strictly specific capital is non-transferable to the tasks performed outside a specific company [Becker 1962; 1975].

Human capital of an individual is shaped in the family environment, especially in the phase before the beginning of education, but also during it when parents invest

their time, own knowledge, skills and money in children, motivated by both altruistic and egoistic motives [Kłobuszewska 2018]. One part of the expenditure made by parents, finances or at least supports formal education, while the remaining part concerns attention to fitness, health and non-formal education.

The concept of human capital assumes investing in its development mainly by gaining general and vocational education [Hanushek, Woessmann, Zhang 2011], acquiring skills during professional work (Mincer 1974), as well as non-formal education (at home and at work [Schultz 1961]), where the empirical research most often takes into account only the number of years or the level of education, and the years of "practising work", as this information is typically available for researchers. Unity between general and strictly vocational education is usually presumed, assuming that both types determine the performance of vocational tasks, yet not every task requires their use to the same extent. The studies suggest that general education may cause long-lasting, positive employment and remunerative consequences, whereas vocational education provides labour market advantage at a faster pace, but for a shorter period.

A separate issue is that job tenure – similarly to education – may be characterized by greater generality or specificity, i.e. the relevance of the competencies acquired in a specific workplace to other potential places. A lengthy job tenure does not have to be reflected in the fluency of performing professional tasks if it had been acquired in workplaces with different characteristics. Hence, for a specific form of employment, the key resource in human capital is that which was developed in the same place [Topel 1991; Roszkowska, Rogut 2007]. When attention is given to the continuation of education after having finished school or college, only in rather exceptional circumstances is it focused on the earnings effects when confronted with specific programmes, as well as the formal and informal types of training undertaken [Liwiński 2017], assuming that they reflect the human capital resource. The studies also significantly involve the input of pedagogical and educational institutions with which individuals might have had contact before having commenced education in a school system.

In general, the problem of education quality does not seem to be addressed. This may affect the real opportunities for an employee to perform productive work and, along with it, obtaining sufficiently high wages. When education is subject to a charge, an estimation, however imperfect, of its quality may be the level of tuition fees [Kwon 2009]. When the actual time devoted to learning can be identified, it is possible to take a more precise approach to the investment scale concerning human capital, and hence a more precise estimation of the obtained education return rates [Wincenciak et al. 2018]. In turn, the time devoted to education concerns the scope and difficulty level of the education programme, as well as individual abilities to master its curriculum – various education investment expenditure may result not only from its subject, but also individual predispositions (innate, as well as previously acquired, abilities).

The alternative to human capital mapping in terms of the level of education is to use the information obtained from the measurement of the competencies of individuals. In international comparisons that possibility was extended along with the initiation of the Programme for the International Assessment of Adult Competencies (PIAAC) by the OECD. Naturally, the PIAAC exclusively focuses on selected competencies: textual understanding, mathematical reasoning and using information and communication technologies. This method of recognizing human skills provided the opportunity to study the relations between competencies (in place of education) and labour market outcomes [Hanushek, Woessmann, Zhang 2011].

Including the education input to human capital, when limited to its level or years spent in the education system, disregards the professional competencies that an individual has at his/her disposal, obtained outside formal education (including long-life learning). The intensity of acquiring competencies in training mode is often identified with the years spent in performing professional work [Mincer 1974], however substantial differences in the individual intensity of acquiring competencies at that time may occur. Mincer himself noticed that investment in professional competencies in the course of professional work is positively correlated with education and negatively correlated with age. The increase in human capital expenditure is characterized by growing benefits for better-educated people and decreasing benefits for older ones (a shorter professional work perspective reduces the return rate for education at a later age).

3. Human capital, education and earnings

Human capital allows certain productivity to be obtained [Becker 1975], which is in turn gratified to the extent that it enables an employee to remain in a specific workplace (arbitrage within the labour market). If the labour market functioned in a perfect way (for example, the work was homogenous, the employees and employers acted in dispersion – their market power was the same, market participants had complete information, there were no limitations to their mobility, and the adjustments in the market were immediate), the remuneration for work would correspond with productivity and be determined by the human capital resource. Workplaces with lower productivity would be filled by low-income employees, whereas more productive ones would be taken by employees with greater capital.

Basically, the amount of earnings is connected with the productivity of employees. Productivity results from personal employees' characteristics as well as the capital outlay of companies. The distribution of the value added between profits and wages changes over time under the influence of conditions in the labour market. In the real economy, structural differences in workplaces and human competencies result in mismatches, and information and mobility barriers, which cause similar differences in educational inputs, do not always result in a similar difference in earnings. The remuneration of individuals – even with the same education – differ across various

professional groups, along with the characteristics of local labour markets, depending on the type of employers.

