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# UNEMPLOYMENT AND LABOUR MARKET POLICIES – EMPIRICAL ANALYSIS FOR POLAND

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K e y w o r d s: unemployment in Poland, active labour market policies evaluation, propensity score matching.

A b s t r a c t

This article presents the development of unemployment and labour market policies in Poland in the period 2005–2015. The paper focuses on the nature and structure of unemployment, expenditure from the Labour Fund, active labour market policy instruments and participants. Active labour market policy evaluation was performed quasi–experimentally and was based on a propensity score matching method. The effects of the policies were evaluated based on information concerning the unemployed taken from the Syriusz database.

## BEZROBOCIE I POLITYKA RYNKU PRACY – ANALIZA EMPIRYCZNA DLA POLSKI

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S ł o w a k l u c z o w e: bezrobocie w Polsce, ewaluacja aktywnej polityki rynku pracy, *score matching*.

A b s t r a k t

W artykule przedstawiono stan bezrobocia i politykę rynku pracy w Polsce w latach 2005–2015. Rozważania skoncentrowano na przyczynach i strukturze bezrobocia, wydatkach z Funduszu Pracy oraz aktywnych instrumentach polityki rynku pracy i ich uczestnikach. Aktywną ewaluację programów zatrudnienia wykonano, wykorzystując podejście quasi-eksperymentalne i metodę *score matching*. Źródłem informacji o bezrobotnych do oceny efektów polityki rynku pracy były dane zawarte w systemie informatycznym publicznych służb zatrudnienia Syriusz.

## Introduction

The Polish economy stands presently at a crossroads. There is a long way to go to close the gap in per capita income when compared to the most developed OECD countries. After being the EU's best performing economy, in the initial years following the outbreak of the global economic crisis, the Polish economy has begun to slow, which is having an increasingly negative effect on the labour market and living standards. Many socio-economic indicators have worsened, particularly in the labour market, which shows that the benefits of the country's economic growth have not been felt evenly throughout society. In this situation, government intervention in the labour market plays a very important role (WIŚNIEWSKI, ZAWADZKI 2010).

The aim of this article is to analyse the unemployment development in Poland in the period 2005–2015 and empirically evaluate the labour market policies. The causal effects of labour market policies will be examined based on a propensity score matching method.

Compared to the highly developed European countries, Poland has few methodological achievements in the field of the research issues discussed. Taking into account the available subject literature and examples of practical applications, it can be stated that in Poland research on the causal effects of labour market policies is in its infancy. After an intensive development of the research on the effectiveness of the Polish labour market policies, initiated in the 90s and undertaken by foreign research teams, the first decade of the twenty-first century saw stagnation. Apart from a few and fragmentary evaluation studies of programmes co-financed with EU funds, there were only two major pieces of research conducted which undertook the problem of estimating the impact of basic active labour market policies (assessment of the net effect) offered by the public employment services on the employment situation of programme beneficiaries. It should be noted that a key hindrance to the development of research on this issue in Poland is the lack of appropriate high quality data concerning individual unemployed persons. This data should be collected in a central database that integrates information about these people from different areas of the social services; for instance, from labour office records, social insurance companies, nursing houses or from health care institutions.

## The situation in the labour market in Poland in the period 2005–2015

Poland's joining the European Union has opened new job markets for Polish people in many countries of the Community and has led to reducing the

size of unemployment in Poland. In 2004 the number of unemployed persons reached 2,999,600 and in 2008 it decreased to 1,473,752 persons, and the unemployment rate fell by almost 10 percentage points and reached the level of 9.5%. Unfortunately, due to the economic crisis which began in the United States in 2007 and reached Europe in 2008; the number of unemployed started to rise again. Poland's GDP rose on average by 3.7% between 2008 and 2011, with growth slowing to just 1.6% in 2009. At the end of 2009, the number of unemployed persons reached 1,892,680 with an 11.9% unemployment rate and four years later the number of unemployed stood at 2,157,883 and the unemployment rate grew to 13.4%. At the end of 2015, the number of unemployed decreased to 1,563,339 persons and the unemployment rate fell to 9.8%.

Table 1

The number of registered unemployed persons and those seeking employment in Poland in the years 2005–2015

| Years | Registered unemployed persons | Unemployment rate | Job seekers |
|---|---|---|---|
| | as at the end of the time period | | |
| 2005 | 2,773,000 | 17.6 | 62,107 |
| 2006 | 2,309,410 | 14.8 | 56,768 |
| 2007 | 1,746,573 | 11.2 | 49,360 |
| 2008 | 1,473,752 | 9.5 | 44,409 |
| 2009 | 1,892,680 | 11.9 | 46,176 |
| 2010 | 1,954,706 | 12.3 | 45,506 |
| 2011 | 1,982,676 | 12.5 | 39,701 |
| 2012 | 2,136,815 | 13.4 | 40,748 |
| 2013 | 2,157,883 | 13.4 | 41,395 |
| 2014 | 1,825,180 | 11.4 | 37,204 |
| 2015 | 1,563,339 | 9.8 | 33,909 |

Source: Ministry for Labour and Social Policy, Labour market statistics.

In the years 2005–2015, the labour market was characterised as having significant liquidity. The inflow of unemployed persons had been decreasing prior to 2008 when it reached the level of 2,476,000, but in 2009 it grew by over 600 thousand persons and stayed at a similar level in 2010. However, a slight downward trend was then observed. The year 2011 marked a quick deepening of this trend and the size of the inflow fell to 2,591,000 persons. However, the largest outflow from unemployment occurred in 2006 and it amounted to 3,156,000 persons. In subsequent years it was decreasing and in 2009 it reached the level of 2,664,800 persons. The situation improved in 2010 – the

outflow rose by over 300,000 persons to deteriorate again in the following year when the outflow decreased by over 400,000 unemployed persons and reached the level of 2,563,500. Undertaking employment had the largest contribution to the outflow from unemployment; however, its share was falling systematically from 45.2% in 2005 to 38.0% in 2009. In 2010 it increased slightly to 39.7% and in 2011 it grew again to 44.1%.

Also, the share of the subsidised employment in the unemployed persons undertaking employment had been on the increase until the year 2010 and had grown from 13.7% to 21.7%. In 2011, due to a significant decrease in the level of expenditures on active labour market programmes from the Labour Fund, the share fell to 9.8%. However, relatively stable was the share of deregistration from the population of unemployed persons resulting from their failure to confirm their readiness to undertake employment; it stood at 30–33%. In the time period 2005–2008, the outflow from unemployment exceeded the inflow (the largest difference was noted in 2007 – over 560,000 persons), which resulted in a decrease in the unemployment level. In the subsequent years 2009–2013, the situation was the reverse – the inflow exceeded the outflow, which contributed to the growth in the unemployment level. Since the year 2014 the situation has changed – the outflow has exceeded the inflow.

Table 2

Inflows and outflows from unemployment in Poland in the years 2005–2015

| Years | Registered unemployed persons 'inflow' | Deregistered unemployed persons 'outflow' | Out of which for the following reasons: | | |
|---|---|---|---|---|---|
| | | | undertaking employment | out of which: subsidised work | non-confirmation of readiness to undertake employment |
| | in the reported time period | | | | |
| 2005 | 2,793,181 | 3,019,782 | 1,365,790 | 186,693 | 993,124 |
| 2006 | 2,692,351 | 3,155,941 | 1,412,799 | 163,019 | 972,176 |
| 2007 | 2,491,242 | 3,054,079 | 1,266,439 | 185,766 | 949,210 |
| 2008 | 2,476,583 | 2,749,404 | 1,052,077 | 186,659 | 874,934 |
| 2009 | 3,083,757 | 2,664,829 | 1,012,375 | 202,329 | 837,751 |
| 2010 | 3,041,964 | 2,979,835 | 1,183,296 | 256,343 | 874,100 |
| 2011 | 2,591,458 | 2,563,488 | 1,130,697 | 110,844 | 827,765 |
| 2012 | 2,654,974 | 2,500,835 | 1,096,364 | 139,248 | 741,056 |
| 2013 | 2,709,444 | 2,688,164 | 1,262,865 | 149,712 | 726,234 |
| 2014 | 2,452,845 | 2,786,200 | 1,285,777 | 163,416 | 738,152 |
| 2015 | 2,368,755 | 2,630,596 | 1,283,943 | 191,008 | 585,768 |

Source: Ministry for Labour and Social Policy, Labour market statistics.

## Expenditures from the Labour Fund

The system of income support of unemployed persons introduced in Poland is based on quasi-insurance principles. Polish law allows for the application of both active and passive measures for counteracting unemployment. The unemployment benefits and labour market policies are financed through the Labour Fund. Its returns come from compulsory payroll contributions paid by employers and from the state budget transfers. The fund is very modest and is limited to dealing with high unemployment.

The act on employment protection and labour market institutions, which became effective on the day when Poland joined the European Union, laid emphasis on active forms of unemployment prevention. It was possible due to the change implemented in September 2004 which shifted pre-retirement benefits and allowances from the Labour Fund to ZUS (The Social Insurance Company). These changes were accompanied by an economic upswing and, therefore, by increased payments made to the Labour Fund which, in the period preceding 2010, led to covering an increasing number of unemployed persons with active instruments of labour market policies. In 2005, the number of unemployed persons involved in active forms of unemployment prevention was 561,700 but in 2007 it rose to 672,800 and in 2010 to 788,000. In the year 2012, the number of unemployed who completed active programmes in the labour market halved and amounted to 382,300. However, an improvement was noted in the employment effects of those undertakings.

Table 3

Expenditures from the Labour Fund in Poland in the years 2005–2015 (in millions of PLN)

| Years | Total expenditure | Allowances and benefits | Active labour market programmes | Other |
|---|---|---|---|---|
| 2005 | 5,551 | 2,998 | 2,052 | 456 |
| 2006 | 5,500 | 2,805 | 2,219 | 467 |
| 2007 | 5,367 | 2,268 | 2,710 | 390 |
| 2008 | 5,753 | 1,911 | 3,362 | 480 |
| 2009 | 11,245 | 4,504 | 6,205 | 536 |
| 2010 | 12,376 | 5,014 | 6,745 | 617 |
| 2011 | 8,751 | 4,796 | 3,328 | 628 |
| 2012 | 11,093 | 3,881 | 6,844 | 368 |
| 2013 | 12,130 | 3,891 | 7,817 | 422 |
| 2014 | 12,125 | 3,205 | 8,515 | 405 |
| 2015 | 10,931 | 5,110 | 5,294 | 527 |

Source: data taken from the Ministry for Labour and Social Policy.

In 2009, 47.9% of the unemployed covered by employment programmes became employed. However, in 2007 this index was higher by almost 10 percentage points (57.7%), but it fell in 2010 to 54.2% and in the following year rose to 55.7%.

Expenditures from the Labour Fund, which were destined to smooth the effects of unemployment and to fight this phenomenon, maintained a similar level throughout 2005–2008 and fluctuated between 5.4 billion and 5.8 billion PLN; however, in 2009 alone they doubled and reached the level of 11.2 billion PLN. In 2010, the rate of increase in expenditures from the Labour Fund was relatively small – the expenditures rose by about 10% reaching 12.4 billion PLN. The year 2011 saw a decrease in expenditures of almost 30% to the level of 8.8 billion PLN. Aso, the structure of the expenditures changed. Prior to the year 2008, the share of the expenditures on allowances and benefits had fallen from 54.0% to 33.2%. In subsequent years, there was growth and in 2011 a level of 54.8% was reached (this was partially due to the inclusion of the payment of pre-retirement allowances and benefits previously realised by the Social Insurance Company to the Labour Fund). The share of the expenditures on unemployment prevention programmes increased from 37.0% in 2005 to 54.5% in 2010. However, in 2011 it decreased to 38.0% and, in particular, a dramatic fall was noted in the expenditures on active labour market policies. In 2011 they were reduced by 64.0% from the previous year and their share in the total expenditure of the Labour Fund fell from 43.0% in 2010 to 21.9% in 2011 and reached the lowest level of the past decade. In the period 2012–2015, total expenditure from the Labour Fund increased to the level about 11–12 billion PLN. In 2015, one can observe a significant decrease in spending on active labour market policies which is accompanied by a simultaneous increase in expenditures on unemployment benefits.

## Active labour market policy measures and participants

In Poland in 2004 by virtue of the act on employment promotion and labour market institutions (2004) a new division of active labour market policies was introduced into labour market services and labour market instruments. The act specified the following four fundamental types of labour market services: job placement, vocational counselling and information, active job search assistance and organisation of training courses.

The following constitute labour market instruments supporting labour market policies: financing the cost of travel to the employer that submits the job offer, financing the cost of accommodation in the work place paid by a person who was sent by a district job centre to undertake employment,

co-financing of the furnishing of a work place, of commencing a business activity, of the costs of consultations and counselling, reimbursing the costs borne for social insurance contributions paid related to the employment of an unemployed person and financing unemployment prevention additional allowances.

In order to prepare and encourage unemployed persons, the following instruments have been defined within the labour market policies in Poland: training courses, intervention works, public works, vocational training at the work place, placements, start-up incentives and other means for creating work places, as well as small public works. These instruments impact the supply and demand sides of the labour market. The supply-oriented instruments include training courses, placements, and vocational training at the work place which, since the year 2009, has had the form of adult vocational training. The demand-oriented instruments, in turn, include subsidised employment which takes the following forms: intervention works, public works, small public works, means for adults' engaging in a business activity and for the furnishing of a work place for an unemployed person assigned by a district job centre.

Vocational training is an instrument for preparing the unemployed and those seeking employment and is applied in the following situations: lack of vocational qualifications, the need to change or complete vocational qualifications, loss of ability to conduct work in the position occupied hitherto, or lack of abilities to seek employment actively. Means for training from the Labour Fund may also be allocated to employed persons over 45 years of age who are interested in their professional development. In accordance with the act, training courses may last up to 6 months; however, in the cases justified by the training programme developed for a specific occupation, the duration of the training may be extended to 12 months. Training services are delivered in the following two modes: group and individual. As regards the former, a job centre may propose an eligible person to participate in training included in the annual training scheme; within the latter mode, an individual may be directed to a training course selected by himself/herself, providing that participation in it is justified. The unemployed covered by training services are entitled to the following forms of financial support:

– a scholarship equal to 120% of the unemployment benefit;

– refund of travel, accommodation, and food costs incurred due to the participation in training;

– refund of child care or of dependent care, up to 50% of the unemployment benefit.

Placements are organised on an employer's premises and are intended to enable unemployed persons to gain experience and acquire skills indispensable to undertake employment. This is especially important for graduates, who

naturally lack work experience. At present, however, placements are assigned to all unemployed persons whose situation in the labour market is special. Depending on the category of persons whose situation in the labour market is special, the length of vocational training has been differentiated but the maximum duration should not exceed 12 months. Placements are regulated by contracts concluded between the district governor and the employer and follow the programme agreed upon. The programme should take into account the unemployed person's psycho-physical predispositions, health condition, the level of education, and the vocational qualifications acquired hitherto. Also, it should specify the scope of the tasks to be realised both by the unemployed person and by the person in charge of the person covered by the programme of placement. Within the duration of the vocational training, the unemployed person is eligible for a scholarship equal to 120% of the unemployment benefit. The employer is not obliged to guarantee employment to the intern after the placement is finished.

The purpose of adult vocational preparation is to increase an adults' participation in continuing education corresponding to employers' requirements. All unemployed persons are eligible for this programme. Adult vocational preparation may take the following two forms:

– learning a job at the practical level,
– training for a job.

Learning a job at the practical level usually lasts from 12 to 18 months and concludes with a qualification examination granting a vocational title, or with an examination qualifying for a journeyman. Training for a job, in turn, lasts from 3 to 6 months and also concludes with an examination checking whether candidates possess specific skills. Adult vocational preparation follows an established programme which considers the vocational qualification standards and both theoretical knowledge and practical skills. Mention must be made that acquiring practical skills must cover a minimum of 80% of the time of vocational preparation and must be conducted on the employer's premises. The employer is obliged to assign a person with the qualifications required to supervise adult vocational preparation.

Refunds of costs incurred by employers for creating work places for assigned unemployed persons within the adult vocational preparation programme functions as an incentive to employers. The amount of those refunds should not exceed 2% of the average remuneration paid out for each month of the vocational training. Another incentive to employers is a bonus to be paid out in the amount of 400 PLN; similarly, for each month of the vocational training, providing the unemployed person passes the final examination. The cost of the examination is also reimbursed from the Labour Fund.

