Risk Premium for Loss of Employment in Polish Regions

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Abstract - **In previous papers of the series, having applied the income-based valuation method of intellectual capital of a region, the author discovered a need for valuation of the risk premium which should be included in the discount rate of labour income. Undoubtedly, both the loss of employment and the amount of labour income contribute to the intuitive calculation of economic migration. The income-based valuation of the right to a certain sequence of income at a certain risk level, properly integrates these factors as one value, providing a clear criterion of selection is assured. Because the labour market does not generate the values that allow the adaptation of the CAPM model, a completely new method of the risk premium valuation has been proposed which produces corresponding results to those based on the CAPM model. The method was applied to respective regions of Poland i.e. voivodeships. As the result, the equity premium puzzle of the Polish labour market was revealed. Due to significant amount of estimates, the obtained results are just the first attempt towards solution of the problem.**

Index Terms - risk premium, labour market, equity premium puzzle, economic migration, intellectual capital of the region

I. INTRODUCTION

The issue of the risk premium for loss of employment has not been directly addressed or broadly analysed in literature so far. Rising unemployment – and indirectly loss of employment – are associated with the change of the amount of the risk premium required by entrepreneurs i.e. the spread between the return on their equity and the risk-free return on assets.

The necessity to valuate the amount of the risk premium for loss of employment emerged from the previous research which the author conducted on a unique method of valuating the intellectual capital of a given social and economic area. The method refers to the income-based valuation methods which triggers a necessity to estimate the proper rate discounting the workers' income, which should include the risk premium expressed as percentage points. In this case, it concerns the risk premium for employment loss. The proposed method of the risk premium valuation is unique because it allows, through a

detailed economic calculation, to move from the valuated probability of employment loss to the amount of the premium included in the discount rate which is directly used for the income-based valuation.

The obtained level of the risk premium for loss of employment can be applied for many purposes. As regards the regions/voivodeships, it is used as one of the interpretative factors of the economic migration, or when combined with the amount of labour income, it expresses the spatial mobility of labour force. Undoubtedly, the obtained results are also significant for the social policy. People migrate for economic reasons in order to gain a better pay for the same work. It means that if they locate their labour activity in a different region, they obtain the right to a different properly phased sequence of labour income, at a different risk level of temporary or permanent loss of employment. Both in this context and in the context of the intellectual capital of a region, the possibility to valuate the right to a certain sequence of labour income at a certain risk level, becomes more significant. Such a valuation expresses an objective and balanced marriage of income and risk, therefore it can become an economic criterion of 'profitability' of working in a given social and economic area. Therefore, it can be assumed that this criterion is significant for the intuitive calculation of the profitability of the situation when the economic migrants change the country of employment.

The estimate of the income value of the right to a certain income sequence in a region, helps to determine what value, at a certain risk level, this right represents for an average worker employed in a given social and economic region or a given professional group. Thanks to the estimate, it is also possible to determine the maximum price which a third party should pay for this right, provided that the remaining conditions are constant e.g. the sales of this right shall not influence, by no means, the quality of the work performed because, as it is commonly known, rewarding workers with advance salaries usually has a negative impact on the quality of work. Thus, it seems obvious that in this situation the term 'risk premium' should be applied as it is similar to the category applied in the analysis of the stock market and results from the substantive

premises of the income-based valuation method. According to the best knowledge of the author, in the scientific research on the labour market, the term 'risk premium' as analogous to the 'risk premium on the capital market' has not been applied so far.

The problem of risk premium is a standard issue related to financial decisions. Originally, it was regarded as a significant difference between the rate of return on shares to which a high risk level was attributed by the shareholders, and the rate of return on bonds (Siegel, 1994). This difference was called equity premium puzzle (Mehra and Prescott, 1985).

Today the standard method of the risk premium valuation is the CAPM (the Capital Asset Pricing Model) which uses data generated on the stock exchange. However, the method is currently under strong criticism (Fassas and Papadamou, 2018). Experts point to considerable weaknesses of the method such as: particularly low estimates of the returns for forwarding companies based on the CAPM (Makrominas, 2018) or exclusion of some risk aspects in the market portfolio (Boubaker, Hamzac and Vidal-García, 2018). These deficiencies are the basis for the hypothesis that because of these drawbacks, the market provides only a sketchy image of harder dependences.

There are some problems related to the risk premium. Undoubtedly, one of them is restricting this category to the values generated on the financial market. The problematic issue concerns setting the risk premium by the NPV calculations as well as the income-based method of the worth estimation of not-listed companies. Another problem is how to define the risk premium. In terms of the financial market, one can speak about historical equity premium, expected equity premium, required equity premium i.e. the premium compensating the risk, and implied equity premium – the required risk premium which is different for different investors, and directly an unobservable value (Fernández, 2006).

In contrary to the interpretations available in scientific literature, when estimating the risk premium for loss of employment, one goes beyond the market of financial assets. However, the definition of this premium remains unchanged. In this case, the risk premium is considered as an additional increase of the income per unit of the applied resources, which compensates the increased risk of employment loss. In terms of stock exchange, the resource is the capital invested in the shares, and the defined premium is the difference between the rate of return on shares to which a high risk level was attributed by the shareholders, and the rate of return on risk-free financial assets. In the labour market conditions, such a resource is understood as workload. Therefore, in comparison with the existing analyses based on the risk premium, the scope of the analysis becomes extended, which should be considered a positive aspect of the presented method. It is natural that employees are concerned with the loss of employment and, when having a choice between two employment options with the same conditions but with different levels of risk, they will choose the lower risk option. It leads to the conclusion that an increase of risk should be accompanied by an increase of salary. If it is assumed that the work performed for two different

employers is different, then in this case, the higher salary should be related to the workload. This brings us back to the classical definition of the risk premium, which now is true also for the labour market.