The explanations for the impact of human capital on earnings most often follow Becker and attribute a driving force in the shaping of productivity to the acquisition of knowledge and skills. There are however other approaches, e.g. the signalling theory [Spence 1973], which assumes that education is only a signal for those employers looking for employees who are able to adapt to job requirements. The employers are willing to offer higher earnings to better-educated individuals as they expect them to be able to obtain higher productivity. The skills necessary to achieve it are acquired directly in the companies. This approach suggests that in the recruitment phase and shortly after the enrolment, wages may depend on education, however, later on, they correspond to the results achieved by the employees. If the signals coming from the education system divide the population accurately according to their abilities in order to achieve the desired production results, then the differences caused by education will persist during the whole professional life.

Individual differences in earnings may deviate from productivity with regard to work characteristics; they are non-measurable at times and barely observable, thereby compensating for lower wages [Acemoglu, Autor 2009]. These may be, e.g. better-than-average working conditions, convenient working hours, and expected lower effort applied to performing professional tasks or features that go beyond the workplace itself, yet they are connected with the social functioning of an individual, e.g. social prestige [Gajderowicz 2016]. Due to the features of work, employees with relatively low productivity may also be better paid, e.g. in the case of hazardous working conditions or antisocial aspects associated with the performed activity.

Different degrees of specificity and generality of human capital may affect the level of remuneration. Due to transferability, general human capital must be sufficiently rewarded to prevent staff turnover. Strictly specific capital does not have to require high earnings as it is unsuitable for use apart from by a specific employer. The other cause of discrepancy between owned human capital and earnings may be the presence of discrimination regarding race, gender and other features. When interpreting the differences in earnings, it is important to note a proper proportion in terms of attributing the differences in wages to the heterogeneity of human capital, thus compensating for the differences in workplace characteristics and labour market imperfections.

In the Polish literature, the link between human capital and earnings has been investigated many times, usually in the context of impact of education on wages. Rutkowski [1996], who studied the rates of return on education in Poland in the initial period of transformation (for 1987, 1992 and 1993), using the Household Budgets data and the Labour Force Survey, estimated (using the Mincer wage equation) the wage premium from an additional year of education at 7-8%. Newell and Reilly [1999] tested the rate of return differentiation of rates of return between young employees (up to 30 years of age) and older. The study revealed that rates of

return proved to be significant higher for older employees. Strawiński [2006], using the extended Mincer wage equation model (with a probit equation of selection), estimated the rate of return on education higher in1998-2005 in the range of 5.9-9.3% (annually). Newell and Socha [2007] examined rates of return and variance of wages for Poland in 1998-2002 on the LFS data. Wage premium from higher education (relative to secondary education) using the method Heckman was estimated in 1998 at approximately 28% (27% in 2002). Morawski, Myck and Nicińska [2009], using the SIMPL microsimulation model and data from Household Budgets Surveys supplemented with LFS, estimated the return on education using the Heckman methods. Wincenciak [2015], using LFS data, estimated returns to investment in education (using NPV method) to be equal to 9.0%-10.2%, depending on specification.

4. Earnings and age

The resource of human capital and its composition change fundamentally during the life cycle. Basically, the entry into the labour market occurs after having gained formal education, however a combination of work and education may also take place, mainly during the higher education stage. Yet work during that period is often not combined with the planned professional career, it is only a temporary activity aimed at supplementing the main income. In effect, most people over the age of 25 have already achieved their target education, with some also having a few years of work experience resulting in higher professional competencies. This applies particularly to those who have confined themselves to secondary education and below.

Education forms specific resources of knowledge, skills and attitudes. These, however, undergo a certain depreciation in the sense that the possibilities of their productive use diminish over time. This is due to the development of knowledge and, most of all, the development of technology and changes in the economic structure which eliminate the applicability of some competencies and require new ones which are not subject to education. The stronger the competition, including that caused by opening up to international trade, the greater the changes and hence the depreciation of human capital which is gained thanks to education. It could be expected that, along with age, the professional suitability of the capital resource obtained from initial education should decrease.