The purpose of organising public works is to prevent unemployed persons from becoming accustomed to economic inactivity, in particular, in unfavourable and very unfavourable situations in the labour market, through temporary employment. These programmes are also intended to support the unemployed materially. Public works denote employing an unemployed person for the period of time up to 12 months in the case where works are organised by communes or non-governmental organisations which statutorily deal with the following issues: protection of the environment, culture, education, physical education, tourism, health care, unemployment, and social welfare. The organiser of public works is entitled to receive for the period of 6 months the reimbursement of part of the cost of remuneration, bonuses, and social insurance contributions. In the case where the employment period exceeds 12 months, the cost borne by the employer is refunded for every second month.

Intervention works are aimed at vocational activation of the unemployed whose situation in the labour market is special and at creating opportunities for undertaking permanent employment. Intervention works programmes help those groups which are exposed to the threat of being vocationally withdrawn and unprepared to maintain contact with the labour market. Intervention works consist in employing an unemployed person pursuant to a contract concluded between the district governor and the employer. The employer that offers a work place to the unemployed person assigned for intervention works may receive a reimbursement of a part of the cost borne for the payment of the remuneration agreed upon in the contract, bonuses and social insurance contributions corresponding to the reimbursed remuneration. The duration of the programme may vary. The basic period of providing aid for the aforementioned groups lasts up to 6 months (or up to 12 months in the case where the reimbursement is paid out for every second month of the employment period). For some categories of the unemployed intervention works may last up to 12 or even up to 24 months (or up to 18 and 48 months in the case where the reimbursement is paid out for every second month of the employment period).

Small public works are primarily aimed at the realisation of social purposes and are targeted to the unemployed who are not eligible for an unemployment benefit and are recipients of social benefits. These instruments are to prevent demoralisation and teach persons threatened by social exclusion how to work. Small public works may last up to 10 hours per week. These works are realised based on a contract concluded between the district governor and the commune for the benefit of whom the public works are going to be conducted. The unemployed person assigned to them is entitled to receive an hourly rate of a minimum of 7.70 PLN for every effective working hour.

The means allocated to the creation of new work places cover the following: a one-off subsidy paid out to the unemployed person to commence business activity, refunds paid out to the employer, and the cost of furnishing or providing additional equipment for a work-stand in return for employing the assigned unemployed person. They are aimed at supporting self-employment and the development of regional small businesses. At present, the amount of means granted to an unemployed person for commencing business activities or providing additional equipment for a work-stand cannot exceed 600% of the average remuneration earned in Poland. In addition, an unemployed person may receive a reimbursement of the documented cost of legal assistance, consultations or counselling. The unemployed person who received the support is obliged to continue the business activity for a period of 12 months under pain of returning the subsidy. The employer representing the small or medium-sized enterprise is obliged to maintain the work place for a period of 2 years.

The number of unemployed engaged in active labour market policies rose in the time period 2005–2010 by approximately 40% and the number of unemployed persons in that period fell by 35%. Therefore, the number of unemployed who were engaged in active labour market policies increased significantly. However, 2011 saw a decline in the number of unemployed by 1.4%. The number of persons engaged in active programmes decreased substantially

Table 4

Number of unemployed persons engaged in main labour market programmes in Poland in the years 2005–2015 (in thousands)

| Years | Total | Training | Intervention works | Public works | Placements | Start-up | Furnishing and providing additional equipment to a work-stand |
|---|---|---|---|---|---|---|---|
| 2005 | 561.7 | 150.7 | 70.9 | 69.2 | 162.7 | 27.9 | 13.1 |
| 2006 | 594.3 | 146.9 | 69.1 | 32.7 | 169.1 | 34.9 | 21.8 |
| 2007 | 672.8 | 178.1 | 59.1 | 40.9 | 173.0 | 45.1 | 37.4 |
| 2008 | 652.3 | 168.3 | 46.0 | 44.5 | 169.9 | 52.2 | 28.0 |
| 2009 | 684.6 | 168.3 | 40.3 | 54.0 | 256.7 | 63.9 | 28.4 |
| 2010 | 788.7 | 182.4 | 43.2 | 74.6 | 299.3 | 77.0 | 44.6 |
| 2011 | 302.0 | 53.8 | 28.5 | 22.8 | 110.5 | 26.1 | 10.7 |
| 2012 | 428.3 | 80.6 | 31.8 | 30.4 | 176.7 | 39.4 | 22.5 |
| 2013 | 414.3 | 84.9 | 33.9 | 32.5 | 194.1 | 45.1 | 23.6 |
| 2014 | 442.2 | 78.5 | 31.1 | 32.6 | 219.7 | 50.0 | 30.2 |
| 2015 | 484.3 | 74.8 | 53.2 | 35.6 | 240.4 | 47.3 | 33.0 |

Source: materials published by the Ministry for Labour and Social Policy.

(by more than 46%) and the programmes covered merely 15% of the total number of unemployed in Poland.

The largest expansion in undertaking business activities and creating new work places was noted in the years 2005–2010 when the number of unemployed engaged in these programmes increased by more than 300%. The number of unemployed participating in placements rose by almost 84% and of those participating in training courses by almost 21%. However, a fall was noted in the number of unemployed persons engaged in intervention works (by 39%). The decrease in the proportion of intervention works was related to the rigorous legal requirements on the employment of an unemployed person after the completion of intervention works. Placements were regulated by less rigorous regulations and after the amendments made in the act at the end of 2008, when the subject scope was extended, it became more favourable. The year 2011 saw a decrease in the number of persons involved in all of the active programmes. The quickest fall in the number of participants was noted in training courses, public works and in supporting business activities. The fall was due to the poor situation of public finances and the drastic cuts in the means allocated to the activation of the unemployed.

In the time period 2012–2015, the tendency has changed and the number of unemployed engaged in active labour market policies has risen and has reached 484.3 thousand. At the end of this period, active labour market programmes covered 31% of the total number of the unemployed.

In 2015, placements had the largest share in the structure of the unemployed engaged in active labour market programmes (49.6%). Training programmes came second; however, their share was on the decrease – it dropped from 26.8% in 2005 to 15.4% in 2015. The share of intervention works was in third place – 11%. In fourth place were noted start-ups (increasing from 5% to 9.8%).

## Methodological aspects of evaluation

In an era of growing competition and increasing pressure on the high effectiveness of activities undertaken by various players of economic life, researching the causal effects of public treatments is the foundation of the so-called evidence-based policies. It allows the capturing of the causal relationships between treatments undertaken, the results observed and the determination of the real effect (the net effect); that is a treatment–induced change, which cannot be ascribed to the impact of other factors. The theoretical framework for reasoning in the scope of the identification of causal dependence determines the so-called concept of the counterfactual (HECKMAN 2005), which

boils down to the idea of attempting to assess the hypothetical effects of events, which are an alternative to what actually happened. This is related to the occurrence of the fundamental problem of causal inference (HOLLAND 1986), since observing for the purpose of a specific unit at a specific time the effects of two mutually exclusive events (participation and non-participation in a programme) is impossible.

In studies of causal effects, based on the counterfactual, two trends can be clearly seen: the statistical trend, which was contributed by the significant scientific works of RUBIN and ROSENBAUM (1983) and the econometric trend whose leading representative is HECKMAN (2005).

The outcome of that research is widely applied in such fields as education, health care, economic policies, social policies or labour market policies. In the area of labour market policies, the biggest methodological progress in investigating the causal effects of labour market programmes aimed at helping the unemployed to find employment was made in the nineteen nineties with the increasing processing power of computers and the creation in some countries of central databases, based on the existing data derived from administrative resources. They contain a wide range of individual information about individuals including the exact course and the main characteristics of previous employment, history of individual episodes of unemployment along with participation in active labour market programmes or social security benefits. A significant increase in unemployment occurred in the 90s in many European countries, and also gave rise to the development of the research. The United States and Australia, and such European countries as Germany, Austria, Switzerland, Denmark and Sweden can boast of significant achievements in researching the field of the real effects of active labour market programmes.

For the purpose of the analysis of causal effects of different treatments at the microeconomic level, experimental methods or quasi-experimental are applied. Due to the wide access to administrative data which are less expensive than the experimental type of data, studying the effects of active labour market programmes in European countries was based primarily on quasi-experimental methods. Research undertaken in the 90s focused on a traditional static approach (static evaluation framework) consisting of juxtaposing participation in one active programme at a specific point in time with the situation of non-participation in any labour market programme (comparing the results obtained in two groups: the treatment group and the control group). The main interest was to investigate the real impact of unemployed persons' participation in those programmes on their employment situation after the programme, measured by an unemployed person's taking up employment, shortening the duration of unemployment, or the level of income earned from work. Depending on the adopted research objectives and the availability of certain sets of

micro data, the following methods were mainly applied: regression analysis, methods based on matching, in particular, the propensity score matching method (in case of the selection of observable characteristics), the combination of matching with the DiD estimator (in case of the selection of observable and unobservable characteristics) as well as the discontinuity regression design (for treatment with an arbitrarily adopted selection threshold).

## Effectiveness of active labour market policies – empirical evidence

The effectiveness of the fundamental active labour market policies applied in Poland in 2009 was evaluated. The analysis performed was quasi-experimental and was based on a propensity score matching method (HABER 2007). In the view of many evaluation specialists, this method gives satisfactory results in the scope of the evaluation of active labour market policies at the microeconomic level.

The effects of the policies were evaluated based on information describing the unemployed taken from the Syriusz database (the information system for public employment services in Poland) exclusively. That means that the labour market status of participants of active labour market measures as well as of unemployed persons not participating in the programmes was determined based only on the data stored in the register of a job centre.

In the present research in the case of a group assigned to active forms, the gross effect stands for the percentage of persons who after the completion of a programme were deregistered due to undertaking employment within three

Table 5

The gross and net employment effects of active labour market policies in Poland

| Active labour market measures | Gross employment effects (in %) | Net employment effects – impact (in % points) |
|---|---|---|
| Training | 43.2 | 8.7*** |
| Placements | 34.0 | 3.1*** |
| Intervention works | 45.0 | 15.6*** |
| Socially useful works | 11.2 | –8.9*** |
| Public works | 30.3 | 4.7 |
| Means allocated to undertaking business activities (start-up incentives) | 100.0 | 62.6*** |

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Source: own calculation based on the data derived from the Syriusz system.

months after the date of its completion. The net effect of a programme constitutes the difference between the percentage of the employed from a group of unemployed persons participating in active labour market policies and from a control group matched by means of the nearest neighbour method.

On the national scale, the most effective in the understanding of the impact on employment turned out to be start-up incentives and intervention works. The positive employment effects were also generated by the supply–oriented instruments of the labour market policies, i.e., by vocational training courses and placements; however, these effects were considerably weaker than the effects resulting from means allocated to undertaking business activities or intervention works. Participation in socially useful works had a negative impact on the chances of being employed and the impact of public works proved statistically insignificant.

The employment effects of subsidies for engaging in economic activity as well as of intervention works appear to be overvalued due to the measuring method applied in labour offices, which leads to a considerable overstatement of the gross effects of those instruments.

The interpretation of the obtained effects of training is a more complex task. The training courses analysed concerned various vocational areas and these courses varied by their length and quality of teaching. For instance, longer training courses due to the lock-in effect may have had much weaker impact than short ones. The poor learning outcome may have been influenced by both the factors related to didactic aspects of the training and by mismatching the teaching content to the current needs of the labour market. The low effectiveness of vocational training courses may also be explained by deadweight loss, which means that those forms of raising qualifications were to a large degree targeted to persons who portended well on the labour market and would undertake employment without using this type of support. The net effects of training courses may have also been undervalued.

The net effects of placements also seem surprisingly weak, though young unemployed people without any vocational experience willingly apply for it. Mention must be made that as of 01 February 2009 the body of persons eligible for placements was extended to the entire group of the most disadvantaged in the labour market and this fact has probably contributed to the lowering of the effectiveness of this form of preparation. In light of the research conducted by the Institute for Structural Research (BUKOWSKI 2009), placements constituted an effective form of supporting unemployed youth who completed primary or secondary education. At present, placements are becoming a more attractive instrument for employers than intervention works since placements provide employees who do not need to be paid for their work and there is no obligation to guarantee employment to them on the completion of the placement. It may be inferred that the inappropriate targeting of placements has

become a major factor in determining the low employment effectiveness of this instrument.

The results of the analysis confirm that socially useful works are not instruments that help persons stop being unemployed. Participation in socially useful works impacted negatively on an unemployed person's chance to undertake employment. However, it does not mean that using this instrument should be abandoned. Socially useful works are intended to realise goals that are different from other programmes. Their role consists in preventing demoralisation and in shaping positive attitudes to work in persons endangered by social exclusion. Therefore, the evaluation of this programme based only on measuring employment effects does not appear to be fully justified since undertaking employment is not the only measurement of the success of socially useful works.

Public works, in a similar way to socially useful works, cannot be looked upon as a means of labour market policy that increases the chances for being employed. The earlier evaluation research on active labour market policies in Poland conducted by the Institute for Structural Research as well as other analyses of employment programmes in selected EU member states confirm the occurrence of the negative net effects of public works or of a statistically insignificant impact of that programme on the likelihood of stopping being unemployed (CALIENDO et al. 2005, KLUVE 2007). Public works are usually accompanied by stigmatisation that most likely has a significant impact on the effectiveness of that form of aid. Public works cease to fulfil preparedness functions and more and more frequently they are functioning as an instrument of passive labour market policies whose major goal is to improve the material situation of the unemployed that fall into hard–to–place groups of the labour market.

## Conclusions

Active labour market policy should play an important role, especially in the situation of poor and uncertain labour market performance. For Poland, the most important challenge is to undertake more in–depth studies of the causal effects of active labour market policy.

Along with the evolution of the role of active labour market policies, increasingly there is also a focus on other goals than merely finding a job. For instance, preventing inactivity and being out of the labour force, decreasing structural mismatches by creating opportunities to improve human capital and increasing, therefore, the variety of strategies used in the preparation of the unemployed (*e.g.*, flexicurity, transitional labour markets, work first) and

instruments. It is necessary to extend and modify the methods previously used in the evaluation of labour market policies.

Firstly, the set of the analysed programme outcomes could be expanded significantly. Depending on the specifics and the objective of the programmes, their impact on various aspects might be studied, for example, on taking further education, participating in another active programme, joining the economically inactive population, remaining employed after the program completion in the long run, the flow rate from unemployment to employment, or annual earnings.

Secondly, a dynamic approach should be introduced in the evaluation research of labour market policies.

Thirdly, in the meantime, the knowledge of the factors that co-determine the participation and programme outcomes also increased. Studies of causal effects should include a much wider set of variables describing not only a specific episode of an individual's unemployment and his/her socio-demographic characteristics, but also the exact course of their career.

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# TRANSFORMATION OF BELIEFS: AN EVALUATION OF ECONOMIC RISK UNDER UNCERTAINTY

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K e y w o r d s: risk decision, uncertainty, investment, trust company, post-communism.

A b s t r a c t

This paper presents the results of a study of the risk-taking behavior of investors in some Eastern European countries in the post-soviet period. A unique transformation processes in society at the transition from the 20th to the 21st century caused the value of this point of view. Individual risk philosophy was on the way to being built under the factors of a changing society from command (full regulation of the environment) to a free market relationship. We investigate the influence of heuristics on the awareness of subjective risk evaluation in the case of a "sollective" investment activity in a trust company, MMM in 1994. The study confirms the bias in human behavior in the case of a high–risk situation. Some results, such as the influence of educational level on risk and reduced income values in terms of absolute growth, contradict the previous findings.

## TRANSFORMACJA WARTOŚCI – OCENA RYZYKA EKONOMICZNEGO W WARUNKACH NIEPEWNOŚCI

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S ł o w a k l u c z o w e: decyzja o ryzyku, niepewność, inwestowanie, spółka powiernicza, post-komunizm.

Abstrakt

W artykule przedstawiono wyniki badań nad zachowaniem inwestorów w warunkach ryzyka w okresie poradzieckim. Unikatowe procesy transformacji w społeczeństwie zachodzące na początku lat 90. XX wieku powodują, że poruszony temat jest ciekawy i wart podjęcia. Filozofia ryzyka jest formowana pod wpływem czynników zmieniającego się społeczeństwa ze stosunków scentralizowanych (pełnej regulacji środowiska) do rynkowych. W analizowanym okresie obserwowano wpływ heurystyki osądów na subiektywną ocenę ryzyka w przypadku kolektywnej działalności inwestycyjnej w analizowanej spółce powierniczej. Badanie potwierdza pewne schematy w zachowaniu ludzi w przypadku wystąpienia sytuacji o wysokim stopniu ryzyka. Jednocześnie niektóre wyniki, jak wpływ poziomu wykształcenia na skłonność do ryzyka lub zmniejszenie wartości przychodu w miarę jego wzrostu absolutnego, są sprzeczne z wnioskami płynącymi z innych, wcześniej publikowanych badań.