The objective set in this paper does not involve estimation of the risk premium based on historical data. Therefore, there is no relation to historical equity premium. The analyses of the risk of employment loss are quite often based on available statistical data concerning this aspect of the labour market (Morissette, Qiu and Chan, 2013). The data provides a certain outlook on the past processes and allows broad explanation, but it is less useful for the future processes, forecasts of which must be included in the valuation of the intellectual capital of a region. Future forecasts are also required in the NPV method or income-based valuation method. The prospect of employment loss is, most of all, the result of the current and future economic situation, and to a significantly lesser extent, the past processes reflected in statistics. Thus, to some extent, the proposed valuation method of the risk premium for employment loss relates to the definition of the expected equity premium. This was achieved by adding to the calculation the results of research on the fear of being fired. Based on the assumption that the representative group of employees tested in this respect understand their current and future position in this company best, it is possible to estimate the probability of employment loss. The possibility of the valuation of the risk premium for employment loss in the future should be considered an undoubted advantage of the proposed method. However, a disadvantage here may be the restriction of broad and methodologically consistent research on the fear of loss of employment conducted in the regional context. Currently it is necessary to use estimates.

The method of valuation of the risk premium for employment is based on the comparison of the expected value of the right to labour income, including the probability of employment loss, with the value of this right with no risk of employment loss. This comparison means that the increased income in terms of the risk of the expected loss due to a dismissal, fully compensates for this situation being a result of a temporary or permanent loss of labour income. In this field the proposed method refers to the required equity premium i.e. the premium that fully compensates for this risk, but not higher. It is an advantage of the proposed solution over models which estimate the risk premium based only on the values generated by the market that can be dominated by inadequate to reality behaviour of its participants. Another unquestionable asset of the proposed method is establishing the risk premium on the basis of the model that omits the rate of returns generated by the market, which is unavoidable in other models e.g. in the CAPM model. In the new method it is possible to avoid the impact of the abovementioned market deficiencies on the risk premium valuation. This particular advantage of the method is confirmed by the research results shown in the further part of the paper.

It is difficult to imagine that market participants would accept a higher risk of employment loss and relatively low salaries. However, in most Polish voivodeships (over 60%) it is often the case. The reasons for this may be high costs and low economic

mobility of workers. In microeconomics, a weak resource allocation mobility is considered a disadvantage of the market. Taking into account the abovementioned results, the standard market research in terms of expecting a compensation for the increased risk of employment loss as a difference between the rate of return on labour resources bearing the risk of employment loss and the risk- free rate of return on labour resources, would probably indicate that such a dependence does not occur due to the ambiguity of the results (even if a reliable method of calculating this rate was discovered). However, once again - it is difficult to imagine that market participants would accept a higher risk of employment loss at relatively low salaries. An additional advantage of the presented method is that it can be applied for the risk premium valuation by the NPV calculations as well as the income-based method of the estimation of worth of not-listed companies. One should not underestimate not-listed businesses as they generate over 40% of GDP in many countries. All the existing methods of the risk premium valuation do not allow it. The research conducted by the author indicates that results arrived by means of the proposed method correspond to results achieved by applying the already existing methods.

The proposed method, however, is not flawless. One of its main disadvantages is the exponentially growing effort along with the extending time horizon assumed in the research. The risk premium valuation in relation to one region from the perspective of 9 years, requires over a thousand highly complex partial calculations, the amount of which is exponentially growing with passing years. In addition, a nine-degree equation must be solved. Therefore, it was necessary to develop a special computer programme for calculations. Another disadvantage may be the assumed time horizon which is a consequence of a limited perception of the risk of employment loss: nobody can foresee precisely their professional position and income adjustments in a 10-year-perspective. Generally, it is assumed that employees with 10 years of work experience gain professional stability and they become free from the risk of employment loss, thus this risk in stable companies should be close to zero.

Yet another method of the risk premium calculation which produces quite reliable results is the survey method (Damodaran, 2009). Usually, the respondent group in the survey method consists of chief financial officers (Graham and Harvey, 2010), though experts suggest to include also investors, managers and even academics (Damodaran, 2009). This method, however, is not commonly used (Damodaran, 2009). For the purposes of this paper, the survey method as a form of obtaining direct knowledge of the required level of the risk premium on the labour market, is barely useful. In the abovementioned research, the respondents are people who are well versed in what the risk premium is and they probably calculate its amount based on similar principles. Another group consists of respondents representing regional labour markets. In this case, the knowledge of the risk premium for employment loss is marginal and the methods of its calculation unknown. Therefore, in case of the labour market it is better to survey workers on the fear of loss of employment and translate the

results into the risk premium by means of the proposed method. This is exactly what the author did. As a result, under the risk premium for employment loss, a new universal characteristic was obtained. This characteristic provides comparability of labour markets in terms of employment loss and eliminates the influence of market deficiencies on the amount of the risk premium. Thanks to this method, the obtained amount of the risk premium reflects the future situation of the market better than the more traditional methods based on values generated by the market.

To summarize, the methods of risk premium analysis found in the literature refer mainly to listed companies. However, it would be absurd to think that not-listed companies are risk-free. Thus, during estimation of the value of listed companies using the income-based method, it is necessary to take risk into account. The situation is similar in valuation of the right to labour income at a determined risk of employment loss. Undoubtedly, this right has its value and is associated with a certain risk of failure to obtain labour income due to employment loss. However, this right has nothing to do with the fact whether a given company is listed on the stock exchange or not.

The proposed method of premium valuation is based on the knowledge of economic and technical characteristics of the analysed companies, their situation on the market, probability of employment loss and possibility of fast re-employment. This allows the calculation of WO_{pr} – the expected value of the right to the defined sequence of labour income including the risk of employment loss and a chance to find a new job. The comparison of WO_{pr} with the formula for the income value of the given income sequence, allows the valuation of the proper discount rate including the risk premium of employment loss. The defrayal of the expected costs which are the result of materialisation of the abovementioned risk, is a part of labour income that exceeds the required level of WO_{pr}, at the discount rate free from risk. In case when there is no materialisation of the risk of employment loss, the abovementioned premium shall be a reward for the employees who take the risk of employment loss. Such a risk premium meets the conditions of the insurance model in which the valuation of the rate amount is based on the value of the expected liquidated damages, provided that in the considered period the discounted expected value of the risk premium for employment loss for a given entity is equal to the discounted expected value of the liquidation of damages this entity suffered. The only difference is, that in case when there is no materialisation of the risk, the insured entity covers the cost of the insurance rate and the entrepreneur takes the risk premium in the form of increased income. However, if the risk occurs, the insured entity receives compensation. When it comes to enterprises, the compensation for losses is possible thanks to accumulated premiums and can be payable in events when the risk did not materialise. The same applies to the risk premium of employment loss.