This approach assumes that the education system, at a specific level, does not undergo substantial changes, that the quality of education remains, to a certain extent, connected with the demands of the economy (e.g. there are some corrections to education programmes, especially vocational ones, implemented during a specific cycle). In the case of deeper institutional changes in the education system, it can be expected that the cycle of introducing new content to education, may be subject to changes which close the gap (or less often puts a distance) between education and labour market requirements, and, as a consequence, the depreciation in capital will

not follow the scheme described. Although the depreciation in competencies within older cohorts will undergo a similar pattern, new graduates from colleges and universities will be equipped with human capital, which grows in comparison to these older cohorts in a different proportion than occurred before. As a result, the differences in human capital resource, which originated in education between generations, may grow more rapidly or diminish. In an extreme case (degeneration of the education system), it may be expected that education among an older cohort will turn out to be a factor which more strongly explains the levels of earnings.

If, however, it was assumed that education does not provide concrete competencies which affect productivity directly, and is only a signal for the employer about the ability of individuals to adapt to the working environment, then its role, over the course of time, is determined by selective features in the education system. Relevant selection may influence age-related widening of the pay gap between those with the same level of education.

In the long term, the proportions of demand and supply concerning those with certain education levels will change. In particular, a sharp increase in those taking part in education processes (e.g. higher education in Poland at the turn of the 1990s and 2000s) or a decrease (the USA of the 1980s) may influence the equilibrium conditions in sub-labour markets for people with a certain level of education, leading to a situation where the return rates from education would change between generations. In Poland, due to the high supply of people with higher education, it may be expected that the significance of higher education for the earnings level will decrease [Wincenciak 2019], especially among younger age groups, whereas in the USA an increase has occurred [Katz, Murphy 1992].

With time the professional experience increases. There is a belief, however, that this is not followed by an increase in human capital, proportional to job tenure. Above all, together with age, the profitability of investing in human capital decreases as the period of its economic use reduces. This applies to general professional experience, as well as specific professional experience acquired in the previous workplace. Most likely investing in the specific capital which is connected with a particular workplace, also brings decreasing returns, given that in a specific place, the resource of relevant knowledge and skills is quite limited for most employees. The change in workplace may be a factor which stimulates an increase in benefits from specific education. Thus it may be expected that professional experience cumulated with age increases the resource of human capital, yet the more this increase declines, the longer the job tenure with the same employee (especially at the same workplace).

5. Intergenerational earnings dispersion in Poland

The above review of the theoretical determinants of the connection between the education level and its nature, job tenure and the earnings level indicate that these relations are complex. Therefore the determination of the direction of actual relations

in the case of the Polish economy requires an analysis of the empirical data. In this part of the article, the results of empirical research using individual data obtained from the Structure of Earnings Survey conducted by the Central Statistical Office in October 2016 are presented. The research is performed every two years on a sample including national economy entities with the number of employees exceeding nine [Central Statistical Office 2018].

The Structure of Earnings Survey data include information on gross earnings. In 2016 (the latest year for which individual data are available), the sample included 795,869 employees. The biggest advantage of this data source is that it provides precise information on gross earnings and their components. It is a more reliable source than information available from the Labour Force Survey, where information on earnings are of a declarative character and refer to net salaries; furthermore the refusal to provide answers to the question on earnings is a growing problem (of a non-random character). Details of the research methodology may be obtained from the Central Statistical Office [2018].

Individual data analysis from the Structure of Earnings Survey for 2016 indicates that, in Poland, an increase in the average earnings level could be observed along with age. However, this did not concern all groups in terms of age and education (Figure 1 and Table 1). Groups of people with an education at a higher education − Master's, Bachelor's, engineering and secondary vocational level – obtained higher earnings with age. However the remuneration of people with a high school education