## Introduction

One of the most important values of modern society at the same level as freedom of speech and religion is financial stability and the economic freedom of individuals. To achieve this state of personal budget, people use different methods aimed at increasing income. It is important that such earnings must be permanent. Therefore, in today's money relations, financial tools that allow us to create additional income have become widely used. Mutual funds, bonds, bank deposits, life insurance policies (e.g. unit linked), and others may be attributed to these tools. Each of these instruments is characterized by a certain degree of risk. Moreover, the risk of the same instrument may vary depending on the level of development of the country and society. The more developed the financial market infrastructure is, the more opportunities for capital formation individuals have. However, there is another side: with the growth of the connections between these instruments, the risk of losses increases and often, when practiced, manifests in a "domino effect".

There is a widespread view that one of the reasons of smaller losses in Eastern Europe during the global financial crisis in 2008–2009 was significantly weaker involvement in the global financial system. Moreover, the current economic problems are not considered as a liquidity crisis but a crisis of confidence. The authors of the book "Animal Spirits: How Human Psychology Drives the Economy, and Why It Matters for Global Capitalism" offer to explore the confidence multiplier: a cascading growth of confidence that in the determined period of time leads to an increasing of financial flows (AKERLOF, SHILLER 2009, p. 17).

Economic phenomena are increasingly explained by using research findings from psychology, sociology and other humanities. As the conclusions of SMITH (1790), SLOVIC (1987), KANEMANN, TVERSKY (1979), KINDLEBERGER, ALIBER (2005), AKERLOF, SHILLER (2009), NASSIM (2012), GIGERENZER (2015) confirm,

when making a decision people are guided not only by rational calculation but also by subjective feelings. This especially appears during risk assessment under uncertainty where a priori prevents accurate prediction.

Having a certain freedom of choice in the area of income generation, the individual decides to participate in financial transactions with a high risk of loss. In such circumstances, the individual estimates the probability of the desired result based on his own consciousness of the problems, beliefs, values, points of references, and risk attitudes. This causes the appearance of biases in risk estimation and an unconscious kink (fracture) of the reference point. Such displays are particularly characteristic for a period of significant socio-economic transformation when the structure of values and the mechanisms of their assessment are being changed. Based on this, the main hypothesis about the specifics of a collective evaluation of economic risks under uncertainty during the transition from a communist regime to a democratic system based on market principles is formed. The aim of the paper is to demonstrate the instability of risk perception and prove the need for a personal approach to investment behavior under the conditions of risk.

## The theoretical approach of individual behavior in making financial decisions under risk and uncertainty

Modern economic theory and practice occupy a large variety of both dogmatic and dialectic interdisciplinary explanations of risk. Both risk and uncertainty have fundamental random events which can be repeated concerning an individual object. However, in situations of risk the frequency of random events is known. In the financial market, it can be historical data concerning the timing of the loss or a decline in prices. Under uncertainty, the individual has no information about frequency, timing and/or the placement of the random occurrences. The first researcher who distinguished risk and uncertainty was KNIGHT (1921, p. 233). In his book, he concluded that uncertainty is rather a state of mind and risk is a state of the surrounding world. Risk is measurable while uncertainty is not. According to GIGERENZER (2015, p. 51), the best solution in terms of risk is not always the best decision under uncertainty. In practice, it complicates the decision-making process, since the possibility of economic and mathematical models are limited or not effective at all. In this situation, people tend to use their own subjective approach to assess the factors, assign them weight, and determine the value and risk. As SAVAGE (1961, p. 578) wrote: "...once the data is at hand and the moment for final action (or analysis) has come, theory leaves room for a great deal of subjective choice".

In the late 20th and the beginning of the 21st centuries, ideas of the theory of behaviorism acquired a significant value. With the help of these ideas, scientists have attempted to explain the behavior deviation of individuals from the optimal maximizing strategy as accepted in orthodox theory. One can say that illogical and irrational actions are "theorized" and they are allocated a place in the models of economic processes. It enables a better explanation of the connection between confined conditions of the decision–making process (e.g. uncertainty), the actual decision and the financial results (e.g. crisis, losses, winnings). Although it should be noted that as early as the 3rd century, ideas about mistakes in the human perception of items that came from subjective judgments were being brought forth (LAERTIOS 2006, p. 554–558).

The fundamental position in analyzing the behavior of individuals is the *theory of expected utility* by Von Neumann and Morgenstern. The hypothesis of rational expectations assumes that in predicting future indicators, individuals do not make systematic errors. Meaning the predictive indicator values, on average, will be close to the actual values. It is also assumed that in order to form their decisions regarding perspectives of changes in indicators, the individual will use all available information. If there is no uncertainty in the market and all the information is available, the hypothesis of rational expectations will lead to a complete prediction. Mathematically, the function model of expected utility is (SCHOEMAKER 1982, p. 538):

$$\sum_{i=1}^{n} p_i \cdot u(x_i), \qquad i = \overline{1, n},$$

note:

$x_i$ – outcome vectors,
$u(x)$ – denotes one constructed via lotteries,
$p_i$ – $n$ associated probabilities,
$n$ – various.

In 1790, even Smith presented a comprehensive study for that time concerning the behavior of the individual (regardless of the economy) on the basis of entirely different kinds of motivations – the principles of morality and ethics rather than strict adherence to self-interest (SMITH 2006). As a result of supplementing the theory of expected utility, the theory of subjective expected utility arose by Savage. The model was expanded to include choice under uncertainty (SAVAGE 1961):

$$\sum_{i=1}^{n} f(p_i) \cdot u([x])_i, \qquad i = \overline{1, n},$$

note:
$x_i$ – outcome vectors,
$u(x)$ – denotes one constructed via lotteries,
$p_i$ – $n$ associated probabilities,
$n$ – various.

In terms of this expanded version of expected utility theory, the subjects are divided into three categories: risk seeking, risk averse, and risk-neutral. Depending on the subject's objective, their utility function can be relatively concave, convex, or straight (please refer to Figure 1 below).

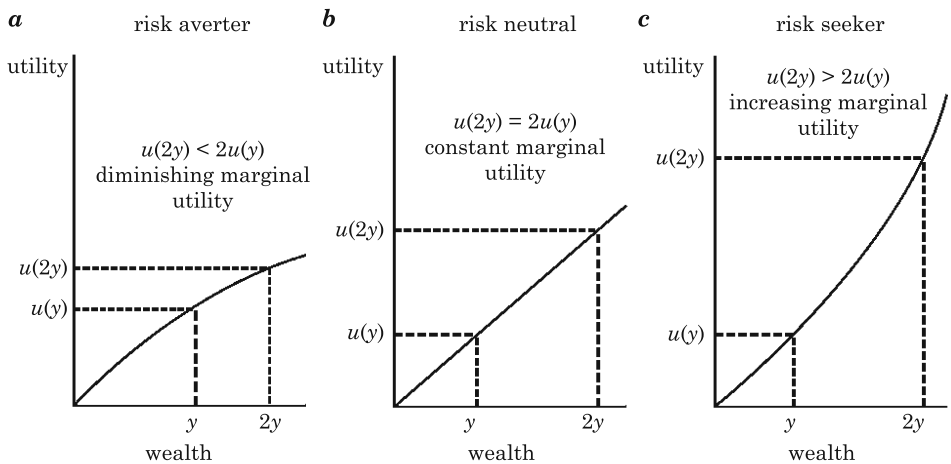


Fig. 1. Different risk attitudes: *a* - risk averter, *b* – risk neutral, *c* – risk seeker
Source: DĄBROWSKI, ŚLIWIŃSKI (2016, p. 18).

There are many economic paradoxes that show how the behavior of people is specific from the economic point of view. The St. Petersburg paradox by Bernoulli concerns an objective assessment of the value of winning under risk. It introduces the criterion of expected utility as a measure of the value of winning. The internal value of money increases with the amount of money, but not linearly. By offering such a hypothesis, Bernoulli concludes that the risk is perceived by everyone in their own way and cannot be valued equally (BERNOULLI 1954, p. 23–36). The Allais Paradox (ALLAIS, HAGEN 1979) led to the understanding that the perception of the probability by various investors

influences the choice of a lottery, that is, a particular investment option. It demonstrates the need to take into account the peculiarities of the perception of random events by the investor and uncertainties in general.

Kahneman and Tversky proposed a model of values function, which takes into account a subjective perception of probabilities:

$$V(a) = \sum_{i=1}^{n} \pi(p_i)\, v(x_i),$$

note:
$\pi(p_i)$ – probability outcome function,
the function value $v(x_i)$ – determined deviation from the reference point (initial wealth).

The value should be treated as a function because of the asset position, which serves as a reference point and the magnitude of the change (positive or negative) from that reference point (KANEMANN, TVERSKY 1979, p. 278). In decision making, an individual is guided not by abstract principles of maximizing pleasure and minimizing losses (hedonistic position), but by encoding in advance the possible consequences of his actions as a benefit or harm, depending on the selected reference point. However, it should be noted that any actions or decisions are relevant only in a certain system of values. Rational behavior in one system may be irrational from the perspective of another (WEBER 1978, p. 20).

## Modification of an individual's investment behavior based on risk and uncertainty perception

In theoretical science, one of the most common approaches to assessing an individual's process of decision-making under conditions of risk is to create conditions of gambling – lotteries. A participant in gambling, unlike the investor, can determine the exact probability of the results. However, investment based on the pyramid principle is something larger than the profit from chaos. Each individual creates his own risk perception based on a particular set of factors.

Uncertainty, as a condition in decision-making, is particularly characteristic of mechanisms that are built on the principle of the pyramid. There is uncertainty with the occurrence of loss, because it depends on the rate of involvement and demand of people. From a theoretical point of view, such a pyramid can exist as long as humanity exists (in the case of a constant influx

of new participants). But in reality, the number of participants is always finite and the activity period of the pyramids is limited. So, the selecting task becomes more complicated due to the lack of information about the likelihood of an event. Back in the 18th century, Isaac Newton, physicist and well-known mathematician had lost 20,000 pounds, taking part in the financial game known as "The South Sea Company". Later he said, "I can measure the motions of bodies but I cannot measure human folly" (WERNIK 2016, p. 5).

Mechanisms of solidarity distribution exist in the state system, which are characterized by uncertainty. For example, the solidarity pension system has the following features: the individual makes payments in exchange for future income. Today's funds are used for payments to previous participants. When the proportion of participants is violated and the number of former participants exceeds the number of active taxpayers, the financial mechanism fails. For example, according to statistical calculations in Ukraine, today it is required that one employed person must pay social security contributions sufficient for the monthly payments of two pensioners. Of course, the most stable guarantor – the State, assures such income. However, even under such guarantees, there are individuals who perceive the level of uncertainty of future earnings (and the risk of failure to receive anything at all) as one that negates the meaning of such investments.

In our opinion, it is interesting to investigate human risk perception under uncertainty in Eastern Europe, where a significant impact on the financial consciousness of people made a centrally planned economy that existed before 1991. Actually, its principles were the basis of some economic relations for a while. As a result, this was reflected in the creation of a risk culture in society, in the decision-making criteria and selection of financial instruments for investment.

The issues of risk culture in society should be explored separately for legal entities and individuals (households). Beginning in 1993–1995, the process of developed countries (Western Europe, USA) investing foreign capital into Eastern Europe began. Together with foreign capital, the models of corporate risk management were introduced, which is a decision-making system. Due to this, most companies were able to get readily developed action plans for circumstances under uncertainty or risk. In general, and until today, risk culture plays an important role in corporate management.

Far more difficult is analyzing the situation with risk culture at the level of ordinary individuals and households. The existence of a centrally planned economy a priori has not acknowledged the possible existence of risk or uncertainty. All spheres of life and fields of economy had formed centralized plans (usually five years). The redistribution of funds was held in accordance with a defined plan. Household incomes were clearly regulated by central

authorities; money circulation was under the supervision of the state. Tools to obtain additional income for individuals were also limited and defined by the state. In fact, individual life under those conditions corresponded to identified stereotypes in society. It created the appearance of a strong financial and social stability, which was provided not by a national wealth of the state but with central planning and regulation.

Such a system of relations formed a hierarchy of values in which the flow of financial resources was deprived of any risky nature. According to Gigerenzer, people tend to fear what the environment fears (GIGERENZER 2015, p. 81). In an example of post-Soviet countries, we can see how risk culture has evolved in terms of societal transformation. According to behavioral finance theory, there are always personal deviations in the process of assessing the actual condition, which leads to irrational decisions. Recent studies indicate that the evaluation process includes myths, illusions, aberrations, and cognitive inclinations (CZAPIŃSKI 2000, p. 202). The uncertainty of decision-making conditions causes changes in the border between the rational and irrational. The latest economic crisis in 2008–2009 clearly focuses on the psychological anomalism of investment decisions. Investors are said to be euphoric or frenzied during booms or panic-stricken during market crashes: "In both booms and crashes, investors are described as blindly following the herd like so many sheep, with no minds of their own" (SHILLER 2015, p. 94).

## Empirical research in the form of a Russian trust company; the case of MMM

In 1994, in some post-Soviet countries, the activity of a trust company "MMM" was selected for an empirical evaluation at the level of the cognitive factor's influence on decision-making. Despite the fact that 20 years have passed, the effects that were found in the behavior of people are relevant today. The activities of "MMM" is an example of collective behavior of individuals under uncertainty. The only way to estimate the probability of losses was through personal subjective judgments based on limited information. Today it is recognized as one of the largest pyramid schemes in the history of Eastern Europe. Even the Federal Reserve System of the United States of America issued shares of "MMM" upon order (MAVRODI 2007, p. 68).

In 1992, in Russia (and later in other post-Soviet countries), the trust company "MMM" was founded. The main objective of the company was the trust management of shareholder contributions. Shares could be purchased at specific points of sale. The nominal value was 1000 rubles. Twice a week, the share prices were announced. It should be noted that the determination and

announcement of the value of shares was carried out under the direction of the company (self-quotes). The promised investment yield was 7000% in six months (CARVAYAL et al. 2009, p. 7). To clarify the situation, the interest rate on bank deposits in 1994 was 190% per annum and the inflation rate was 215%.

Based on existing economic and sociological observations, which were performed in 1994, it is possible to qualitatively describe the connection between an individuals' response to the changing situation with the trust company "MMM" and the effects that occurred (ZOTOVA 1994, p. 32–40).

The first phase of "MMM" was that the market value of the shares was, 1,600 rubles, yield – 100% per month; during the first stage, the demand was growing rapidly. The risk of non-receipt of funds for investors at this stage was subjectively assessed as minimal. A constant increase of customers provided the stability for payouts. From the standpoint of rational judgment, a decision must have been based on Hawley's principle, in which the higher the potential reward is expected to bring from a particular investment, the higher must be the risks associated with it, and therefore the higher likelihood that the investment can bring a loss.

The second phase was that the Ministry of Finance announced that such a high yield on shares of "MMM" had no economic basis; this caused panic among investors and a rapid sale of shares. Consequently, the price of shares on the secondary market was 2/3 of the officially announced price. Investors had overestimated the risk, which led to a significant increase in those wishing to quit the game at this stage, with a defined amount of money. The weight of subjective risk had increased.

The third phase was to correct the unfavorable situation. The company "MMM" decided to increase the stock's yield by 2,000 rubles every week. This caused changes in the weight of risk and profitability; the number of participants in the game grew rapidly.

The fourth phase included government information about high-risk investments and problems in the company. Shares of "MMM" caused panic on the stock market, and this reduced stock prices by 100-fold. Nevertheless, private investors had not sold shares in the hope of a change and due to high trust in the company. At this point, a number of effects were released: loss aversion, excessive self-confidence, trust, and uneven situation assessment. People gave more weight to their own aspirations and information on risk than the information on the risk of bankruptcy. This confirms the thesis of SLOVIC (1987, p. 280–285), that people do not necessarily follow the rational economic theory of decision making, thus suggesting that other variables play important roles in determining the willingness to take risks. The nature of risk and how it is perceived makes it the main component in how people make decisions, and it affects the courses of action they choose.

The fifth phase was that the company stopped pay outs and declared bankruptcy. According to expert observations, the consequences of the market activities of MMM were financial losses of $110 million for 15 million people.

*Representation* is the first criterion for analysis of subjective risk assessment. In our opinion, the principle of representativeness appeared at the macro level: individuals perceived the emergence of financial instruments in free circulation as changes in economic regimes. It is known that the early 1990s was a difficult period of transition from a planned economy to a market economy. Changes have taken place both at the macroeconomic level and at the level of societal consciousness. There was a significant difference in the living standards of the Soviet Union and Western Europe and the USA. The ordinary inhabitant of the former Soviet Union had a preconceived notion of unlimited possibilities of a market economy, freedom of enterprise and rapid earnings. Therefore, the emergence of the trust company, which was associated with market principles, was accepted as a new norm of life. Such false judgments (based on representativeness) can be observed in every major change of the socio-economic model of society.