The previous research which motivated the author to raise the issue of valuation of the risk premium of employment loss in a given social and economic area, was already published in three successive papers published in Scientific Journal of Bielsko-

Biala School of Finance and Law (Ostoj, 2017a), (Ostoj 2017b), (Ostoj, 2017c).

II. METHODOLOGICAL ASSUMPTIONS

The main assumptions of the presented analysis result from the approach of the precursors of intellectual capital (Edvisson and Malone, 2001). The assumptions can be reduced to the following statements:

1. Intellectual capital of an entity is the difference between the value of the entity as an organised whole and the value of the net assets subject to registration (i.e. accounting value) – that is to say, the value of the assets subject to the market valuation;
2. Market value of a given entity as an organised whole is equal to the economic resources collected in this entity, where one of the resources is intellectual capital.

When it comes to a region, it is difficult to establish its market value, because it is not and cannot be subject to market transaction. However, an attempt could be made to assess its value for the whole group of residents in terms of their income obtained through the location of activity in this particular region. In this regard, the application of the income-based valuation method becomes relevant.

Under these assumptions, the formal shape of the formula for the calculation of the region value was obtained (Ostoj, 2017, B):

$$W_{d\ reg} = \sum_{i=1}^{\infty} \frac{D_i}{(1 + (r_n + r_r))^i} = \sum_{i=1}^{\infty} \frac{Z_i + Am_i + P\mathfrak{l}_i + Cz_i}{(1 + (r_n + r_r))^i}$$
$$= \sum_{i=1}^{\infty} \frac{PKB_i}{(1 + (r_n + r_r))^i}$$

(1)

Where:
Wd reg – income value of the region;
D_i – income obtained within the region;
Z_i – accumulated profit obtained in i-year in all companies within the region;
Am_i – accumulated defrayal of depreciation costs with the income in i-year in all companies within the region;
$P\mathfrak{l}_i$ – accumulated remuneration obtained by residents in i-year – the employees who locate their activity in a given region;
Cz_i – accumulated rents obtained by residents in i-year – the owners of properties who locate their activity in a given region;
r_n – return on assets free from risks;
r_r – r risk premium expressed by the additional required rate of return;
PKB_i – Gross Domestic Product generated in i-year by residents in a given region.

In terms of the above assumptions, a part of the assessed economic value of the region - as an organised whole – is the value which the region represents to the employees professionally active within its area. In terms of the income value, this value will be equal to the value of the right to a properly phased sequence of disposable labour income of those entities who located their professional activity within the region, including the risk premium for employment loss. Taking into account the above assumption, it can be stated that the value of the region for professionally active employees in

this area – *WPRReg* – is expressed by the following formula (2):

$$WPR_{Reg} = \sum_{i=1}^{\infty} \frac{(P\mathfrak{l}_n)_i^R}{\left(1 + (r_{br} + r_{prp\mathfrak{l}})\right)^i}$$

(2)

Where:
WPRReg – value of the region for employees professionally active within its area;
$(P\mathfrak{l}n)_i^R$ – total amount of net pays obtained within the region in i-year subject to calculation;
$r_{prp\mathfrak{l}}$ – premium for the risk taken by employees (employment and pay loss);
r_{br} – interest rate free from risk.

Similarly, it is possible to calculate the value of the right to income of an average household obtained as the result of locating the professional activity within the region – Formula (3):

$$WDPGD_{Reg} = \sum_{i=1}^{\infty} \frac{12 \times (PD_n)_i^R}{\left(1 + (r_{br} + r_{prp\mathfrak{l}})\right)^i}$$

(3)

Where:
$WDPGD_{Reg}$ – value of the region for an average household obtained as a result of locating the professional activity within the region;
$(PDn)_i^R$ – average net pay for work in i-year subject to calculation;
$r_{prp\mathfrak{l}}$ – premium for employment and pay loss risk taken by employees;
*r_{br} – interest rate free from risk.*

The possibility of estimating the $WDPGD_{Reg}$ value is important, as it is one of the significant premises that trigger employee migration between regions. However, it is currently subject to intuitive calculation, because valuation of $r_{prp\mathfrak{l}}$ by region causes difficulties i.e. the premium for risk of employment and remuneration loss taken by employees who locate their professional activity in a given R region.

The main problem with estimating the risk premium, is finding a proper measure for the probability of employment loss in the years that follow the date of the research and then estimating probability on its basis. In the beginning, it should be noticed that the risk of employer's losses cannot be equated with the risk of employment loss of employees. Employment loss is not always associated with the liquidation of the employer's company, it may also be the consequence of various organisational changes within the company. Moreover, to some extent, the risk premium depends on the expected value of the right to the defined sequence of income properly phased in time including the probability of their loss. The entrepreneur who is forced to implement the company survival strategy, must make some of the workforce redundant, otherwise the company could be shut down. On the other hand, employment loss may not necessarily be associated with big losses suffered by the owner with respect to the liquidation of the company.

The estimation of probability of employment loss based on the movements among the employed and unemployed for the purposes of the proposed calculation, is pointless. Figure 1. proves that at a stable level of employment and unemployment, significant employment reductions in comparable periods are possible.

FIGURE 1. MOVEMENT BETWEEN THE LABOUR RESOURCE AND THE ENVIRONMENT OF THE LABOUR RESOURCE
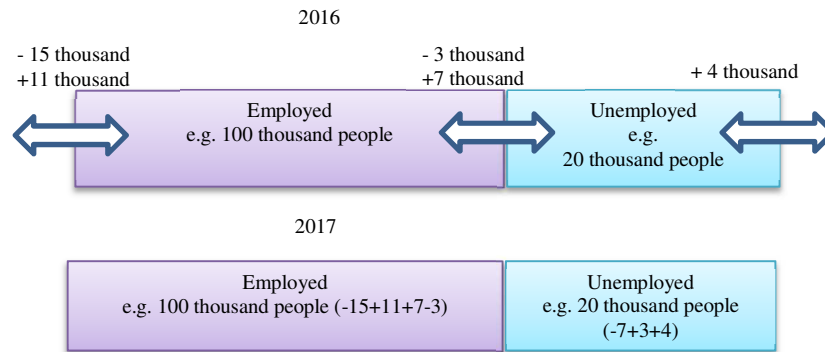

Source: Own work

Figure 1. assumes that from one period to another (YOY – 2016/2017) both the number of the employed and the unemployed is stable. A simple calculation can prove that nobody lost the job because the number of the unemployed did not increase. However, it is not true. In 2016, 18 thousand people were made redundant, 15 thousand were excluded from labour resources as they did not attempt to find a new job, and 3 thousand were added to the group of the unemployed. Other companies increased their employment taking on 11 thousand of new employees (e.g. graduates of 2016), and 7 thousand people who were previously unemployed. Moreover, 7 thousand people beyond labour resource did not find a job and were added to the group of the unemployed. To summarize, in the presented situation the YOY number of employed and unemployed did not change, despite the fact that 18 thousand people were made redundant.