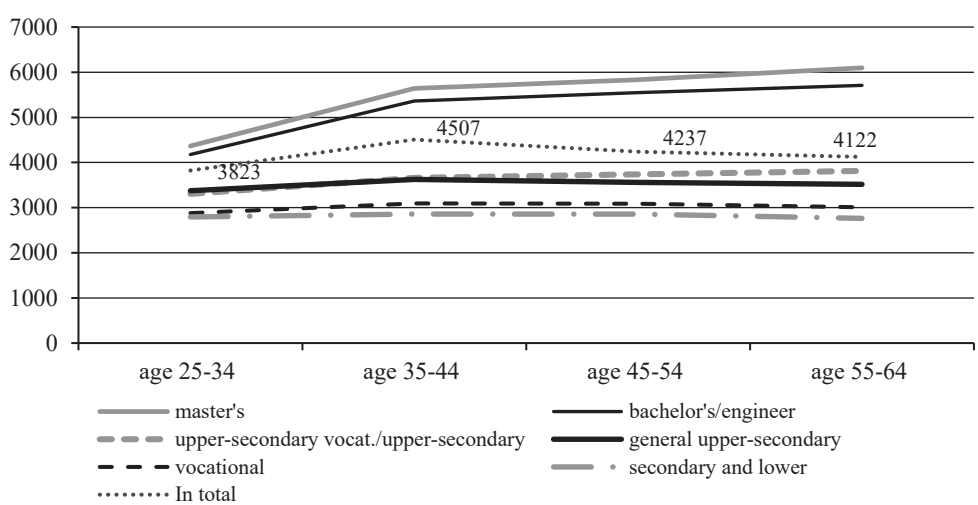

Fig. 1. Average gross monthly salaries by the level of education in PLN, 2016

Source: own study based on individual data from Structure of Earnings Survey, Central Statistical Office 2016.

Table 1. Average gross monthly salaries in 10-year age groups in PLN, 2016

People aged 25-34				
Education level	Average	Median	Standard deviation	Coefficient of variation
Masters and above	4,365	3,547	2,973	0.681
Bachelor/engineer	4,176	3,500	2,663	0.638
Upper vocational/upper secondary	3,306	2,930	1,630	0.493
General upper secondary	3,374	2,885	2,091	0.620
Vocational	2,878	2,550	1,242	0.432
Secondary and lower	2,794	2,535	1,190	0.426
In total	3,823	3,193	2,497	0.653
People aged 35-44				
Master's and above	5,639	4,400	4,814	0.854
Bachelor's/engineer	5,358	4,200	4,597	0.858
Upper vocational/upper secondary	3,657	3,188	2,211	0.605
General upper secondary	3,625	2,920	3,083	0.851
Vocational	3,093	2,678	1,508	0.488
Secondary and lower	2,856	2,517	1,332	0.466
In total	4,507	3,600	3,868	0.858
People aged 45-54				
Masters and above	5,831	4,660	5,426	0.931
Bachelor/engineer	5,551	4,357	5,477	0.987
Upper vocational/upper secondary	3,741	3,386	2,040	0.545
General upper secondary	3,558	3,050	2,399	0.674
Vocational	3,083	2,700	1,383	0.449
Secondary and lower	2,857	2,509	1,214	0.425
In total	4,237	3,591	3,737	0.882
People aged 55-64				
Master's and above	6,097	4,939	4,773	0.783
Bachelor's/engineer	5,708	4,592	4,889	0.856
Upper vocational/upper secondary	3,813	3,497	2,000	0.524
General upper secondary	3,515	3,138	2,242	0.638
Vocational	3,007	2,655	1,326	0.441
Secondary and lower	2,762	2,421	1,134	0.410
In total	4,122	3,488	3,182	0.772

Source: own study based on individual data from Structure of Earnings Survey, Central Statistical Office 2016.

decreased among 40-year-olds, while among people with a vocational or secondary school or lower education, the earnings in the 55-64 years age group was found to be even lower than for younger groups. Therefore, if the earnings level indicates productivity and depends on human capital, then it would have to be assumed that less-educated people are more likely to lose human capital with time, whereas greater experience does not compensate for the loss of competencies acquired in the education process, as well as general vitality, which is especially significant for those professions where manual work is carried out.

At the same time, among people with a higher education, the earnings were more differentiated (the coefficient of variation is within the range 0.64 to 0.98), which also applies to people with a general upper-secondary education (the coefficient of variation is within the range 0.62 to 0.85). These relatively big differences could have been caused by both actual differences in the education system (not every type of higher education contributes to human capital formation to the same extent), as well as the non-uniform production effect obtained from a given capital (due to partial imbalances in the labour market and the limitations of mobility within it, as well as the limitations in the market mechanism of earnings formation, including in the public sector). Individual abilities demonstrated during the education process and in professional work could also have been part of the earnings dispersion. The intensification of differences in earnings occurred mainly in the first 20 years of employment, while later on, the differences decreased. This phenomenon may be attributed to the impact of job experience on the accumulation of human capital (knowledge and skills), although the possibilities and profitability of gaining such capital decreased with time.

The earnings of less-educated people were less differentiated and more stable during the whole professional life cycle. In their case, practising work provided short-term benefits, however these were small and did not appear in the later years of their professional career.