Based on the observation of the investment behavior of people under risk in 1994–1995, the research group "Circon" has introduced some specific effects of decision making under uncertainty (RADAEW 2002, p. 58):

– Judgment instability that is under the influence of public opinion becomes irrational; under complete uncertainty, individuals behave contrary to the model of "homo economicus", because they are looking for additional information in society to limit uncertainty. Kępinski calls this process "information metabolism" (MISZCZYŃSKI, TARNOPOLSKI 2005, p. 12).

– The addictive effect of the financial game; despite a change in the form of the game, the rules, and the length of the game cycle, induced individuals to invest again; even after having negative previous experiences.

*Value function formation*. In this situation, it was important to form individual risk perception thresholds, the point where the risk criterion was higher than the benefits of participation in the financial game. In practice, this point can quantitatively describe the moment of the stock price decline (it had reached a predetermined unacceptable price – for example 500 rubles, 1,000 rubles) or a point of suspension or completion of the game.

Under the influence of an addictive effect, the individual risk perception threshold was being changed. After each sharp collapse in share prices, the limit for risk aversion was increasing but, over time, individuals psychologically acclimated to the given situation. Their own subjective value of the share price was growing even faster. Thus, with a slight increase in the share price of 3–3.5 times, individuals increased their own expected utility by more than 100 times. As shown in Figure 2, at the beginning of the financial game on January 21, 1994, the share price was set at 225 rubles. At the same time,

investors agreed on a maximum price threshold of 450 rubles. Later, the ratio was changing disproportionately: at an official rate of 300 rubles / maximum price threshold – 1,000 rubles; 330 rubles/9,000 rubles; 740 rubles/50,000 rubles. This demonstrates that individuals greatly overestimated the expectations from buying the shares. This situation had no economic basis, as the official price growth was slow. That was the subjective value of the accumulation of individual feelings, expectations, and collective action.

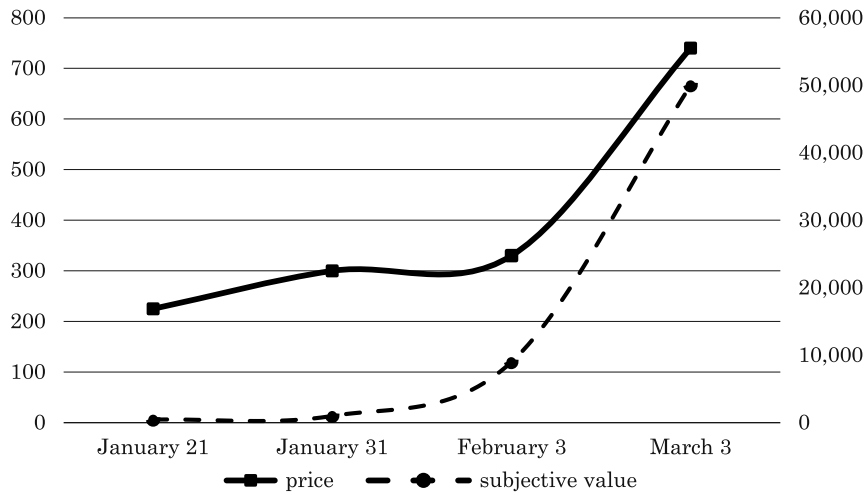


Fig. 2. Changes in price and the subjective value of MMM shares in 1994, thousands of rubles
Source: RADAEW (2002, p. 57).

*Overconfidence.* Overconfidence in judgments can at times influence people to believe that they know when a market move will take place, even if they generally believe as an intellectual matter that stock prices are not forecastable (SHILLER 2015, p. 172). According to a survey of the financial game participants, 70% were aware of the risk of investments. The mechanism of formation and distribution of financial resources was known (ZOTOVA 1994, p. 36). It can be concluded that the subjects took the high risk because they were confident in the possibility of obtaining high dividends. The role of excessive self-confidence of individuals in the process of risk assessment is seen in the work of Kindleberger and Aliber, "Manias, Panics and Crashes: A History of Financial Crises". The author describes the general model of the financial bubble, which is caused by widespread excitement among inexperienced investors which come into the market in the hope of a quick profit and then panic when it becomes clear that expectations were wrong (KINDLEBERGER, ALIBER 2005, p. 28–32). The mechanism of trust in "MMM" was similar to a story about a Thanksgiving turkey by Taleb (established by Bertrand

Russell). During its lifetime the turkey is constantly being fed, with each passing day, the likelihood of survival is increased. The turkey could conclude that it is in a winning situation. However, in spite of the existing theoretical reliability, the day of its death is already determined (TALEB 2012, p. 93). This is similar to the definition of risk in investing in a financial pyramid. Individuals within a certain period receive payments (dividends). On this basis, they have formed the view that the operation will always bring benefits. However, by its nature, a pyramid scheme is ultimately doomed to failure. Only the time of its occurrence is uncertain.

*People tend to accept the risk in case of incurring losses*. This can be partly explained by the fact that the financial game passed seven complete cycles. After each bankruptcy, contrary to the idea of rational behavior, people were again buying shares of "MMM" with the hope that it is possible to recover lost funds. The investment process in "MMM" passed all the classic stages that are defined in the theory of financial behavior for the game cycle (KINDLEBERGER, ALIBER 2005):

– Stage of rational investment (individuals were taking rational decisions and were forming a strategy for future behavior based on the initial conditions) – first phase of high benefits;

– Stage of euphoric participation of people (appears during the price increase) – this stage is illustrated in Figure 2: investors significantly increased their financial expectations of share price;

– Stage of panic – the second stage of the company "MMM";

– Stage of collapse and depression – the fifth stage of bankruptcy.

However, in the case of the "MMM" example, there was a deviation from the classical scheme of the game cycle as a stage of panic was replaced by the induced euphoria that pushed investors to the acceptance of the risk.

According to a survey conducted among 426 MMM shareholders in 1994, 60% confirmed that the promised interest could not be earned a priori (ZOTOVA 1994, p. 37). Therefore, the criterion of maximizing the utility from winning while individuals were making the decision to participate in the financial game was not singular. Beyond the promised high interest on deposits, a multi-constellation of socio-economic, political and cultural factors was held.

According to survey results, 45% of participants did not consider themselves deceived investors, and that they consciously accepted the terms of the game and the existing risk (ZOTOVA 1994, p. 37). One can say that the overall collective agreement allowed for a certain level of fraud. It is suggested that business people accept deception as part of most economic transactions and it is often justified by those engaged in it (CARR 1968). This means that the lack of financial literacy was not a major factor in the decision to participate in the financial game. Most investors have shown an increased propensity to risk. Each gain predetermined the increase in risk appetite.

*The unevenness of information assessment.* Individuals tend to give greater weight to the positive information that confirms their judgment than the information that denies it. For the most part, this is typical of inexperienced investors. Individuals need only emphasize the positive news and give less emphasis to the negative (SHILLER 2015, p. 67). It is considered that the information has a positive value to the individual if it causes a positive emotional condition (pleasure, luxury, curiosity) and is also expected. Negative information (negative emotion conditions) causes a fear of losses. Mechanisms of its estimation are different due to not only social and cultural factors but also to a biological structure. Recent studies show that there are independent centers for the evaluation of positive and negative information in the brain, which are called the centers of reward and punishment (KOZIELECKI 2000, p. 199). The Ministry of Finance's uneven information assessment of the danger of investments in shares of "MMM" (fourth stage) in 1994 caused most investors to not sell the shares and keep them with the hope of future earnings. Negative information about possible financial problems of "MMM" was not evaluated rationally. Moreover, the heuristic effect was reinforced by collective action because individualism was not characteristic of the post-Soviet society. Considering that the technological capabilities of the information transmission were very limited, interpersonal communication was very developed. The collective organization of society contributed to the unification of decisions on financial transactions with the shares of "MMM".

*Availability heuristics.* People may have a better understanding of financial concepts when they are confronted with them in their daily lives. The importance of experience is observed in countries that saw periods of hyperinflation. Thus, according to a survey by Standard and Poor's, perception and understanding of the mechanisms of inflation are higher in Argentina and Bosnia and Herzegovina compared to the average level in the world. This is because these countries had experienced hyperinflation in the late 1980's and early 1990's (KLAPPER et al. 2015, p. 11). In summary, this regularity can be extended to all significant economic recessions. That is, individuals having a previous negative experience with investment funds should in the future be guided by acquired associations. In the trust company situation, the availability principle appeared through the mass distribution of information about large payments. During 1992 to 1995 an extensive marketing campaign was performed (it attracted famous artists and prominent figures of the nation to advertise "MMM"). Moreover, in the first stage the dividends had actually been paid appropriately, so some participants who were at the higher levels of the pyramid were an example of probability. Thanks to the spread of positive information in society, the number of those wishing to become shareholders of "MMM" proportionally increased. Thus, the frequency of dividend payment assessment was distorted under the influence of the excessive subjective

weight of positive information. In our opinion, the error in assessing the probability of bankruptcy during the fourth stage of the "MMM" example was also caused by availability heuristics. Due to the proper manipulation of increasing stock prices in the third stage, the company actually nullified the risk assessment for investors, and eliminated previous negative emotions related to the loss. A significant decline in trust and in prices was artificially supported by increased self-quotation. This caused massive ignorance toward official warnings about the possibility of a "MMM" bankruptcy during the fourth stage, because people were comparing it to the previous stage. Greater weight was given to previous experience and associations about the revenue.

However, this pattern has exceptions. In 2011, an organization named "MMM" appeared once more in the market, which offered a yield of 20% to 60% monthly. In 2012, a return on investment was promised at the level of 30–75%. During 2011–2012, 35 mln people had funds invested. Pay outs stopped unexpectedly and the company announced their closure. In our opinion, the transfer of a negative experience into society has a limitation period: a change of generations updates the paradigm of risk and the concept of negativity. Here one can refer to Ulrich Beck who explained the change in the perception of risk influenced by the industrialization of society (BECK 1992). The range of accepted risks increases: the perceived uncontrollable risk of 100 years ago may currently be the norm. Some of the reasons that situations of irrational risk assessment appeared, particularly when making investment decisions, is the financial awareness and literacy of people. Research conducted by the rating agency Standard & Poor's shows the level of financial literacy in Eastern Europe: 38% of the Russian population can be considered as financially literate, in Ukraine – 40%, in Slovakia – 41%, in Poland – 42%, in Lithuania – 39%, in Latvia – 48%, in Hungary – 54%, in Estonia – 54%, in Belarus – 38%. By comparison – in Denmark, Norway and Sweden – 71%, in Canada and Israel – 68% (KLAPPER, LUSARDI 2015). This shows that most people take financial decisions with below average knowledge. This, in our opinion, is one of the factors that affect the proper assessment of risk under uncertainty[1]. Of course, there will always be a percentage of people, who tend to take high risk. It can be considered a natural tendency for risk taking (as well as the existence of natural unemployment), but most of the investors became participants of the pyramid scheme influenced by heuristics.

[1] It should be noted that the level of education affects the accuracy of risk assessment under uncertainty, however, according to the results of a social survey, the level of education is inversely affect the riskiness of individuals. Less risk appetite show people with education below average and those with higher education accept higher risks involved in investments (Issledovatelskaja gruppa Cirkon. 2011, p. 40).

## Conclusions

The theory of analysis of the economic behavior of individuals under conditions of risk and uncertainty evolved from a purely objective approach to a modern subjective experience. The shift of attention to cognitive factors is due to the fact that the decision-making environment becomes more complicated, modernized, and informed. Classical approaches to risk assessment do not meet the needs of today's society because information volumes are increasing and require fast decisions. This reduces the value and completeness of conclusions drawn based on purely mathematical instruments.

As shown by this study, the mechanism of risk assessment and decision-making is not sustainable and is influenced by the environment. This is particularly illustrated by post-Soviet countries during the socio-economic transformations. Specifically, the problem of subjective risk assessment showed itself during the financial activity of the "MMM" trust company in 1994. A strengthening of behavioral effects when making investment decisions has been a compilation of cognitive, social, cultural, economic and political factors. There was a transition from collectivism to individualism in public relations; the economy was shifting from a planned system to a free-market system. Based on this, the specific risk perception was formed: underestimation of the high probability of bankruptcy and overstatement of income expectations. The study shows that the individual's financial behavior under the conditions of economic transformation has changed. That confirms the theory that behavior depends on different factors and is not stable in a transformation economy. The results could also be useful for financial lessons in countries that are facing transformation at the moment. Based on this conclusion, we can look from a new perspectives at investor behavior in post-soviet countries.

Further research should be focused on the identification of national cultures of risk. The level of accepted risk under uncertainty is the conditional limit, which is determined by society. This is confirmed by the re-establishment of the trust company "MMM" in the 21st century and great attention should be paid to it by the people. Considering the fact that the important preconditions for building an adequate risk culture are education, literacy, and human consciousness; it is important to take into account these factors in analyzing the decision-making process.

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# AN ASSESSMENT OF THE INFLUENCE OF THE NUMBER OF MICRO-ENTERPRISES ON THE UNEMPLOYMENT RATE IN POLAND WITH THE USE OF PANEL MODELS

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K e y w o r d s: micro-enterprise, unemployment, panel model.

A b s t r a c t

Small and medium-sized enterprises, in particular, micro-enterprises play an important role in generating gross value added as well as in job creation. The objective of the study is to evaluate the dependence between the number of micro-enterprises and the rate of unemployment in particular provinces in Poland in the years 2004–2014. The paper includes an analysis of cross-sectional and time series data using panel models. The conducted analysis showed that, as expected, a negative relationship exists between the number of micro-enterprises and the unemployment rate.

## OCENA WPŁYWU LICZBY MIKROPRZEDSIĘBIORSTW NA STOPĘ BEZROBOCIA W POLSCE Z ZASTOSOWANIEM MODELI PANELOWYCH

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S ł o w a k l u c z o w e: mikroprzedsiębiorstwo, bezrobocie, model panelowy.

A b s t r a k t

Małe i średnie przedsiębiorstwa, w tym szczególnie mikroprzedsiębiorstwa, odgrywają istotną rolę w wytwarzaniu wartości dodanej brutto oraz tworzeniu miejsc pracy. Celem opracowania jest ocena zależności między liczbą mikroprzedsiębiorstw a stopą bezrobocia w poszczególnych województwach w Polsce w latach 2004–2014. W opracowaniu przeanalizowano dane przekrojowo-czasowe za pomocą modeli panelowych. Przeprowadzona analiza wykazała, że – zgodnie z oczekiwaniami – występuje ujemna zależność między liczbą mikroprzedsiębiorstw a stopą bezrobocia.

## Introduction

The share of entities from the sector of small and medium-sized enterprises in generating gross value added in the 28 European Union member states is at a level close to 58%. This proportion in Poland is slightly lower and fluctuates around 50% (HUTERSKA et al. 2015, p. 615). However, it is extremely important. According to the Central Statistical Office, in 2014 small and medium-sized enterprises accounted for 99.8% of the total of non-financial companies operating in Poland, and the participation of micro-enterprises amounts to 95.8% (*Działalność przedsiębiorstw niefinansowych* 2015). Participation of small and medium-sized enterprises in the generation of GDP is also significant. In 2012, it reached the level of 48.5%, and micro-enterprises had the largest share (30%) in the generation of GDP (ŁAPIŃSKI et al. 2015, p. 15).

The Act of July 2, 2004 on the Freedom of Economic Activity (Ustawa z 2 lipca 2004 r. o swobodzie działalności gospodarczej, DzU z 2004 r., nr 173, poz. 1807, as amended) defines a micro-enterprise (in Article 104) as an enterprise which in at least one of the last two financial years employed on average up to nine employees and generated an annual net turnover from the sale of goods, products, services, and financial operations not exceeding the PLN equivalent of 2 million euros, or its total assets in one of the last two financial years did not exceed the PLN equivalent of 2 million euros.

Micro-enterprises in the main (*i.e.*, 98.1%) are owned by individuals. Given the possibility of obtaining financing from EU funds for individuals starting business activity, as well as tax relief in the first years of this activity, microenterprises are a way to create a place of work for job seekers (*Działalność przedsiębiorstw niefinansowych* 2015, p. 29).

Due to the important role played by this type of enterprise in the economy, the article attempts to examine the dependence between the number of entities defined as micro-enterprises and the rate of unemployment in particular provinces in Poland.

The research objective of this study is the assessment of the influence of the number of micro-enterprises on the unemployment rate in individual provinces in Poland. The research method is an analysis of cross-sectional and time series data using panel models. The study employed data published by the Central Statistical Office on unemployment and the number of micro-enterprises in Poland by province for the time period 2004–2014.