The available estimates of the probability of employment loss based on the statistical data, are divergent. For example, the National Bank of Poland provides the probability of changing the status of an employed person into an unemployed at the level of 1% in 2013 – see Figure 2.

FIGURE 1. PROBABILITY OF MOVEMENTS BETWEEN THE EMPLOYED AND UNEMPLOYED IN 2008-2016.
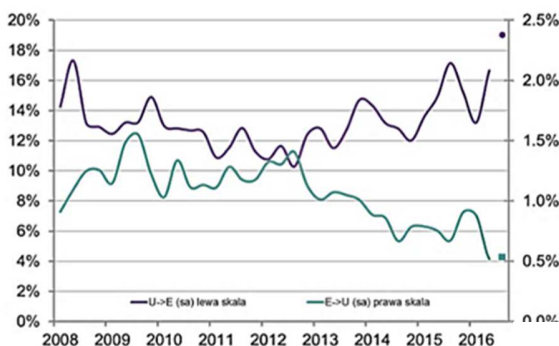

Source: (Roszkowska et al., 2017)

Nevertheless, as it can be seen in the above example, this information does not provide a complete picture of employment loss, because some percentage of the people made redundant can be excluded from the labour resource. Another source estimates the probability of employment loss at the level of 7% in 2013 – Figure 3.

FIGURE 2. PROBABILITY OF EMPLOYMENT LOSS IN OECD COUNTRIES.
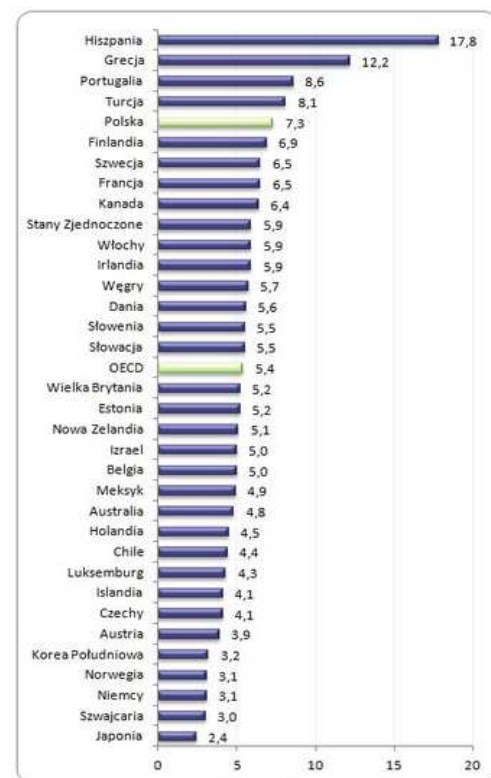
Source: (Sedlak & Sedlak, 2018)

On top of the abovementioned inaccuracies regarding the estimates of probability of employment loss based on the historical data, another problem arises - no assurance can be given to the repeatability of the reasons for redundancy in the future. The historical data does not have to be subject to the extrapolation in the future. For example, if a voivodeship is a mining region with historically small percentage of redundancy, in an event of a gradual depletion of the resources, there may be a threat of massive redundancies. Of course, the

reasons for inaccuracies between the results of the historical data analysis and the future reality can be numerous as the risk relates to the future.

Given the above, the attempt to estimate the probability of employment loss based on the historical data on redundancies is abandoned in favour of estimating the probability of redundancies based on fear of employment loss felt by workers employed in the region in the first, second, third and the following years. It is reasonable for at least three reasons:

- active employees observe the company executives who possess the knowledge on the company's future development and staffing needs, the knowledge also refers to the condition of the company, and in this context – the employee's professional position. The professional position is considered here as the usefulness of employees in terms of their professional competence in the context of the development needs of the company, whereas the employee's position results from the legal conditions valid for the region, which guarantee continuity of employment e.g. permanent employment and its consequences. On that basis it can be assumed that the employee's fear of redundancy is a more accountable factor of the probability of redundancy than the historical statistical data.

- employees covered by early retirement protection period show low fear of employment loss. Moreover, this low fear reduces the risk of employment loss for the new employees, including employees from other regions, because natural wastage creates workplaces for the younger generations. Estimation of risk based on the historical statistical data is again unjustified, because this data includes the past age structure of employees.

- the proposed method of assessment of the region value is not subject to market verification, because regions cannot be subject of market transaction. Therefore, market valuation or a market price established by two independent parties of the transaction are impossible. In the light of the above, when defining the value of a region as 'the value that it represents for its real and potential residents', one should aim at objectifying the assessment of this value not through the market, but the greatest possible consideration of the element of objectivity, by implementing individual feelings of the representative group of the actual and potential employees. In this case, one may speak of the fear of redundancy. The region is worth as much as it is valuated by the real and potential residents.

To summarize, it seems that the data on the employees' fear of employment loss is a better basis for valuation than statistical data that reflects accuracies which not necessarily have to arise in the future. In the further part of this paper the author used statistics available in the reports of the Barometer of the Labour Market and in the statistical yearbooks of the Central Statistical Office of Poland (GUS). Some of the statistics refer to the net labour income. It is justified by the fact that it is possible to assess these values through the labour market, what's more, there are acceptable methods of their extrapolation in the future i.e. methods of average pace of real and long-term growth.

III. VALUATION OF THE PREMIUM FOR RISK OF EMPLOYMENT LOSS

Taking into consideration the methodological assumptions defined above, an attempt was made to valuate the risk premium for employment loss in particular regions of Poland. It was done using the data on fear of 'definite' employment loss in the perspective of the following 9 years, for each respective voivodeship of Poland. The assumed time horizon of the research results from the fact that in the discount calculation, on which the income-based valuation method is based, the data usually comparable in terms of the value and concerning more distant years (10 years and more), has little impact on the final result and the surveyed employees are not able to provide reliable answers related to the fear of redundancy in the more distant time horizon. Unfortunately, the available statistics on the employee's fear of redundancy do not provide such data directly. Therefore, further analysis will be conducted using estimates based on additional assumptions.