In total, although the older generation obtained higher earnings on average, it did not apply to the whole of this population. The remuneration of older people with an upper-secondary education was slightly higher than the earnings of young people with the same level of education. The young with a vocational education or lower were better paid than older people with the same level of education. As a result, the differences in average earnings between the best-paid people with a higher education and the worst-paid people with a secondary education at most were greater in the old generation than in the young one (2.04 times in comparison to 1.56).

6. Econometric study results

The aim of the study is the explanation of the level of earnings through features indicating human capital resource, i.e. education and job tenure with least squares linear regression. The study included people aged 25-64, both overall and per

10-year cohorts. In Version II, the relation between the earnings level and individual features was studied, where, apart from job tenure with a current employer, job tenure from other workplaces were also taken into consideration along with the type of employment contract and the voivodeship in which the employer was located. In Version II, the characteristics of the employer were also considered (Classification of Business Activities, ownership sector and size of employment).

Mincer's [1974] earnings model was used in all calculations:

$$\ln w_j = x_i \beta + u_i$$

where the variable $\ln w_j$ is a logarithm for the hourly rate of gross remuneration (calculated as a quotient of total gross earning and nominal work time), and β is the vector of parameters and vector $\mathbf{x}_j$ is a vector of the explanatory variables used in the wages equation.

It was possible to observe the impact on the amount of earnings of two basic components of human capital, as presented in Table 2. In each of the cohorts, as well as in the overall population, a higher level of education provided relatively higher earnings. However, among the youngest (i.e. people aged 25-34), there was a derogation from this rule – those with an upper-secondary vocational education and a post-secondary education received a smaller benefit from education (regarding secondary education and below) than people who had completed general upper-secondary school education. Among older people, such a dependence did not occur. In younger age groups (25-34 and 35-44), vocational education coexisted with earnings lower than those obtained by people with a secondary education at most, who were usually employed in elementary occupations. Only older employees with a vocational education benefited from it in terms of earnings. Nevertheless, their benefits were lower than the benefits from education for people who had completed a general upper-secondary school education. This result, while surprising on the one hand, on the other, confirms that, among people with a vocational education, there are often structural mis-adaptations in the field of education and the job performed, as well as knowledge and skills gaps and improper attitudes towards work, which altogether result in relatively low earnings [Szczucka, Strzebońska, Worek 2019]. Such an explanation refers to the concept of human capital, especially the specific type, and its role in shaping productivity.

It may be surprising that education level gained in importance in terms of earnings determination as age increased. Therefore, the conclusion is that a clear depreciation in human capital coming from education does not occur with age, it rather develops greater strength in the determination of earnings.

In turn, a job tenure with a specific employer within older cohorts had a lower impact on earnings than in younger cohorts. This indicates that older people – who generally have a longer professional record with a given employer – did not especially make any gains if this tenure was longer than in the case of other employees from a

Table 2. The determination of earnings by education and occupational record (Ordinary Least Squares regression) – 2016

Specification	(1)	(2)	(3)	(4)	(5)	(6)
Explanatory variables	Total population		Age 25-34	Age 35-44	Age 45-54	Age 55-64
Job tenure with current employer	0.0134***	0.0126***	0.0305***	0.0235***	0.0223***	0.0200***
	(6.78e-05)	(6.90e-05)	(0.00117)	(0.000650)	(0.000474)	(0.000486)
Total job tenure	0.00408***	0.00548***	0.0360***	0.0176***	0.00660***	0.00546***
	(7.34e-05)	(7.22e-05)	(0.00102)	(0.000586)	(0.000417)	(0.000424)
Masters and PhDs	0.669***	0.695***	0.446***	0.656***	0.835***	0.822***
	(0.00287)	(0.00286)	(0.00697)	(0.00657)	(0.00523)	(0.00529)
Bachelors and engineers	0.475***	0.499***	0.344***	0.472***	0.559***	0.565***
	(0.00331)	(0.00323)	(0.00726)	(0.00720)	(0.00653)	(0.00713)
Upper-secondary vocational / upper-secondary education	0.182***	0.195***	0.0883***	0.150***	0.209***	0.230***
	(0.00290)	(0.00281)	(0.00699)	(0.00658)	(0.00502)	(0.00496)
General upper-secondary education	0.168***	0.177***	0.117***	0.138***	0.155***	0.165***
	(0.00332)	(0.00322)	(0.00746)	(0.00740)	(0.00605)	(0.00641)
Vocational education	0.0167***	0.0158***	-0.0212***	-0.00539	0.0148***	0.0263***
	(0.00298)	(0.00289)	(0.00754)	(0.00671)	(0.00499)	(0.00504)
Control variables						
Gender	X	X	X	X	X	X
Contract type	X	X	X	X	X	X
Voivodeship	X	X	X	X	X	X
Ownership sector		X	X	X	X	X
Polish Classification of Activities Section		X	X	X	X	X
Company size		X	X	X	X	X
(Occupational record in current workplace)[2]			X	X	X	X
(Occupational record in other workplaces)[2]			X	X	X	X