## Methodology

In this paper, panel models were used in analyzing cross-sectional data. In the subject literature, panel data are usually related to cross-sectional

and time series data (*Ekonometria współczesna* 2007, p. 409). According to G.S. Maddala, panel data are the data "with which we deal when we have the information on specific cross-sectional units covering a longer period of time (of more than one period)" (MADDALA 2006, 2008, p. 643). T. Kufel interprets panel data as data "which can be observed in at least two dimensions" (KUFEL 2007, p. 164) and he points to cross-sectional and time series data as the best example. In B. Dańska-Borsiak's opinion, panel data constitute a particular type of time-series-cross-section data in which the number of objects $N$ exceeds (sometimes to a great extent) the number of points in $T$ (DAŃSKA-BORSIAK 2011, p. 14).

Panel data are categorised into balanced and unbalanced panels (*Ekonometria współczesna* 2007, p. 410). The balanced panel is the information on a constant group of items (such as, for instance, countries, regions, industries, businesses, households, etc.) throughout the period analysed. If a group of items in the period under consideration is subject to change (*i.e.,* further new items are added, or certain items are removed), then we deal with the unbalanced panel.

Models based on panel data (*i.e*., panel models) allow a description of the dependence between economic phenomena in both time and spacial dimensions. These models take into account national, regional, or industry differentiation over time. The results of empirical studies based on these models are an important source of information for economic decision-makers (individuals and institutions).

The examined items are affected by two types of factors (*Ekonometria współczesna* 2007, p. 410):

– factors affecting all the tested items equally,
– factors affecting individual tested items in a specific manner.

For the purpose of estimating panel data models, the following can also be applied:

– ordinary least squares estimator (OLS),
– fixed effect estimator (FE),
– random effect estimator (RE).

The OLS estimator is used when all the items included in the study are homogeneous and the differences between the empirical and theoretical values of the dependent variable are only a consequence of the random component (*Ekonometria współczesna* 2007, p. 410).

The FE and RE estimators are used in case of sample heterogeneity. The source of sample heterogeneity is individual effects. The FE estimator assumes that individual effects are non-random and can be estimated. However, in the case of the RE estimator it is assumed that individual effects are random and they form part of the random component. In this case, the individual effects

cannot be estimated, only their dispersion can be estimated (*Ekonometria współczesna* 2007, p. 411–416, DAŃSKA 1995, p. 4).

When choosing the panel model (a simple model, *i.e.*, without individual effects or models with one-way individual effects, *i.e.*, FEM – fixed effect model, or REM – random effect model) the following tests are used: the Wald test, the Breusch-Pagan test, and the Hausman test. These tests allow the correctness of the estimated model to be evaluated. A discussion of these tests can be found in an abundance of econometric literature (KUFEL 2007, p. 166, 170–171, MADDALA 2006, 2008, p. 649–650, *Ekonometria współczesna* 2007, p. 416–418).

## Empirical Results

In order to describe the dependence between the number of micro-enterprises and unemployment in Poland, a panel model was used in this study. Data were collected for 16 provinces in Poland, and they relate to a period of 11 years (annual data for 2004–2014). The study used data published by the Central Statistical Office in its reports entitled "Financial companies" and "Unemployment". The study concerns the 2004–2014 time period.

Let the following be:

$y_{it}$ – the unemployment rate in the $i$-th province in $t$ period (shown as %),
$x_{it}$ – the number of micro-enterprises in the $i$-th province in $t$ period,
$i$ – the number of the province ($i = 1, 2, ..., 16$),
$N$ – the total of the provinces ($N = 16$),
$t$ – the number of the period ($t = 1, 2, ..., 11$).
$T$ – the total of the periods ($T = 11$).

A simple panel model (without individual effects), estimated by means of OLS takes the following form:

$$\hat{y}_{it} = 17.981 - 0.000031x_{it} \qquad (1)$$
$$(0.542)\ (0.00000435)$$

The sum of the squared model residuals is $\sum_{i=1}^{16}\sum_{t=1}^{11} e_{it}^2 = 2{,}544.928$. The determination coefficient $R^2 = 22.6\%$. This result indicates a rather low level of explanation of the formation of the endogenous variable estimated by the simple model.

Table 1 shows the average values of the unemployment rate in each of the provinces. Noticeable differences concern the constant value estimated for all panel data (see model 1).

Table 1

The average unemployment rates in individual provinces in Poland (data for 2004–2014)

| Province | Average unemployment rate (in %) |
|---|---|
| Dolnośląskie | 14.21 |
| Kujawsko-Pomorskie | 17.08 |
| Lubelskie | 14.33 |
| Lubuskie | 16.74 |
| Łódzkie | 13.85 |
| Małopolskie | 10.89 |
| Mazowieckie | 11.55 |
| Opolskie | 14.75 |
| Podkarpackie | 16.05 |
| Podlaskie | 13.53 |
| Pomorskie | 13.66 |
| Śląskie | 11.11 |
| Świętokrzyskie | 16.63 |
| Warmińsko-Mazurskie | 21.65 |
| Wielkopolskie | 10.11 |
| Zachodniopomorskie | 19.24 |

Source: elaborated by the authors based on *Liczba bezrobotnych zarejestrowanych...* (2016).

A model with fixed effects (FEM), estimated by OLS takes the following form:

$$\hat{y}_{it} = 29.272 - 0.000138x_{it} \tag{2}$$

$$(4.0246)\ (0.0000381)$$

The sum of the squared model residuals is $\sum_{i=1}^{16}\sum_{t=1}^{11} e_{it}^2 = 1{,}552.313$.

Table 2 shows the estimates of individual fixed effects for specific provinces.

Table 2

The estimated individual fixed effects for specific provinces

| Province | Evaluations of individual effects (in %) |
|---|---|
| Dolnośląskie | 32.28 |
| Kujawsko-Pomorskie | 28.21 |
| Lubelskie | 24.21 |
| Lubuskie | 22.70 |
| Łódzkie | 29.61 |
| Małopolskie | 31.78 |
| Mazowieckie | 50.35 |
| Opolskie | 19.69 |
| Podkarpackie | 25.17 |
| Podlaskie | 19.27 |
| Pomorskie | 28.99 |
| Śląskie | 38.80 |
| Świętokrzyskie | 22.87 |
| Warmińsko-Mazurskie | 28.90 |
| Wielkopolskie | 33.67 |
| Zachodniopomorskie | 31.85 |

Source: elaborated by the authors based on *Małe i średnie przedsiębiorstwa...* (2015), *Liczba bezrobotnych zarejestrowanych...* (2016).

The estimated (generalized least squares – GLS) form of the model with random effects (REM) takes the following form:

$$\hat{y}_{it} = 18.514 - 0.000036x_{it} \qquad (3)$$

$$(0.000)\ (0.00000914)$$

The sum of the squared model residuals is $\sum_{i=1}^{16}\sum_{t=1}^{11} e_{it}^2 = 2{,}564.66$.

Table 3 shows the results of the Wald, Breusch-Pagan, and Hausman tests based on which the decision to choose the right model was made. These tests allow verification of the assumptions with regards to the correctness of the panel model estimation.

Table 3

The results of the Wald, Breusch-Pagan, and Hausman tests

| Test | Hypotheses | Test statistic | $p$ value | Decision* |
|---|---|---|---|---|
| The Wald's test | $H_0$: the homogeneous model constant terms, independent of the item and time (OLS estimator)<br>$H_1$: the heterogeneous terms for individual items, but constant over time (FE estimator) | $F = 6.7781$ | $p \approx 0.000$ | Rejection of $H_0$ |
| The Breusch--Pagan's test | $H_0$: the variance of the random component of individual effects insignificantly differs from zero (OLS estimator)<br>$H_1$: the variance of the random component of individual effects significantly differs from zero (RE estimator) | $LM = 76.9538$ | $p \approx 0.000$ | Rejection of $H_0$ |
| The Hausman's test | $H_0$: both FE and RE estimators are unbiased (RE estimator is more effective)<br>$H_1$: FE estimator is unbiased but RE estimator is biased (FE estimator) | $\chi^2 = 7.2221$ | $p \approx 0.00545$ | Rejection of $H_0$ |

* The adopted level of significance is 0.05 (*i.e.*, $\alpha = 0.05$).
Source: elaborated by the authors based on the data contained in Tables 1 and 2.

Analysing the results of the Wald test, it can be stated that the appropriate model to describe the dependence between the number of micro-enterprises and the unemployment rate is the fixed effects model (FEM). The results of the Breusch-Pagan test indicate the random effects model (REM) is the better model. Finally, the results of the Hausman test allow the authors to conclude, assuming risk error at a 0.05 level ($\alpha = 0.05$), that the appropriate model for describing the examined dependence is the fixed effects model (FEM); which is model (2).

In the next section, the study presents the interpretation of the evaluation of the parameters of the fixed effects model. The differences between the estimates of the individual effects and the average unemployment rate in specific provinces are very helpful in the interpretation of the individual effects. They are presented in Table 4.

Table 4
The differences between the evaluations of the individual effects and the average unemployment rate in the surveyed provinces

| Province | Difference |
|---|---|
| Dolnośląskie | 18.07 |
| Kujawsko-Pomorskie | 11.13 |
| Lubelskie | 9.88 |
| Lubuskie | 5.96 |
| Łódzkie | 15.75 |
| Małopolskie | 20.89 |
| Mazowieckie | 38.79 |
| Opolskie | 4.95 |
| Podkarpackie | 9.13 |
| Podlaskie | 5.75 |
| Pomorskie | 15.33 |
| Śląskie | 27.69 |
| Świętokrzyskie | 6.25 |
| Warmińsko-Mazurskie | 7.25 |
| Wielkopolskie | 23.56 |
| Zachodniopomorskie | 12.61 |

Source: elaborated by the authors based on the data contained in Tables 1 and 2.

The evaluation of the parameter of the explanatory variable (-0.000138) is interpreted as follows: if the number of micro-enterprises increases by one enterprise, then the unemployment rate (due to the increase) falls on average by 0.000138 of a percentage point. The interpretation of the evaluation of the individual effect of the Dolnośląskie province (see Tables 1, 2 and 4) is as follows: if there are no micro-enterprises in the Dolnośląskie province, then the average annual unemployment rate in this province is 32.28%, and is higher than the real annual average unemployment rate for this province by 18.07 of a percentage point. A similar interpretation is given for the remaining evaluations of individual effects.

## Conclusion

The analysis confirmed the existence of a negative dependence between the number of micro-enterprises and the unemployment rate. It can also be stated that the greatest influence of the number of micro-enterprises on the unemployment rate can be observed in the following provinces: Mazowieckie,

Śląskie, and Wielkopolskie, and that these are highly urbanized and industrialized provinces. The lowest effect, in turn, can be noted in the Opolskie, Podlaskie, and Lubuskie provinces.

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# SPATIAL VARIATION OF PUBLIC-PRIVATE WAGE DIFFERENTIALS[1]

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K e y w o r d s: public-private wage differentials, public-sector wage premium, control function, spatial differences in wages.

A b s t r a c t

The aim of this paper is to estimate the adjusted sectoral wage gap in Poland and to examine its spatial differences in terms of the size of settlement units. In particular, a hypothesis that there is a negative relation between the public-sector wage premium and the size of a settlement unit is tested. We use a set of individual data from the representative survey *Human Capital Balance* (BKL) carried out in Poland for the period from 2010 to 2014. We apply the control function approach (both with homogeneous and heterogeneous impacts) to address the problem of selection mechanism. We show that, after controlling for structural differences in employment, generally there is a moderate positive premium related to public employment. However, this premium differs between types of settlement units, with public employment being most attractive in medium-sized cities. This may pose a challenge for the public sector regarding attracting highly qualified employees in the biggest cities. As a consequence, the efficiency of public-sector services provision (education, healthcare, administration) may be seriously threatened.

## ZRÓŻNICOWANIE PRZESTRZENNE RÓŻNIC W PŁACACH MIĘDZY SEKTOREM PUBLICZNYM A PRYWATNYM

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S ł o w a k l u c z o w e: różnice w płacach między sektorem publicznym a prywatnym, premia płacowa z zatrudnienia w sektorze publicznym, funkcja sterowania, przestrzenne zróżnicowanie wynagrodzeń.

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Abstrakt

Celem opracowania jest oszacowanie skorygowanej sektorowej luki płacowej w Polsce oraz zbadanie jej przestrzennego zróżnicowania ze względu na wielkość jednostek osadniczych. W szczególności jest testowana hipoteza, że istnieje negatywna relacja między wielkością premii płacowej z zatrudnienia w sektorze publicznym a wielkością jednostki osadniczej. W pracy wykorzystano dane jednostkowe pochodzące z badania *Bilans kapitału ludzkiego* (BKL), które przeprowadzono w latach 2010–2014. Aby rozwiązać problem nielosowej selekcji do sektora, zastosowano metodę funkcji sterowania (zarówno w wersji zakładającej wpływ homogeniczny, jak i heterogeniczny). Wykazano, że po uwzględnieniu różnic w strukturze zatrudnienia na ogół występuje umiarkowana dodatnia premia związana z zatrudnieniem w sektorze publicznym. Premia ta różni się jednak między typami jednostek osiedleńczych. Zatrudnienie w sektorze publicznym jest najbardziej atrakcyjne w średnich miastach. Zjawisko to może stanowić wyzwanie dla sektora publicznego w aspekcie przyciągania wysoko wykwalifikowanych pracowników w miastach największych. W konsekwencji efektywność zapewnienia usług sektora publicznego (edukacji, służby zdrowia, administracji) może być tam poważnie zagrożona.

## Introduction

Among the European Union economies, Poland is a country with a relatively high share of public-sector employment (ILO 2016). Despite the dynamic development of private economic activity during the process of economic transition, almost a quarter of jobs in Poland are still generated by the public sector. In the first quarter of 2016, there were almost 3.8 million individuals employed in public institutions or state enterprises (*Aktywność ekonomiczna ludności Polski* 2016a). Yet the role of the public sector in labour market performance exceeds its borders. One of the most important channels through which it impacts other areas of the national economy is the wage-setting process. The evolution of public-sector wages is important for the equilibrium of public finances, the inflation rate and other macroeconomic variables.

It is a long-run regularity, observed in many countries, that the average wage in the public sector exceeds that in its private counterpart. However, it would not be correct to simply conclude that any individual stands to earn more once employed in the public sector rather than in the private. The difference in average wages may be to a large extent explained by reference to differences in the personal characteristics of earners that are relevant to the labour market (e.g., level of education, experience, occupation, etc.). The public sector employs persons that are, on average, older, have higher levels of education and have greater firm-specific job experience (longer job tenure) than the average private sector employee. Moreover, there are several theoretical explanations for why wages may also depend on employer characteristics such as industry, firm size or profitability. Since the structure of both ownership sectors differ in these aspects, such explanations may also apply to intersectoral wage differentials.

The objective of this paper is to examine spatial differences of the public--private wage gap in Poland in terms of the size of settlement units. In particular, a hypothesis that there is a negative relation between the public--sector wage premium and the size of a settlement unit is tested. We use a fairly comprehensive collection of data taken from the *Human Capital Balance* (BKL) carried out in Poland for the period from 2010 to 2014. The main advantage of this data set in the context of our study is its classification of settlement units, which is more detailed than that of Labour Force Surveys (LFS).

As for methodology, we apply the control function approach (both with homogeneous and heterogeneous impacts) to address the problem of selection mechanism. We show that, after controlling for structural differences in employment, there is generally a moderate positive premium related to public employment. However, this premium differs between types of settlement units, with public employment being most attractive in medium-sized cities. To the best of our knowledge, this is the first study on the public-private wage gap in the spatial context and also the first paper applying the methodology of the control function approach with heterogeneous impacts to the problem of public-sector wage premiums in Poland.

The paper is structured as follows. First, we shortly discuss the theoretical foundations of the public-private wage differential and its spatial variation. Second, we offer a survey of the relevant literature, focusing on existing research on the Polish labour market and spatial aspects of the adjusted sector wage premium. Third, we describe the properties of the sample taken from the BKL data set and discuss differences in employment structures between the two sectors of the Polish economy in the spatial context. Finally, we report the estimates of an adjusted wage gap and its variation across different types of the settlement units. The paper ends with conclusions.