As the data used in the valuation refers to the workers' fear of employment loss in the perspective of the whole country, it should be indicated that the regional differentiation of subjective perception of the possibility of employment loss is meaningless. The assessment is conducted according to the applied methodology and based on factual information from actual residents of a given region. Thanks to this assumption, while estimating the regional fear levels, it is possible to use the correlation between the registered unemployment rate and the fears disclosed at a national level.

Once the levels of registered unemployment in every region are known and the relation between the rate of unemployment and the fear of loss of employment at national level is established, it will be possible to evaluate the level of the loss of employment fear for each respective voivodeship. Such an approach gets appreciation from experts of the labour market. For example, Łukasz Komuda, an expert from the Foundation for Social and Economic Initiatives and the editor of rynekpracy.org, claims that 'the moods of employees correspond to the hard statistical data – the registered unemployment rate. […] The professional life is a domain very sensitive to various factors and the Poles do not live in a model reality where everybody earns the national average. The anxiety of the residents of small towns and villages is twice as high as the fear of the residents of the cities above 200 thousand people' (Komuda, 2018). Therefore, the moods, feelings and fears of employees have an impact on the rate of local unemployment.

Taking the above into account, the nation-wide unemployment statistics were correlated with the percentage of workers who reported the fear of employment loss in the first and the second year of employment from the date of the research in 2016-2018 (Table 1).

The calculations show that on the national scale, the correlation coefficient between the unemployment rate and the

fear of certain employment loss in the following year from the date of the research is positive and indicates a strong correlation (k=0,7696), which seems to confirm the abovementioned expert opinion on a strong correlation between the
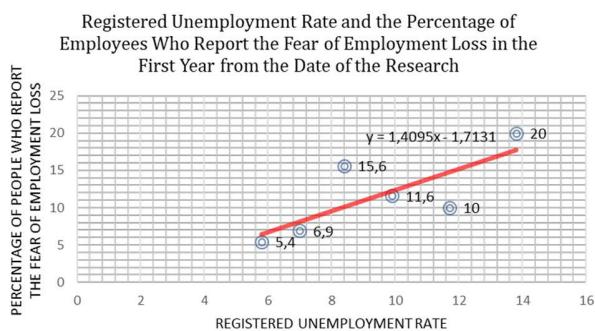
unemployment rate and the fear of employment loss. The above correlation was presented in Figure 4.

TABLE 1.
REGISTERED UNEMPLOYMENT RATE AND THE FEAR OF EMPLOYMENT LOSS IN 2013-2018

Month of Research	Year of Research	Registered Unemployment Rate [%]	In the first full year [%]	In the following full year/years [%]	No fear of employment loss in the following 2 years [%]	I do not know [%]
August	2013	13,8	20	6,9	64,6	8,5
III quarter	2014	11,7	10	6	79	5
III quarter	2015	9,9	11,6	7,8	76,1	4,5
III quarter	2016	8,4	15,6	8,4	69,1	6,9
III quarter	2017	7	6,9	4,7	84,6	3,8
III quarter	2018	5,8	5,4	3,3	88,4	2,9
Average in the period of 2013-2018			11,58	6,18		

Source: (Barometr Rynku Pracy, 2013), (Barometr Rynku Pracy, 2014), (Barometr Rynku Pracy, 2015), (Barometr Rynku Pracy, 2016), (Barometr Rynku Pracy, 2017), (Barometr Rynku Pracy, 2018).

FIGURE 4. REGISTERED UNEMPLOYMENT RATE AND THE PERCENTAGE OF PEOPLE WHO REPORT THE FEAR OF EMPLOYMENT LOSS IN THE FIRST YEAR FROM THE DATE OF THE RESEARCH

Source: Own work based on the data in Table 1

Taking into consideration the correlation coefficient (K= 0,7696) that indicates a strong correlation between the unemployment rate and the fear of employment loss in the first year from the date of the research, the linear correlation between these values was estimated, expressed by the formula (4).

$$y = 1,4095\,x - 1,7131 \qquad (4)$$

Using the correlation (1), the level of employment loss fear in the first year was estimated for each region. The obtained results are presented in Table 2.

Based on the data in Table 1 regarding the participation of employees who fear employment loss in the first and the second year from the date of the research, assuming that in the following years the participation cannot be negative and based on the methodological assumptions from the previous subchapter, the curve showing the correlation of the percentage of people who fear employment loss was estimated, regarding the following years from the date of the research. The curve and the formula are presented in Figure 5.

TABLE 2.
REGISTERED UNEMPLOYMENT RATE AND THE ESTIMATED PARTICIPATION OF EMPLOYEES WHO FEAR OF EMPLOYMENT LOSS IN THE FIRST YEAR OF THE DATE OF THE RESEARCH (AS OF 31 XII 2016)
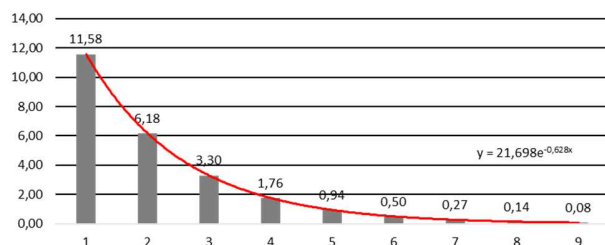
Region	Registered Unemployment Rate [%]	Participation of Employees Who Fear Loss of Employment in the First Year from the Date of the Research
Poland	11,4	0,1436
Lower Silesia	10,4	0,1295
Kuyavia-Pomerania	15,5	0,2013
Lublin	12,6	0,1605
Lubusz	12,0	0,1520
Łódź	11,8	0,1492
Lesser Poland	9,7	0,1196
Masovia	9,6	0,1182
Opole	11,8	0,1492
Subcarpathia	14,6	0,1887
Podlaskie	12,9	0,1647
Pomerania	11,1	0,1393
Silesia	9,6	0,1182
Holy Cross	14,1	0,1816
Warmia-Masuria	18,7	0,2464
Greater Poland	7,6	0,0900
West Pomerania	15,5	0,2013

Source: (Rocznik statystyczny Rzeczypospolitej Polskiej, 2015) and own calculations

Using the estimated correlation and applying the assumed criteria unified at the national level in order to assess the risk of employment loss in the following years from the date of the

research, the percentage of the employees who fear loss of employment in the following 9 years from the date of the research, was estimated. It is presented in Table 3.