Source: own study based on individual data from Structure of Earnings Survey, Central Statistical Office 2016.

given group of age. Younger groups had more differentiated earnings due to a specific job tenure. That said, a specific job tenure did not cause such great differences in earnings where it resulted from education. Professional experience gained at other employers were of a similar significance. Among the young, earnings were affected by general job tenure to an extent similar to job tenure with a current employer, which would suggest an interchangeability between general and specific job tenure.

In older groups, the role of experience, apart from that gained in the current workplace, was insignificant. The results concerning job tenure indicate that human capital obtained in the course of performing professional work has relatively less significance in comparison to education, and that this significance decreases in older age groups, suggesting that the influence of professional experience on earnings is exhausted relatively early. The hypothesis that the effect of professional experience on the knowledge and skills acquired during professional work is more important at the beginning of a professional career may therefore be true. Among older employees, most of them are characterized by considerable experience. However the differences in experience among them do not result in clear earnings dispersion, which leads to the conclusion that their status in the labour market does not change significantly, depending on the years previously worked. It is also noteworthy that employees do not gain much of an increase in earnings from additional years of work compared to differences in education. Education differentiates employees regarding their productivity to a greater degree. The fact that these differences increase along with age leads to the assumption that, among long-term employees, they are the fundamental determinant of the amount of earnings. This is perhaps also because there is an active attitude connected with education, e.g. further training while in work, which more often applies to better educated people.

Other controlled employment features affected the earnings of specific age groups in a similar way (complete results of estimations are available from the authors). Taking up a job at a big company favoured higher earnings, while working in the private sector lowered their level, albeit very slightly. Employment other than on the basis of indefinite duration employment contract was connected with lower wages. However, local labour markets enabled all age groups to achieve higher-than-average earnings (e.g. Mazowsze, Lower Silesia and Pomorskie), while others were characterized with relatively low earnings (e.g. Świętokrzyskie, Lublin and Podkarpacie). Similarly, employment in specific sections (e.g. the mining, information and communication, and energy industries) affected wages positively, whereas it had a negative influence on others (such as public administration, social security, culture, entertainment and recreation, hotel and catering, as well as finance and insurance). The negative or positive impact of the respective section on the earnings level did not radically change among the generations. In each age group, however, the female gender had a negative influence on the earnings level.

7. Conclusion

The dispersion of earnings determinants, depending on the age of the employee, was researched in the article by focusing mainly on the role of the education level and the job tenure at current and previous employers. The results suggest that human capital acquired during a professional career has relatively little significance in the case of the earnings level (in comparison to education). Furthermore, its importance decreases as the age groups become older. This leads to the conclusion that the effect of a professional record as a source of knowledge and skills obtained in the course of work is more important at the beginning of a career. This result means that the behaviour of many young people who connect education with professional work is rational and can improve their future situation in the labour market. In turn, the high and growing with age role of education suggests that selection on the basis of education is appropriate, while, in the case of positions requiring higher competencies, the accumulation of human capital in the course of work was higher than in positions requiring fewer competencies. As a result, the dispersion of earnings increases with age. Generally, our results are comparable with earlier research on wage determinants in Poland, as far as the main determinants are concerned (return to education, gender discrimination, spatial differentiation).

Some limitations to the current analysis should also be noted. Due to the character of the data used (research on the working population), it was impossible to take the effect of selection into employment into consideration (Heckman's 1979 selection model). This means that the values of the estimators of variables describing the influence of education level may be overestimated as they are partially responsible for the process of employment selection (better-educated people are characterized by a higher level of professional activity and a lower probability of unemployment). This problem may be resolved using the Labour Force Survey data, yet their quality regarding earnings is significantly lower than in the case of the Structure of Earnings Survey.

It is also worth noting that the impact of education and professional experience may vary between generations. Dynamically changing conditions on the labour market in Poland have affected how human capital determines wages. In order to examine this effect it would be necessary to use panel data which unfortunately is not available for Polish social researchers.

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