## Public-private wage differentials: theoretical background

There are a number of other potential reasons why an individual with given characteristics may earn a different wage based on employment in the private or public sector. Profit maximization is usually the main goal of private companies, while a significant portion of the public sector is focused on delivering public goods and services, realizing social and political goals or redistributing wealth. Consequently, the wage formation mechanism in the public sector is to a large extent regulated by political process, while in the private sector it is strongly determined by economic mechanisms and is subject

to efficiency criteria. Wages in the public sector are weakly correlated with workers' marginal productivity (FOGEL, LEWIN 1974), although in recent years the role of efficiency criteria have grown in the public sector (LAUSEV 2014). The wage structure in the public sector is more compressed than that in the private sector, which favours low-skilled workers and discriminates against high-skilled workers, especially managers. Both sectors are subject to principal-agent problems. Better monitoring of effort might reduce the need to pay more across all employees, but in the public sector it is not always clear who should play the role of principal (BEBCHUK, FRIED 2004). The public sector is usually more unionized than the private, which strongly affects the wage--setting mechanism, giving more power to the labour supply side in wage negotiations.

The public and private sectors differ also in the structures of their economic activity. Public-sector wages are less closely related to the business cycle, while private sector wages seem to be strongly procyclical. As a result, public-sector relative wages are countercyclical: they increase in times of economic slump, which would justify the potential attractiveness of public--sector employment in times of economic crises (MACZULSKIJ 2013). The literature has also highlighted that public-sector wages are related to electoral cycles (BORJAS 1984).

Lastly, there are significant differences between institutions that may explain the observed empirical regularities in the wage distributions (SILVESTRE, EYRAUD 1995, ELLIOTT et al. 1999). Although many countries have implemented reforms to introduce more market-oriented mechanisms to the public sector, differences in the recruitment process, wage setting and collective bargaining coverage prevail. The public sector is characterized by strict rules of promotion and remuneration, related mainly to job tenure (MAKEPEACE, MARCENARO-GUTIERREZ 2006, BURGESS, METCALFE 1999). Lower wages can be somewhat compensated by other employment benefits, like greater job security or more flexible hours.

In many local labour markets, the public sector has monopsony power as it remains the only source of demand for workers with higher education (MUELLER 1998), which allows it to dictate wage levels. Monopsony in this context should not be understood as a situation involving only a single buyer of labour, but rather as a situation in which the supply of labour to an individual firm is not infinitely elastic. The reason for this lies in the existence of significant frictions in the labour market and the fact that, in most cases, it is employers who set wages. The barriers to labour force mobility (both in terms of qualifications and space) are the main sources of such frictions, and may result in differences between wages offered by similar employers to similar employees located in different areas.

The spatial distribution of private economic activity is to a large extent driven by mechanisms described by the new economic geography (NEG). One of the most important results described by NEG is the emergence of industrial clusters and spatial variations of wages. These are explained by reference to linkages between centripetal and centrifugal forces, especially those related to economies of scale, with certain roles played by the relational, social and contextual aspects of economic behaviour (FUJITA, KRUGMAN 2004). Public activity – given its nature – is more related to the distribution of the domestic population. As a result, it is significantly more evenly distributed over the territory of a given state, with smaller spatial variations of wages. We may then expect that public-sector wage premiums may differ between regions and between particular types of settlement units. This may lead to substantial differences in the relative attractiveness of public-sector employment and may impact the efficiency of the provision of public services, particularly in certain locations. We may thus expect that there would be a negative relation between the public-sector wage premium and the size of a settlement unit. This hypothesis is tested below.

## Review of the empirical literature on public-private wage differentials in Poland

For the majority of developed countries, evidence of positive public-sector wage premiums has been found. However, the scale of this premium varies between studies. On the other hand, research for developing countries generally reveals a negative public-sector wage premium, which seems to vanish as these countries reach economic maturity (LAUSEV 2014). Poland, similarly to other transition economies, seems to be an interesting case demonstrating the impact of institutional changes on the sectoral pay gap. Numerous studies have employed various methodological approaches in analysing this group of countries. Their results are largely inconsistent with the findings for the developed countries. The initial period of transformation is found to adversely affected the public-sector wage premium (the wage gap is estimated to be on average about 20% in favour of the private sector). With progress in the transition process, the absolute value of the wage gap decreases over time to zero, and has become positive in some countries. Several studies of the sectoral wage gap in the Polish labour market have been undertaken by Socha. In his study conducted with NEWELL (1998), based on LFS data from 1992 and the single equation estimation, a positive private sector wage premium was revealed (5.1% for men and 8.6% for women). Moreover, a study by SOCHA and WEISBERG (2002) using LFS data for November 1995 showed that human

capital was found to be a stronger determinant of wages in the private sector than in the public. A similar type of analysis was also conducted by LEHMANN and WADSWORTH (2000), ADAMCHIK et al. (2003) and NEWELL and SOCHA (2007). The fact that the private sector in Poland offers higher rewards for higher qualifications than does the public sector was also confirmed by RUTKOWSKI (1996, 1997). One of the most regularly cited papers in the literature is by ADAMCHIK and BEDI (2000). The authors applied the endogenous switching regression model in order to control a selection of public-sector employment. As an instrument, they used age and whether an individual entered the labour market before or after 1989. Their results revealed a significant public pay penalty that was particularly large for tertiary graduates. In recent years, research on public-private wage differentials in Poland has been scarce. GROTKOWSKA and WINCENCIAK (2014) used LFS data for Poland for the year 2010 to show that, despite 20 years of economic transition, the public-sector wage premium in Poland is still negative. They used a methodology similar to that of the majority of earlier studies (Mincerian wage regression), yet they addressed the problem of selection in employment (by adding a Heckman correction) and the potential variation of the premium across different parts of the wage distribution (by using quantile regression). The public-sector wage penalty was found to be particularly strong for women, young people and those with higher levels of education.

Although there has been some research on the spatial variation of public--private wage differentials, this has mainly concerned regional dimension and highly developed countries. DELL'ARINGA et al. (2007) showed that significant differences exist in public-private wage differentials across Italian regions, and that this can be partly explained by reference to local labour market conditions affecting the private sector and only marginally the public sector. GARCIA-PEREZ and JIMENO (2007) used data from the European Community Household Panel for the period from 1995 to 2001 to show that there are sizeable public-sector wage differences among Spanish regions. Moreover, regional differences in public-sector wage gaps vary across gender, educational levels and occupations. Additionally, they display a positive correlation with regional unemployment, while correlating negatively with regional labour productivity. MEURS and EDON (2007) analysed the spatial variation of the public-sector wage premium for France. Using standard methods of estimation and geographically-weighted regressions for 2002, they showed that the average public-private wage differential does not differ widely across regions. However, quantile regressions estimated by region revealed that the pattern of public wage premiums varies according to gender and skill. According to our best knowledge, analysis of this kind has not yet been performed for Poland.

## Data source and econometric strategy
## Data description

The data source used in our study was the general population survey realized in one of the largest studies of the labour market in Central and Eastern Europe – BKL – carried out by the Polish Agency for Enterprise Development in cooperation with the Jagiellonian University. The surveyed population included people of working age (i.e., women aged 18-59 and men aged 18–64) living in Poland at the time of the study. The sample was drawn from the Universal Electronic System for Registration of the Population (i.e., the PESEL register). The sample was stratified and proportional. The strata were based on the division of the sample into subregions (NUTS3) according to GUS and the classes of settlement units. Additionally, for every independent region, the stratification of the drawn sample encompassed the breakdown by gender and age group for individual town size classes.

In the period from 2010 to 2014, the total number of interviews equalled 88,560, out of which 52,032 interviewees were identified as working (according to LFS criteria). However, the sample used in our study included only 22,784 of these observations. Since the wage question in the survey questionnaire refers to average monthly earnings from all income sources, we decided to limit our sample to only those hired workers who declared that they had only one job at the time of the survey. Since the survey covered several years, it was necessary to deflate wages to PLN for the year 2014.

## Statistical description of the sample

Table 1 presents basic statistics on the structure of the population employed in public and private sectors in the sample used for empirical analysis. One of the most characteristic features of the public sector in Poland is its feminization. More than 61% of employees in the public sector are women. In the private sector, this share is slightly above 43%. This trend is probably related to the specific structure of economic activity in both sectors. Large portions of workers in the public sector are employed in occupations specific to non-market services (healthcare, education, administration), and these are clearly more regularly performed by women.

The public sector, on average, also employs older workers than does the private sector: the mean age of an employee in the private sector is 37.7 years, while in the public sector it is 42.9 years. The difference is even bigger when we use the median as a measure of central tendency. However, the most important area of difference between the employment structures of the public and private

Table 1

Structure of the sample: public versus private sectors

| Specification | Private sector | Public sector | Total |
|---|---|---|---|
| Gender [%] | | | |
| Men | 56.65 | 38.96 | 50.60 |
| Women | 43.35 | 61.04 | 49.40 |
| Educational level [%] | | | |
| Tertiary | 15.80 | 41.34 | 24.53 |
| Secondary vocational | 29.06 | 26.11 | 28.05 |
| General secondary | 11.68 | 8.44 | 10.57 |
| Basic vocational | 34.89 | 18.50 | 29.28 |
| Primary | 8.57 | 5.59 | 7.55 |
| Class of settlement unit [%] | | | |
| Rural areas | 37.45 | 33.41 | 36.07 |
| Towns up to 19 th. | 14.84 | 16.73 | 15.48 |
| Towns 20–199 th. | 27.84 | 30.32 | 28.69 |
| Cities 200 th. + (excluding Warsaw) | 16.54 | 16.94 | 16.67 |
| Warsaw | 3.34 | 2.59 | 3.09 |
| Occupational group [%] | | | |
| Managers | 2.90 | 2.80 | 2.86 |
| Professionals | 7.37 | 32.17 | 15.85 |
| Technicians | 9.25 | 16.09 | 11.59 |
| Clerks | 7.55 | 11.84 | 9.02 |
| Salesmen | 22.59 | 10.36 | 18.41 |
| Farmers | 1.78 | 1.38 | 1.65 |
| Craftsmen | 26.01 | 7.89 | 19.82 |
| Machine operators | 13.23 | 7.71 | 11.34 |
| Elementary occupations | 9.31 | 9.75 | 9.46 |
| Methods of job acquisition [%] | | | |
| Direct contact with employer | 46.88 | 58.35 | 50.8 |
| Family members' contacts | 33.13 | 22.29 | 29.42 |
| Advert | 6.92 | 3.45 | 5.73 |
| Job centre | 5.66 | 7.33 | 6.23 |
| Internet | 4.36 | 2.08 | 3.58 |
| School | 1.57 | 3.86 | 2.36 |
| Other | 1.47 | 2.63 | 1.87 |
| BKL edition [%] | | | |
| 2010 | 19.20 | 19.77 | 19.40 |
| 2011 | 17.98 | 18.47 | 18.15 |
| 2012 | 18.17 | 17.88 | 18.07 |
| 2013 | 21.99 | 22.42 | 22.14 |
| 2014 | 22.65 | 21.47 | 22.24 |
| Age [years] | | | |
| Mean | 37.70 | 42.88 | 39.47 |
| Median | 36.00 | 43.00 | 38.00 |
| Standard deviation | 10.97 | 10.30 | 11.03 |
| Job tenure [years] | | | |
| Mean | 7.69 | 14.44 | 10.00 |
| Median | 5.00 | 12.00 | 7.00 |
| Standard deviation | 8.01 | 10.70 | 9.57 |

Source: own calculations based on the BKL data set.

sectors is human capital. More than 40% of public-sector workers have higher education, and more than a quarter have vocational secondary education or post-secondary education. In the private sector, the largest group of workers are those with vocational education – both basic and secondary. The public--sector remains the main source of demand for higher qualifications, which is related to the specific occupational structure of its employment. In recent years, the share of craft workers and plant and machine operators has significantly decreased, accompanied by an expansion of the share of professionals. The latter is now the largest group of public-sector workers (more than 32% of the sample).

The distribution of public-sector workers among different types of settlement units is clear. The private sector is over-represented in rural areas and in Warsaw. In all other classes of towns and cities, the share of public-sector jobs is higher than average.

When we want to apply the control function methodology, we must include in the model at least one variable that is highly correlated with treatment (in our case: public-sector employment) and not significantly correlated with the outcome variable (in our case: net hourly wage). We discovered that the populations of workers in both sectors differ significantly in terms of the ways in which they found their jobs. Jobs in the public sector are more regularly found through public job intermediation (job centres), direct contacts with employers or through the assistance of schools. In the case of private employment, three channels seem to be used more often than usual: the internet, adverts and family members' contacts and acquaintances. Since the variable describing the means by which the job was found is not a significant predictor of wages, it was included in the econometric model in the selection equation.

Table 2 summarizes the basic descriptive statistics of wage distribution in both sectors in the sample. It was calculated using information on hourly declared net wage rates (only for hired workers holding just one job). A glimpse at Table 2 shows that the wage level is higher in the public sector across almost all labour force characteristics, yet the scale of the gross premium is different for particular groups of the labour force.

The average gross premium in the sample is 20.0%. The difference is significantly larger for women than for men. The average wage is higher in the public sector for all educational levels, with the exception of primary education. However, in cases of individuals with tertiary education, the averages are almost equal and the median is lower in the public sector. The same pattern may be noted in the results for occupational groups. There are significant differences in gross public/private wage rates across different classes of settlement units. The ratio is highest for small- and medium-sized cities. In Warsaw, the average wages offered in the private sector are higher than in its public counterpart.

Table 2

Wage distribution characteristics within the sample: public versus private sector

| Specification | Private [PLN] | | | Public [PLN] | | | Public/ Private ratio | |
|---|---|---|---|---|---|---|---|---|
| | mean | p50 | SD | mean | p50 | SD | mean | p50 |
| Total | 13.40 | 10.63 | 15.36 | 16.01 | 12.99 | 17.58 | 1.200 | 1.222 |
| Gender | | | | | | | | |
| Men | 14.34 | 11.69 | 17.41 | 16.85 | 13.79 | 16.69 | 1.175 | 1.180 |
| Women | 12.17 | 9.74 | 12.07 | 15.48 | 12.60 | 18.10 | 1.272 | 1.294 |
| Educational level | | | | | | | | |
| Tertiary | 19.93 | 16.56 | 25.54 | 20.06 | 16.33 | 22.91 | 1.006 | 0.986 |
| Secondary vocational | 13.15 | 11.03 | 11.61 | 13.70 | 12.50 | 7.42 | 1.042 | 1.133 |
| General secondary | 12.80 | 10.42 | 13.74 | 13.98 | 11.36 | 17.72 | 1.092 | 1.091 |
| Basic vocational | 11.86 | 10.00 | 12.90 | 12.16 | 10.11 | 13.57 | 1.025 | 1.011 |
| Primary | 11.09 | 9.38 | 9.44 | 10.51 | 8.85 | 7.26 | 0.948 | 0.943 |
| Class of settlement unit | | | | | | | | |
| Rural areas | 12.26 | 10.11 | 17.15 | 13.58 | 11.10 | 11.08 | 1.108 | 1.098 |
| Towns up to 19 th. | 12.83 | 10.59 | 13.21 | 16.41 | 12.64 | 24.97 | 1.279 | 1.193 |
| Towns 20–199 th. | 13.67 | 11.04 | 11.90 | 16.27 | 13.24 | 12.20 | 1.190 | 1.199 |
| Cities 200 th. + (excluding Warsaw) | 14.93 | 11.69 | 16.48 | 17.69 | 13.50 | 25.32 | 1.185 | 1.155 |
| Warsaw | 18.99 | 15.39 | 20.33 | 18.62 | 15.01 | 17.97 | 0.980 | 0.975 |
| Occupational group | | | | | | | | |
| Managers | 21.54 | 17.41 | 19.52 | 20.32 | 17.82 | 9.60 | 0.943 | 1.024 |
| Professionals | 19.79 | 15.63 | 18.70 | 20.97 | 16.43 | 25.83 | 1.060 | 1.051 |
| Technicians | 16.10 | 13.19 | 15.80 | 15.01 | 13.24 | 9.57 | 0.932 | 1.004 |
| Clerks | 13.05 | 11.22 | 11.08 | 13.64 | 11.69 | 9.22 | 1.045 | 1.042 |
| Salesmen | 10.94 | 9.09 | 16.72 | 12.80 | 10.43 | 11.95 | 1.170 | 1.147 |
| Farmers | 12.33 | 10.19 | 9.32 | 13.92 | 11.75 | 7.99 | 1.129 | 1.153 |
| Craftsmen | 12.63 | 10.71 | 14.23 | 14.06 | 11.97 | 19.02 | 1.113 | 1.118 |
| Machine operators | 13.35 | 11.20 | 11.77 | 14.31 | 12.50 | 8.78 | 1.072 | 1.116 |
| Elementary occupations | 11.92 | 9.10 | 16.37 | 9.59 | 8.40 | 5.24 | 0.804 | 0.923 |

Source: own calculations based on the BKL data set.