Then, in order to determine the expected value of the right to the 9-year sequence of the net income broken into particular regions, the net incomes are juxtaposed (Table 4).

It should be remembered that in case of materialization of the risk of employment loss, the employee will or will not find a new job. It influences the expected value of the income in the considered 9-year sequence. The employee can assumingly lose the job in the 1st, 2nd, 3rd, ..., 9th year in the given sequence of 9 years.

FIGURE 3. ESTIMATE OF THE PERCENTAGE OF THE RESPONDENTS WHO FEAR EMPLOYMENT LOSS IN THE FOLLOWING 9 YEARS FROM THE DATE OF THE RESEARCH

TABLE 3.
ESTIMATE OF THE PROBABILITY OF EMPLOYMENT LOSS IN THE FOLLOWING YEAR FROM THE DATE OF THE RESEARCH

Region	As of 31 Dec 2016 Registered Unemployment Rate [%]	Probability of Employment Loss in the Following Year from the Date of the Research								
		1st year	2nd year	3rd year	4th year	5th year	6th year	7th year	8th year	9th year
		1	2	3	4	5	6	7	8	9
Poland	11,4	0,1435	0,0766	0,0409	0,0218	0,0116	0,0062	0,0033	0,0018	0,0009
Lower Silesia	10,4	0,1294	0,0691	0,0369	0,0197	0,0105	0,0056	0,0030	0,0016	0,0009
Kuyavia-Pomerania	15,5	0,2013	0,1074	0,0573	0,0306	0,0163	0,0087	0,0047	0,0025	0,0013
Lublin	12,6	0,1605	0,0856	0,0457	0,0244	0,0130	0,0069	0,0037	0,0020	0,0011
Lubusz	12	0,1520	0,0811	0,0433	0,0231	0,0123	0,0066	0,0035	0,0019	0,0010
Łódź	11,8	0,1492	0,0796	0,0425	0,0227	0,0121	0,0065	0,0034	0,0018	0,0010
Lesser Poland	9,7	0,1196	0,0638	0,0341	0,0182	0,0097	0,0052	0,0028	0,0015	0,0008
Masovia	9,6	0,1182	0,0631	0,0337	0,0180	0,0096	0,0051	0,0027	0,0015	0,0008
Opole	11,8	0,1492	0,0796	0,0425	0,0227	0,0121	0,0065	0,0034	0,0018	0,0010
Subcarpathia	14,6	0,1886	0,1007	0,0537	0,0287	0,0153	0,0082	0,0044	0,0023	0,0012
Podlaskie	12,9	0,1647	0,0879	0,0469	0,0250	0,0134	0,0071	0,0038	0,0020	0,0011
Pomerania	11,1	0,1393	0,0743	0,0397	0,0212	0,0113	0,0060	0,0032	0,0017	0,0009
Silesia	9,6	0,1182	0,0631	0,0337	0,0180	0,0096	0,0051	0,0027	0,0015	0,0008
Holy Cross	14,1	0,1816	0,0969	0,0517	0,0276	0,0147	0,0079	0,0042	0,0022	0,0012
Warmia-Masuria	18,7	0,2464	0,1315	0,0702	0,0375	0,0200	0,0107	0,0057	0,0030	0,0016
Greater Poland	7,6	0,0900	0,0480	0,0256	0,0137	0,0073	0,0039	0,0021	0,0011	0,0006
West Pomerania	15,5	0,2013	0,1074	0,0573	0,0306	0,0163	0,0087	0,0047	0,0025	0,0013

However, in this case it is obvious that after each employment loss, the employee had to find re-employment in the following year. It means that in any of the years considered, the employee did not lose the job permanently, therefore he/she still received income. In case of materialization of the risk of employment loss, for example, in the 2nd and the 7th year in the considered sequence of years - the permanent employment loss could arise with the defined p_k probability only in the 7th year, otherwise the employee would not obtain the income in the 3rd, 4th, 5th and the 6th year – and this is what the variant assumes.

Therefore, in the presented model of the given combination of employment loss in the following 9 years, two variants of possible materialization of risk can be considered. The first always assumes a new job to be found quickly within the year in which the employment was lost (short-term unemployment), which results in the income loss only in this year. The second variant assumes that in case of materialization of the employment loss risk, only the employment loss in the last possible year of the given variant of the employment loss combination in the following 9 years results in the permanent

unemployment, therefore the permanent income loss in the following years.

Region	Registered Unemploymen t Rate [%]	Average Gross Pay [zł]	Average Monthly Net Pay [zł]	Avergae Annual Net Pay [zł]
Poland	8,2	4052,19	2889,94	34679,28
Lower Silesia	7,2	4140,76	2951,48	35417,76
Kuyavia-Pomerania	12	3506,02	2509,06	30108,72
Lublin	10,3	3625,04	2592,53	31110,36
Lubusz	8,6	3541,91	2534,24	30410,88
Łódź	8,5	3712,34	2653,08	31836,96
Lesser Poland	6,6	3839,56	2741,98	32903,76
Masovia	7	4948,13	3514,46	42173,52
Opole	9	3708,24	2649,86	31798,32
Subcarpathia	11,5	3501,68	2506,66	30079,92
Podlaskie	10,3	3583,38	2562,81	30753,72
Pomerania	7,1	3995,39	2850,33	34203,96
Silesia	6,6	4059,14	2894,40	34732,8
Holy Cross	10,8	3472,53	2485,76	29829,12
Warmia-Masuria	14,2	3454,95	2473,96	29687,52
Greater Poland	4,9	3711,14	2652,13	31825,56
West Pomerania	10,9	3681,90	2632,17	31586,04

Source: Data from the Polish Annual Statistical Report, 2017 and own calculations. The net pay was calculated using the Pay Calculator (Kalkulator wynagrodzeń, 2016).

Based on the available data and the current condition of the market, the author assessed the probability of finding new employment quickly ($1 - p_k$). The probability was determined at the level of around 68% because such a percentage of respondents claimed, in the 2nd quarter of 2018, that they would easily find new employment of at least the same quality as the previous one (Monitor Rynku Pracy, 2018). In order to estimate the average monthly real net income (Płn)ji – obtained in the i-year by the employees-residents in the m-region over the following 9 years (as the Gordon's model assumes), the stable pace of the YOY income growth was assumed, equal to the average pace of growth established on the basis of the historical data. It was assumed that the income dynamics results from the growth level of a given economic area and in a short time perspective, it is its relatively permanent characteristics. The dynamics of the real net income in the household sector is presented in Table 5.

Based on the above data, the expected value of the right to the defined sequence of average labour income possible to obtain through the professional activity in the area of a given region was estimated (4):

$$WOPD_m = \sum_{j=1}^{512} \sum_{k=1}^{2} \sum_{i=1}^{9} \frac{12 \times (Pł_n)_i^{j,k}}{(1+(r_{br}))^i} \times p_j \times (p_k)^{-(1-k)} \times (1-p_k)^{(2-k)}$$

(4)

Where:
$WOPD_m$ – expected value of the right to the sequence of the average labour income possible to obtain through the professional activity in the area of m-district,
$(Pł_n)_i^j$ – accumulated average monthly net pay obtained by employees-residents in m-district in i-year, in j-variant of the employment maintenance for 9 years, and in k-variant of staying in/abandoning the labour resources,
r_{br} – discount rate free from risk,
p_j – probability of j-variant of the employment maintenance in the following 9 years,
p_k – probability of the permanent employment loss in the last year of j-variant of the employment maintenance in the following 9 years.

Then by solving the equation that correlates the expected value of the right to the defined sequence of the average labour income with the formula for the income value of this right at a given income sequence, the r_{dm} discount rate was calculated including the risk premium. The obtained results are presented in Table 6.

The obtained results indicate a low level of the risk premium for employment loss in Poland – the level does not exceed 0.6 percentage point. It is a relatively low level compared to the risk premium in the discount rate of the companies, which in the 3rd quarter of 2016 fluctuated, depending on the level of capitalization, and reached the level of 19.6 pp for companies of micro capitalisation. However, it is worth noticing, that for the companies of macro capitalisation the value of the risk premium was estimated at the zero level (Financialcraft - Analytics & Accounting, 2016).

The relatively low level of the risk premium for employment loss results from a few premises. First, a relatively low percentage of employees is afraid of employment loss in the following years and many of them are not afraid of losing employment at all. Moreover, in case of ordinary workers, the loss of employment means only the loss of the current income without any losses to the possessed capital. Such losses usually occur in case of a liquidation of the company or a necessity of its restructuring. It influences the expected value of the right to the defined sequence of income of the company's owner, lowering it significantly. Of significant importance is also the fact that workers can find new employment of the same quality effortlessly and practically cost-free. The model, of course, takes this factor into account.

Another issue worth attention is the negative correlation between the risk level and the amount of the net income which was discovered in the analysis of the net income depending on the risk premium level. This correlation level is significant, as it is proved by the correlation coefficient (K= -0,616588); See Figure 6.

TABLE 4.
ESTIMATION OF THE AVERAGE GROWTH OF THE REAL NET INCOME IN THE HOUSEHOLD SECTOR IN 2010-2015

| Region	Dynamics					Growth			
	2011	2012	2013	2014	2015	2015		Average	
	a	b	c	d	e	-	[%]	-	[%]
	2010=100	2011=100	2012=100	2013=100	2014=100	2010=100		2010-2015	
Poland	101,2	100,8	100,7	102,6	103,5	**0,090833**	9,08%	0,018167	**1,82%**
Lower Silesia	99,6	101,8	102,1	102,5	103,9	**0,102484**	10,25%	0,020497	**2,05%**
Kuyavia-Pomerania	98,2	99,6	99,6	102,9	102,8	**0,030478**	3,05%	0,006096	**0,61%**
Lublin	101,5	99,8	99,7	102,2	102,5	**0,057953**	5,80%	0,011591	**1,16%**
Lubusz	100,1	98,7	98,3	102,2	102,6	**0,018364**	1,84%	0,003673	**0,37%**
Łódź	99,3	100,8	100,2	103,2	103,4	**0,070232**	7,02%	0,014046	**1,40%**
Lesser Poland	101,7	101,4	101,1	103,5	103,6	**0,117919**	11,79%	0,023584	**2,36%**
Masovia	103,5	102,2	101,7	103,4	103,7	**0,153484**	15,35%	0,030697	**3,07%**
Opole	100,3	100,1	98,5	103,3	104,3	**0,065506**	6,55%	0,013101	**1,31%**
Subcarpathia	100,3	100,4	100,7	101,9	104,2	**0,076728**	7,67%	0,015346	**1,53%**
Podlaskie	100,6	98,4	101,7	100,4	102,8	**0,039061**	3,91%	0,007812	**0,78%**
Pomerania	101,2	100,8	100,3	102,6	103,5	**0,0865**	8,65%	0,0173	**1,73%**
Silesia	101,4	101,5	101,8	101,9	103,9	**0,109281**	10,93%	0,021856	**2,19%**
Holy Cross	99,9	99,2	98,4	103	104,5	**0,049605**	4,96%	0,009921	**0,99%**
Warmia-Masuria	101,5	99,3	99,7	101,9	102,8	**0,052635**	5,26%	0,010527	**1,05%**
Greater Poland	102,1	100,4	99,9	103,3	103,8	**0,098051**	9,81%	0,01961	**1,96%**
West Pomerania	99	99,8	100	101,8	103,4	**0,040002**	4,00%	0,008	**0,80%**

Source: a. the Polish Annual Statistical Report, 2013, b. the Polish Annual Statistical Report, 2014, c. the Polish Annual Statistical Report, 2015, d. the Polish Annual Statistical Report, 2016, e. the Polish Annual Statistical Report, 2017

TABLE 6.
RISK PREMIUM FOR EMPLOYMENT LOSS AND THE AVERAGE NET PAY ACCORDING TO THE DISTRICTS

Country/Region	Risk Premium [pp]	Average Net Pay According to the Districts [thousands zł]	Correlation Coefficient for All Districts	Correlation Coefficient for the Districts with the Negative Trend
Poland	0,221	2,89		
Greater Poland	0,116	2,65		
Lesser Poland	0,166	2,74		
Silesia	0,168	2,89		
Masovia	0,173	3,51		
Pomerania	0,187	2,85		
Lower Silesia	0,188	2,95		
Łódź	0,235	2,65		
Lubusz	0,250	2,53		
Opole	0,253	2,65	K= -0,616588	
Lublin	0,297	2,59		
Podlaskie	0,302	2,56		
Holy Cross	0,316	2,49		K= -0,8088359
Subcarpathia	0,331	2,51		
West Pomerania	0,334	2,63		
Kuyavia-Pomerania	0,362	2,51		
Warmia-Masuria	0,428	2,47		

Source: Own calculations results based on the presented model and statistical data.