## Econometric strategy

There are many statistical procedures that are used for wage gap analyses that allow us to isolate the effects of so-called observables on differences in earnings. However, there is probably no single method that would allow us to address all the methodological problems that arise while studying intersectoral wage gaps. We use an endogenous treatment-regression model, also known as an endogenous dummy-variable model. It uses a linear model for the outcome and a constrained normal distribution to model the deviation from the conditional independence assumption. The model was brought into the modern literature by HECKMAN (1976). MADDALA (1983) derived the maximum

likelihood and two-step estimators of the version implemented here, reviewed some empirical applications of this model, and described it as a constrained endogenous-switching model. BARNOW, CAIN and GOLDBERGER (1981) derived the conditions for which the self-selection bias of the simple OLS estimator of the treatment effect, δ, is non-zero and of a specific sign.

The basic intuition behind the model is as follows: if individuals make optimal choices concerning their sector of employment on the basis of their unobserved characteristics (e.g., gains or ability), for the observed subsample of public-sector workers, the error in the wage equation will have a non-zero expected value that is different from that of private sector workers. In order to address this problem, we must recover an estimate of the conditional mean of these un observables for the public and private sector workers and add it to the wage equation (similar to adding the omitted variable creating bias).

More formally, the endogenous treatment-regression model is composed of an equation for the outcome $y_j$ and an equation for the endogenous treatment $t_j$:

$$y_j = x_j\beta + \delta t_j + \varepsilon_j,$$

$$t_j = \begin{cases} 1, \; if \; w_j\gamma + u_j > 0 \\ 0, \quad \text{otherwise,} \end{cases}$$

where $x_j$ are the covariates used to model the outcome, $w_j$ are the covariates used to model the treatment assignment, and the error terms $\varepsilon_j$ and $u_j$ are bivariate normals with mean zero and the covariance matrix:

$$\begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}.$$

It is assumed that covariates $x_j$ and $w_j$ are unrelated to the error terms – in other words, they are exogenous.

The dependent variable of the model is the natural logarithm of the hourly net wage rate. The independent variables in the wage equation were chosen based on the Mincerian approach (MINCER 1974) and included: gender, age, age squared, level of education, job experience, occupational dummies, employer ownership sector, class of settlement unit, regional dummies and yearly dummies. The selection equation included several variables: gender, age, level of education, the means by which a given job was found, class of settlement unit, regional dummies and yearly dummies.

## Estimate results

Table 3 includes the results of the estimates of the sector selection model. Based on these three specifications, a specification 3 was chosen to be used in the joint two-step estimation of linear regression with endogenous treatment.

Table 3

Model of probability of public–sector employment: results of probit estimates

| Specification | 1 | 2 | 3 |
|---|---|---|---|
| Female | 0.2862*** | 0.2900*** | 0.2945*** |
| (Base category = males) | [0.000] | [0.000] | [0.000] |
| Tertiary | 1.0201*** | 1.0427*** | 1.0549*** |
| | [0.000] | [0.000] | [0.000] |
| Secondary voc. | 0.2663*** | 0.2634*** | 0.2711*** |
| | [0.000] | [0.000] | [0.000] |
| Secondary gen. | 0.2098 | 0.2239 | 0.2620 |
| | [0.233] | [0.206] | [0.378] |
| Basic voc. | –0.1205*** | –0.1400*** | –0.1355*** |
| (Base category = primary) | [0.000] | [0.000] | [0.000] |
| Age | 0.0360*** | 0.0341*** | 0.0347*** |
| | [0.000] | [0.000] | [0.000] |
| Direct contact with employer | – | 0.6675*** | 0.6485*** |
| | – | [0.000] | [0.000] |
| Family members | – | 0.3840*** | 0.2825*** |
| | – | [0.000] | [0.000] |
| Advert | – | 0.0857 | 0.0665*** |
| | – | [0.126] | [0.005] |
| Job centre | – | 0.7558*** | 0.6693*** |
| | – | [0.000] | [0.000] |
| School | – | 0.1599 | 0.1254 |
| | – | [0.251] | [0.185] |
| Other channel | – | 0.0752*** | 0.0565 |
| (Base category = internet) | – | [0.000] | [0.390] |
| Towns up to 20 th. | – | – | 0.0182 |
| | – | – | [0.516] |
| Towns 20–200 th. | – | – | –0.0390* |
| | – | – | [0.068] |
| Cities 200 th. + | – | – | –0.0898*** |
| | – | – | [0.002] |
| Warsaw | – | – | –0.2369*** |
| (Base category = rural areas) | – | – | [0.000] |
| Constant | –2.3411*** | –2.1497*** | –2.0957*** |
| | [0.000] | [0.000] | [0.000] |
| Regional dummies | no | no | yes |
| Yearly dummies | yes | yes | yes |
| Number of observations | 22,753 | 22,746 | 22,746 |
| Log likelihood | –12,315.879 | –12,310.587 | –12,306.021 |

Note: $p$ – values are reported in square brackets.
Significance is denoted by *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: own calculations based on the BKL data set.

Generally, the results of the probit equation are fairly sensible and cohere with expectations: women have a higher probability of employment in the public sector than men, and this probability increases with age. As for education levels, persons with vocational education have a higher probability of employment in the private sector, while individuals with higher levels of education are more likely to work in the public sector, with this effect being particularly strong in the case of tertiary graduates. Persons that search for jobs via direct contact with employers or with the help of job centres have the highest probability of public-sector employment. By comparison to rural areas, the opportunities for private sector jobs are greater in all types of cities with more than 20 th. inhabitants.

In the next stage a full two-step linear model of wages with endogenous decision of sector of employment was estimated. The results are presented in Table 4. Generally, the results of the wage equation are sensible and in accordance with expectations: women, *ceteris paribus*, get lower wages than men (with wage penalties varying between 18% and 23%, depending on the specification). More job experience, both general and specific, increases wages, although the effect reverses once the employee reaches 52–54 years of age (depending on specification). The higher one's level of education, the higher their wage rate. However, the premium for education falls significantly when we include the occupational dummy in the model. A significant effect of agglomeration was found: living in a big city (and in Warsaw in particular) meant a significant wage premium. For cities up to 200 th. inhabitants the wage premium is relatively low (as compared to rural areas), although it is significant. It increases for bigger cities and exceeds 25% for Warsaw. As for the most important variable in the context of the study, the public-sector wage premium (ATE) was found to be significantly positive, although quite moderate (between 2.5% and 4.3%, depending on specification). This may be interpreted as a sign of the maturity of the Polish labour market and the advancement of the transition process. In this aspect, Poland – one of the leaders of the economic transition in the region – seems to have caught up with the developed countries, where the positive public-sector wage premium is well-documented.

In Table 4, the coefficients on the wage covariates do not vary by sector of employment. The differences in wages between public and private sector employees are modelled as a level shift captured by the coefficient on the indicator for sector. Now we want to allow some of the coefficients to vary over employers' sectors and then use margins to estimate the ATE. We begin by estimating the parameters of the model in which the coefficients on gender, education level and class of settlement unit differ for public and private sector workers. The results of these estimates are presented in Table 5. Due to the

Table 4
The results of a two-step linear model of wages with endogenous decision of sector of employment

| Specification | 1 | 2 | 3 |
|---|---|---|---|
| Female | –0.2303*** [0.000] | –0.1765*** [0.000] | –0.1945*** [0.000] |
| Age | 0.0315*** [0.000] | 0.0217*** [0.000] | 0.0321*** [0.000] |
| Age squared | –0.0003*** [0.000] | –0.0002*** [0.000] | –0.0003*** [0.000] |
| Tertiary | 0.5779*** [0.000] | 0.4956*** [0.000] | 0.3805*** [0.000] |
| Secondary voc. | 0.2325*** [0.000] | 0.1637*** [0.000] | 0.1738*** [0.000] |
| Secondary gen. | 0.2361*** [0.000] | 0.1438*** [0.000] | 0.1936*** [0.000] |
| Basic voc. | 0.0761*** [0.000] | 0.0366*** [0.000] | 0.0186*** [0.000] |
| Job experience | 0.0075*** [0.000] | 0.0064*** [0.000] | 0.0068*** [0.000] |
| Towns up to 20 th. | 0.0612*** [0.003] | 0.0596*** [0.003] | 0.0314*** [0.009] |
| Towns 20–200 th. | 0.0555*** [0.004] | 0.0555*** [0.004] | 0.0555*** [0.007] |
| Cities 200 th. + (excluding Warsaw) | 0.1917*** [0.000] | 0.1517*** [0.000] | 0.1139*** [0.000] |
| Warsaw (Base category = rural areas) | 0.3971*** [0.000] | 0.2791*** [0.000] | 0.2571*** [0.000] |
| Public (Base category = private) | 0.0425*** [0.000] | 0.0318*** [0.000] | 0.0251** [0.022] |
| Constant | 2.3954*** [0.000] | 2.6846*** [0.000] | 2.1951*** [0.000] |
| Lambda | 0.0794* [0.072] | –0.0786* [0.098] | –0.0205 [0.458] |
| Rho | –0.1825 | –0.1978 | –0.0389 |
| Sigma | 0.4351 | 0.3978 | 0.5274 |
| Regional dummies | yes | yes | yes |
| Occupational dummies (1d) | no | yes | no |
| Occupational dummies (2d) | no | no | yes |
| Yearly dummies | yes | yes | yes |
| Number of observations | 22,746 | 22,746 | 22,746 |

Note: $p$ – values are reported in square brackets.
Significance is denoted by *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: own calculations based on the BKL data set.

complexity of the model, only one specification has been presented, which controls for 2-digit occupational groups, regions and years of data collection. The results of the estimation show that there are substantial differences in the determinants of wages in both sectors. In accordance with the results of other

studies, women are less discriminated against in the public than in the private sector. Although the public sector is a main source of demand for tertiary education, it is the private sector that better rewards those with the highest qualifications. If you live in Warsaw and work in the public sector, you may enjoy a significant positive wage premium (almost 23%) but, in the case of the private sector, the premium would be substantially higher (almost 35%). In the case of smaller cities similar differences prevail, with the exception of towns of between 20 th. and 199 th. inhabitants. The difference between different types of cities is even more significant if we restrict our sample to only those with a tertiary education.

Because we interacted the variable denoting ownership sector with three of the covariates, the estimated coefficient on the sector is not an estimate of the ATE. However, we may use margins to estimate the ATE from these results. In our case, ATE was estimated to equal 0.0469 with a standard error of 0.0132, while ATT was estimated to equal 0.0423 with a standard error of 0.0167.

Table 5

The results of a two–step linear model of wages with endogenous decision of sector of employment: heterogeneous impact of sector of employment

| Covariates | Total sample | Individuals with tertiary education |
|---|---|---|
| 1 | 2 | 3 |
| Female × Private | –0.2680*** | –0.1466*** |
| | [0.000] | [0.000] |
| Female × Public | –0.2059*** | –0.1743*** |
| | [0.000] | [0.000] |
| Age | 0.0268*** | 0.0564*** |
| | [0.000] | [0.000] |
| Age squared | –0.0003*** | –0.0005*** |
| | [0.000] | [0.000] |
| Tertiary × Private | 0.1867*** | – |
| | [0.000] | – |
| Tertiary × Public | 0.1768*** | – |
| | [0.000] | – |
| Secondary vocational × Private | 0.0899*** | – |
| | [0.000] | – |
| Secondary vocational × Public | 0.1165*** | – |
| | [0.000] | – |
| Secondary general × Private | 0.1023*** | – |
| | [0.000] | – |
| Secondary general × Public | 0.1229*** | – |
| | [0.000] | – |
| Basic vocational × Private | 0.0639*** | – |
| | [0.000] | – |
| Basic vocational × Public | 0.0647*** | – |
| | [0.000] | – |

cont. table 5

| 1 | 2 | 3 |
|---|---|---|
| Job experience | 0.0062***<br>[0.000] | 0.0041***<br>[0.000] |
| Towns up to 20 th. × Private | 0.0350***<br>[0.001] | 0.0550***<br>[0.000] |
| Towns up to 20 th. × Public. | 0.0066<br>[0.667] | 0.1111***<br>[0.000] |
| Towns 20–200 th. × Private | 0.0601***<br>[0.000] | 0.0501***<br>[0.000] |
| Towns 20–200 th. × Public | 0.0797***<br>[0.000] | 0.1397***<br>[0.000] |
| Cities 200 th. (excluding Warsaw) + × Private | 0.1180***<br>[0.000] | 0.2180**<br>[0.029] |
| Cities 200 th. (excluding Warsaw) + × Public | 0.0959***<br>[0.000] | 0.1759**<br>[0.047] |
| Warsaw × Private | 0.3494***<br>[0.000] | 0.5194**<br>[0.033] |
| Warsaw × Public | 0.2332***<br>[0.000] | 0.1332*<br>[0.071] |
| Public | 0.0511***<br>[0.000] | 0.0102*<br>[0.081] |
| Constant | 1.7589***<br>[0.000] | 1.4744***<br>[0.000] |
| Regional dummies | yes | yes |
| Occupational dummies (1d) | no | no |
| Occupational dummies (2d) | yes | yes |
| Yearly dummies | yes | yes |
| Number of observations | 22,491 | 5,569 |
| Log pseudolikelihood | –24,536.25 | –7,121.76 |

Note: $p$ – values are reported in square brackets.
Significance is denoted by *** $p<0.01$, ** $p<0.05$, * $p<0.1$.
Source: own calculations based on the BKL data set.

## Conclusions

The objective of this paper was to investigate public-private wage differentials in Poland and their spatial variation in terms of types of settlement units. We applied the control function methodology (both with homogeneous and heterogeneous impacts) to show that, after controlling for structural differences in employment, there is generally a moderate positive premium related to public employment. However, this premium differs between types of settlement units, with public employment being most attractive in medium-sized cities. It may be related to several facts. First, the level of wages in the public sector is generally less spatially differentiated than wages in the private sector, where the correlation between wages and size of settlement unit is positive and

statistically significant. This brings about an effect of the relative attractiveness of private sector employment in the biggest cities. In rural areas, the public sector is relatively underdeveloped, which often results in lack of alternatives for employment in the public sector. Moreover, the average level of educational requirements in the private sector is considerably higher in the biggest cities than in smaller town and rural areas. These are the biggest cities where private economic activity requiring the highest level of qualifications is concentrated (information and communication, financial and insurance activities, professional, scientific and technical activities, administrative and support service activities). As a result, these are the biggest agglomerations where the private sector is an attractive alternative to employment in the public sector for persons with tertiary education and a negative public sector wage premium is observed.

This phenomenon poses a considerable challenge for the public sector in the biggest cities regarding attracting highly qualified employees, which may seriously threaten the efficiency of public-sector services provision (education, healthcare, administration). Due to the low wage attractiveness of public--sector jobs, the public sector in the biggest cities may face serious difficulties in attracting and retaining qualified employees. In addition, low wages could encourage moonlighting, which might similarly weaken the efficiency of the public sector.

The rate of return on higher education in smaller cities is lower than in major centres. Meanwhile, the inputs necessary to attain a tertiary level of education are not similarly reduced. This raises a question of the effectiveness of the educational choices of young Poles.

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# AUTONOMOUS VEHICLES – CHALLENGES FOR THE INSURANCE INDUSTRY

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K e y w o r d s: motor vehicle insurance, insurance market, autonomous vehicles, road safety.

A b s t r a c t

The objective of this article is to identify and analyse opportunities and threats for the insurance industry related to the popularisation of autonomous vehicles. The analysis uses the data and forecasts included in reports of independent research institutions, which forecast the tempo of development of autonomous vehicle technologies. In the following few years, the global model of transport is going to change as it will gradually move away from the model of possessing individual vehicles and towards using a fleet of autonomous vehicles depending on current needs. The fundamental motivation for changes will be safety, comfort and lower costs. A direct result of the technological revolution for the insurance industry is a reduction of the amount of paid compensation, which is related to the improvement in the safety of road traffic. However, the new model of individual transport is going to dramatically reduce the number of vehicles on roads, and therefore it will result in a significant drop in the income for insurers coming from selling vehicle insurance policies, which currently is one of the most significant sources of income for numerous markets.

## POJAZDY AUTONOMICZNE – WYZWANIA DLA BRANŻY UBEZPIECZENIOWEJ

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S ł o w a k l u c z o w e: ubezpieczenia komunikacyjne, rynek ubezpieczeń, pojazdy autonomiczne, bezpieczeństwo na drogach.