FIGURE 4. RISK PREMIUM FOR EMPLOYMENT LOSS AND THE AVERAGE DISPOSABLE NET INCOME OF HOUSEHOLDS IN THE 3RD QUARTER OF 2016
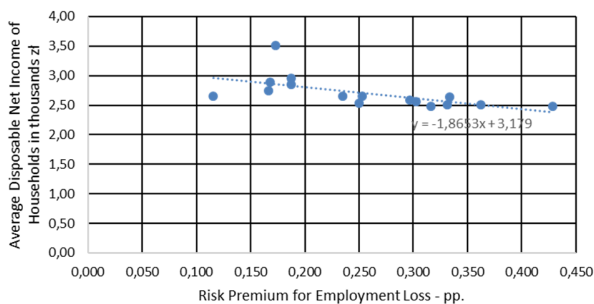
Source: Based on data in Table 5

The obtained results seem to contradict the basic correlation between income and risk. In this correlation subtraction of the increased risk should be awarded with a higher income. Higher risk premium in the valuation of the right to the sequence of the income which is possible to obtain in a given area, translates in increased risk of employment loss. However, this is accompanied by the decrease of the disposable net labour income. This correlation is confirmed by the mutual inclination of the trend lines representing the variability of the risk premium for employment loss according to the regions in relation to the trend line of the disposable net income of households – Figure 7.

FIGURE 5. TREND LINE OF THE DISPOSABLE NET LABOUR INCOME AND THE TREND LINE OF THE RISK PREMIUM GROWTH ACCORDING TO THE DISTRICTS.
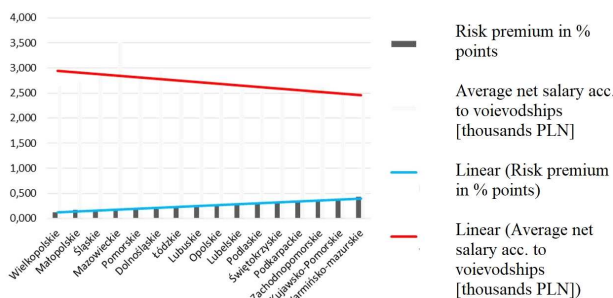
Source: Based on the data in Table 5

Therefore, the author of the paper deals with the equity premium puzzle and its explanation at the same time. The conducted analysis seems to prove the character of the labour market, which means that the increased risk of employment loss is not awarded with a relatively higher income. In contrary – the increased risk is proportional to the decrease of the disposable net income of households. Such situation on the market fuels migration from areas offering employment with a relatively low pay and a high risk of its loss to areas where income is higher and the risk of employment loss relatively lower.

However, when looking at Figure 7, it can be noticed that the first four regions (Greater Poland, Lesser Poland, Silesia and Masovia) stand out of from the set trend line. Along with the increase of the risk (the risk premium increases), the increase of the remuneration can be observed, whereas this increase in the

capital district is disproportionately big. Excluding these regions from the correlation coefficient estimation causes that the correlation coefficient increases to the level which indicates a very strong significance of the considered correlation K = - 0,8088359. It was presented in Table 5. The disclosed correlation allows for the formulation of two hypotheses:

1. Voivodeships which are better developed socially and economically, are characterised by a lower risk of employment loss at high-income level. It is a sufficient reason for attracting migrant workers. The employees who are territorially mobile are able to calculate the profits that result from the possibility of obtaining a higher remuneration in a given region and the costs associated with the materialization of the risk of its loss. Therefore, the correlation that assumes the increase of income at a higher risk of employment loss, remains kept.

2. Less developed voivodeships, being a reservoir of the workforce for the four better developed regions (and possibly also beyond), are able to keep only these workers who are not territorially mobile. Their reasons for the lack of mobility are so strong that the lower risk of employment loss and the higher income in other regions are not a sufficient incentive to change the workplace. At the same time, high risk of employment loss causes high unemployment. In such conditions a relatively lower remuneration level is also possible.

IV. CONCLUSIONS

On the grounds of the conducted analysis, it can be subjectively stated that the value which a given social and economic area represents for the employees active in this area, is based on their intuitive calculation and is not subject to market verification. For this reason (and others presented in this paper), it seems reasonable to research not only the probability of employment loss estimated on the basis of the statistics, but also based on the fear of employment loss. Then, the moods of the employees will correspond to the hard statistical data – the registered unemployment rate.

The low level of the risk premium for employment loss estimated on the grounds of the formulated model, results from the relatively low percentage of workers who fear redundancy in the coming years after the research, and – from the high percentage (even up to 84%) of workers who do not report such concern. Moreover, workers who are not entrepreneurs lose only the current income without losing any of the possessed capital. Entrepreneurs usually suffer from losses on capital in case of liquidation of the company or necessity of its restructuring.

The current possibility of a relatively quick re-employment is also significant: 68% of the surveyed employees claimed that they can easily find a job at least as good as the previous one, and 88% claimed that they would find any job. The low cost of retraining is also significant – 88% of the respondents claimed it was not necessary.

The negative correlation between the risk of employment loss and the amount of the income possible to obtain in a given social and economic area, is also significant. As the correlation coefficients indicate – the generally negative correlation can be observed in less developed regions where the low level of remuneration causes the outflow of employees who are territorially mobile and ready to look for better employment. It may be assumed that a certain proportion workers or job seekers in those regions are reluctant to relocate, what in times of high unemployment may lead to the increase in employment instability at the low average level of renumeration. It does not refer to the regions of high-income level. In these regions, the increase of the risk of employment loss corresponds to the increase of the remuneration level. The low level of the estimated risk premium for the employment loss is the result of current good situation on the labour market (the employee's market). However, such a condition does not guarantee an absolute stability. Therefore, in papers which will follow, the author will use the average data which will be the parameters for a longer-period model. In addition, the information on the fear of redundancy in relation to the researched regions in a wider time horizon will be used, provided that such information is available.

V. Acknowledgments

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