A b s t r a k t

Celem artykułu jest identyfikacja oraz analiza szans i zagrożeń dla branży ubezpieczeniowej, związanych z upowszechnieniem się pojazdów autonomicznych. W analizie wykorzystano dane i prognozy z dostępnych raportów niezależnych instytucji badawczych, przewidujące tempo rozwoju technologii pojazdów autonomicznych. W ciągu najbliższych kilku lat zmieni się też model globalny transportu związany z postępującą rezygnacją z posiadania indywidualnego pojazdu na rzecz

korzystania w miarę potrzeb z floty pojazdów autonomicznych. Podstawowym motywem zmian będzie bezpieczeństwo, wygoda oraz niższe niż dotąd koszty. Bezpośrednie skutki rewolucji technologicznej dla branży ubezpieczeniowej to ograniczenie wartości wypłacanych odszkodowań związane z poprawą bezpieczeństwa ruchu drogowego. Nowy model transportu indywidualnego spowoduje jednak dramatyczne ograniczenie liczby pojazdów na drogach, a co za tym idzie znaczny spadek dochodów ubezpieczycieli ze sprzedaży ubezpieczeń komunikacyjnych, które obecnie są jednym z najważniejszych źródeł przychodu.

## Introduction

Leading automotive companies have been on the market for over 120 years and since the beginning they have participated in a technological arms race. Cars have never before been so safe and easy to drive as they are today. In recent years, progress in the development of the field of electronics has brought many solutions which increase driving safety and which take over the role of the driver in a car. The vision of cars without drivers has accompanied automotive futurologists for several decades; however, only recently has technological development made it possible to fully implement this vision. Many contemporary cars are capable of independently assisting the driver in keeping the car in a driving lane and within a safe distance from the car in front as well as monitoring the level of tiredness of the driver.

A relatively small step separates the automotive industry from complete elimination of the driver from the process of driving a car. Many automotive companies, as well as IT technology leaders such as Google, already have conducted road trials. In the meantime, Tesla Motors, through a software update, introduced an autopilot function to the users of their cars, which allows them to use a fully autonomous driving mode in certain circumstances (*Tesla Press Information* 2016). According to all of the research and practical trials, it is human error and human imperfection that are the causes of most traffic accidents (*Road safety...* 2015). Railway and air transport have proven that the more automation is introduced, the safer transport becomes.

Currently, autonomous vehicles are still relatively primitive and are ineffectual at trying to equal a human. In emergency situations, they cannot manage and require the driver to take over control of the steering wheel. However, according to the reassurance of manufacturers themselves, as well as research centres dealing with transport issues, it is just a matter of time before autonomous cars will become an everyday reality.

Eliminating the driver is not only a question of convenience, but also an announcement of great changes in many areas of life and the economy. According to available estimates, these types of vehicles are going to revolutionise individual transport within the next few, or dozen or so, years. The insurance industry will not avoid the repercussions of this process.

The objective of this article is to identify and analyse the opportunities and threats presented to the insurance industry by the development of technologies related to popularising autonomous vehicles that are capable of independent driving on public roads without a driver.

## Definitions and forecast development in the field of autonomous vehicles

In order to systematise the knowledge and notions used in this article, we need to define an autonomous vehicle.

"Automated vehicle: a motor vehicle (car, truck or bus) which has technology available to assist the driver so that elements of the driving task can be transferred to a computer system.

Autonomous vehicle: a fully automated vehicle equipped with the technologies capable to perform all driving functions without any human intervention" (PILLATH 2016, p. 2).

The road to achieving autonomous vehicles will certainly not be a revolutionary process. For many years, cars have been equipped with various systems which support the driver in difficult conditions or even take over some of the driver's tasks. For example, since the 1980s leading manufacturers have equipped their cars with ABS. At the turn of the century, driving stability systems such as ESP were popularised on a large scale. Recent years have brought the further development of electronics and a drop in production costs. As a consequence, even in the mid-range class of cars, the following have been installed: driving lane assist, active cruise control capable of avoiding collisions with the preceding vehicle and automatic parking systems, among others. Nevertheless, it is the driver who makes critical decisions and takes full responsibility for how the vehicle moves. Parallel research conducted by leading automotive companies, Tesla Motors and Google, has been a breakthrough on our way to the full autonomy of vehicles. Fully autonomous vehicle prototypes have driven many kilometres on closed tracks so far. The latest software update for Tesla S cars turned out to be a breakthrough. It allows the driver to use a so called autopilot, which allows the car to drive itself fully autonomously on public roads within a limited scope. The extent of vehicle automation has been categorised in the following gradation (Tab. 1).

The classifications contained in the above table require an explanation. Individual levels of automation differ from one another in the extent to which the driver is engaged in the driving process. The lowest levels require a decision and reaction in setting the speed and the driving lane for the car to follow. For example, level 1 is an automatic parking system, and level 2 is

Table 1

Levels of vehicle automation

| Level | Extent of automation |
|---|---|
| 0 | No automation<br>the full-time performance by the human driver in all aspects of the dynamic driving task, even when enhanced by warning or intervention systems |
| 1 | Driver assistance<br>the driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task |
| 2 | Partial automation<br>the driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver performs all remaining aspects of the dynamic driving task |
| 3 | Conditional automation<br>the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene |
| 4 | High automation<br>the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene |
| 5 | Full automation<br>the full-time performance by an automated driving system in all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver |

Source*: Automated and Autonomous...* (2015).

active cruise control. The levels from 0 to 2 also require the human to monitor the surrounding space. On levels 3 to 5 this function is taken over by the car. Starting from level 3, the vehicle begins to do everything for the driver; however, it still requires the human to react in emergency situations. The implemented autopilot of Tesla S falls into this level. Tested vehicles use visual analysis and navigation data. Current solutions are not yet based on vehicles communicating with one another and with the road infrastructure. However, analogous systems have been available in passenger air transport for years (among others, the TCAS system). On level 4, which is in operation in some driving modes (for example in a particular agglomeration area), the vehicle is capable of controlling the car in every traffic situation even without the driver's reaction. Advanced prototypes tested by Google and some other leading car manufacturers are currently at this stage of development. However, due to legal restrictions they are not authorised to be used on public roads (*Automated and Autonomous...* 2015, p. 25). Level 5 is full automation under

any conditions, the vehicle is not equipped with any conventional control devices and the driver cannot directly influence the driving. Fully autonomous cars only leave the driver with the decision of selecting the driving route and the mode that will be used to cover it.

Introducing successive levels of automation throughout the years undoubtedly contributes to improving driving safety and to decreasing the number of accidents which are caused by a human error. However, there is a question whether the driver assisted by automation will be able to react efficiently if it is necessary. This problem is discussed later in this article.

Scientists and global consulting firms estimate that the popularisation of new solutions will take place around 2030 or later. According to available forecasts, the market share of autonomous vehicles in the sale of new passenger cars and light goods vehicles is estimated to be 20–25% at that time (VIERECKI et al. 2015, p. 20). At first, this will take place in large city agglomerations, and the first users will be today's teenagers for whom a car does not constitute such a value as it does for people who grew up in the 70s and 80s. However, the increasing pace of technological development and manufacturers' forecasts allow us to suppose that this process will proceed much faster.

Before technology reaches the level necessary to create fully reliable and safe autonomous vehicles capable of dealing with any situation on the road, legal matters need to be put in order first, which so far have been a very serious limitation for the development of this kind of means of transport. The essential issue is the necessity of the physical presence of a driver in a vehicle travelling on the road. In Europe, the legal foundation concerning road traffic is the *Vienna Convention on Road Traffic*, which regulates that a driver must be present in a moving vehicle and the driver must continuously control the movement of this vehicle (EUGENSSON et al. 2013, p. 5). Rapid technological progress has forced the law to adapt to accelerated changes in reality. Today, the law in some US states already authorises the testing of autonomous vehicles to move in public road traffic. In Europe, the work to adapt this Convention (as well as local legal acts to authorise autonomous vehicles to drive independently) is already in progress.

The inevitable quick development of autonomous vehicles has been noticed by the decision-makers from the automotive industry. Research results have proven that this tendency has been highly assessed by them and its importance keeps growing (*Global Automotive* 2016).

## The consequences of the popularisation of autonomous vehicles for individual transport

Mass popularisation of autonomous cars will definitely cause huge changes in the everyday lives of city dwellers and in urban models in general. The currently prevailing model of passenger car transportation usually consists of one or several cars in a household used for travelling to work, school, to do the shopping or for recreational purposes. The car is usually the most expensive property present in a household. Its exploitation entails numerous serious costs, which (apart from fuel) include repair costs and servicing, insurance, and a considerably fast decrease in value, most of all. Research conducted by scientists from Columbia University has proven that an average car owner uses their vehicle only for a small percentage of the time. This results in a huge wastage of resources and a huge total cost of owning and using a car (TCO) measured by the cost of covering one kilometre (*Transforming Personal...* 2013). Autonomous cars can significantly reduce that cost by means of abandoning the idea of owning a car for the paid use of a fleet of autonomous vehicles. In this model, the car (autonomous) will be used whenever the need for transport arises. It will safely drive the passengers to their destination and will proceed to take the next run. Furthermore, this kind of transport will be available to people who do not have a driving licence. Obviously, such a change is not going to happen suddenly, since many people are still attached to the idea of owning a car. However, they can be easily convinced on account of

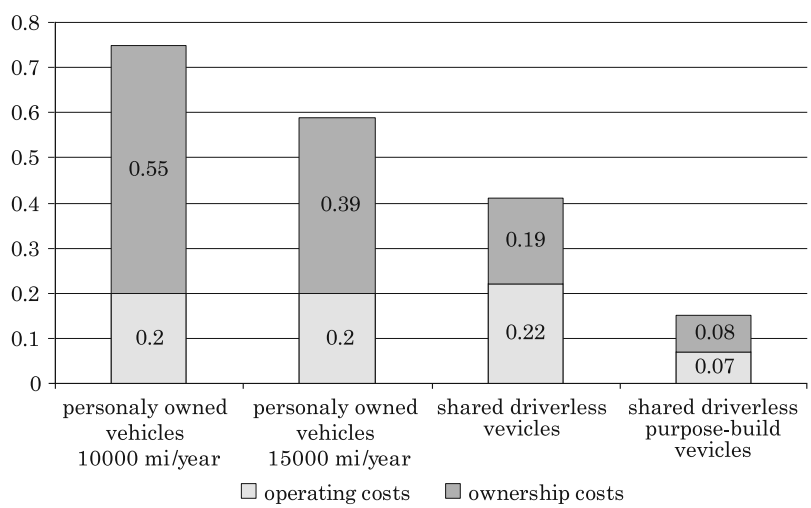


Fig 1. The cost of using autonomous and conventional vehicles
Source: *Transforming Personal...* (2013).

safety, and most of all, because it is simply more economical. In the described solution, the cost of one covered kilometre is reduced by approximately 80%. Additionally, in large agglomerations, the nuisance of finding a free parking space is of no small importance. The new idea of transportation will surely win over people who are sceptical towards public transport.

Transportation needs will be satisfied by vehicles rented for the duration of the transport, which will be owned by corporations. As a consequence of the adopted model and the increase in effectiveness of vehicle use, the number of vehicles will significantly decrease.

This new model of transportation is going to revolutionise today's urban concepts, which are still subordinated to the movement of vehicles in agglomerations. A smaller number of cars will mean less space dedicated to road infrastructure in favour of space dedicated to pedestrian traffic and recreation (*Re-inventing the wheel* 2015).

It is natural that the process of automatization will start with private passenger cars used in highly urbanised areas, which constitute a large part of the market. Those who live far away from large cities, heavy goods transport and all types of special vehicles will most likely stay away from autonomous technologies longer.

Limiting the number of vehicles and sharing them in agglomerations has been desired for years by environmentalists, among others, who are protesting the ever-progressing pollution of the natural environment in large city agglomerations. This is mainly connected with exhaust emissions. Presently, many European capitals enforce traffic restrictions for cars with combustion engines in city centres or even aim at eliminating older and less ecological vehicles entirely.

## The influence of autonomous vehicles on the insurance industry

Popularisation of autonomous vehicles (in the above-mentioned scale, automation levels 4 and 5) brings many challenges for the insurance industry. They can be classified into two basic categories:

– Legal determinants,
– Market determinants.

In the first category, the question of liability for damages in accidents is particularly important. According to available statistics, it is the people who currently cause the overwhelming majority of accidents (*Road traffic accidents...* 2015). Usually, they are caused by inattention, daring or tiredness. Insurers are currently charged with the high costs of accidents; however, they

have developed regulations concerning mutual liability for causing accidents. In the case of fully autonomous vehicles, eliminating the human factor is surely going to contribute to a reduction in the number of accidents. Despite the main objective of developing autonomous transport, which is the improvement of safety, accidents cannot be eliminated, simply due to technical reasons. Presently, a human is liable for what happens with the vehicle and the risk is covered by motor vehicle Third Party Liability (OC). The development of technology will gradually limit the role of the driver, until the human is entirely eliminated from the process of controlling the vehicle. The driver will become a passenger, whose role will be limited to choosing the destination and route, and optionally the mode of covering the route. In conventional road traffic, it is the driver who makes a large number of decisions in a very short time. Some of those decisions may have tragic consequences. Especially if a sudden change in the situation on the road will make it impossible to avoid an accident. For example, if a pedestrian suddenly appears in the roadway and the only choice would be to either hit the pedestrian or avoid the pedestrian collision by choosing a tree on the shoulder or a bus full of passengers coming from the opposite direction. At present, the law cannot determine liability if this critical decision is made by a computer controlling the vehicle. New dilemmas will arise, which are going to be difficult for artificial intelligence to resolve. They will concern fully automatic vehicles (level 5). The computer will need to decide whether to save its passengers or other road users. Each possible choice will have legal consequences; both if passengers of the autonomous vehicle or third parties will suffer as a result of the selected manoeuvre. This poses a new serious challenge for insurance companies in the context of paying claims under motor Third Party Liability (OC) (*The future of the car* 2015). In the future, this liability will most likely be transferred from the driver onto the vehicle manufacturer or the provider of a transport service. This shows the scale of the problem which will need to be dealt with in the very near future. This will need to be dealt with not only by insurers, but also by legislators and the law, since the system does not yet provide for settling dilemmas of this type.

Moreover, other new risks will appear. One example is perhaps the first fatal accident in automotive history in a Tesla S car that was moving in the autonomous mode, which happened in 2016 (*Tesla Press Information* 2016). The cause of the accident was a software failure of the Tesla autopilot, which interpreted the side of a truck trailer blocking the road as a part of the sky, and therefore it concluded that there was no obstacle in the road. This accident also reveals another problem. As was presented above, before autonomous vehicles become common, lower levels of automation will be functioning first, which require the driver to pay attention in critical moments. We cannot however

expect anyone to be capable of reacting immediately after the vehicle has travelled without the driver's assist for a few hundred kilometres, and suddenly the situation on the road exceeds the adaptive capabilities of the autonomous vehicle. It is only the driver's reflexes that can prevent a disaster. The tragic example of the Tesla accident is the best proof of that. Insurers will be forced to establish liability in complicated situations by determining the cause of the accident as well as human or machine liability.

The second group of challenges results from the change in the model of individual transport mentioned above. They may turn out to be some of the most serious dangers that the insurance industry will need to face in the near future (*The insurance industry*... 2015). On the one hand, increased safety of road traffic will contribute to limiting costs, but on the other hand, a dramatic shrinking of the motor vehicle insurance market on the global scale will be a considerable factor for generating profits. Presently, in Europe they constitute about 27% of insurers' profits (*European Motor*... 2015).

Decreased profits are not the only problem. The obligatory character of Third Party Liability (OC) currently constitutes an essential factor in obtaining new clients. The emergence of autonomous vehicles will force changes in sale models in the retail customer sector.

Instead of the disappearing Third Party Liability (OC) for individual clients, a new market for Third Party Liability (OC) will emerge for providers of transport solutions based on autonomous vehicles, who will most likely take the liability for accidents. However, at this stage it is difficult to foresee how this market segment will be formed. It is highly probable that this market will be much smaller than it is now, partly because of the smaller number of cars and the frequency of claims.

Apart from typical liability for accidents, it will be necessary to evaluate the cybernetic risk connected with the purposeful taking over of control, sabotage or disrupting the functioning of a single autonomous vehicle or a larger number of them at the same time (*The future of the car* 2015). The motivation behind these types of actions could be, for example, a new form of a terrorist attack or another kind of crime driven motivation.

The market for comprehensive motor insurance (Autocasco) will also experience a thorough transformation. Most likely, it will also be reduced rapidly, due to the above-mentioned factors and also due to the elimination of the risk of car theft.

Calculating and diversifying contributions will become a new challenge, for example, depending on whether the car is driven by a human or a computer. A large part of personal income, which so far has been spent on the purchase and use of cars, will be spent on something else, which is also an opportunity for insurers.

Insurers will be forced to deal with the need to adjust to the shrinking market of classical motor vehicle insurance. About a decade ago, such a scenario was a complete abstraction.

## Summary

In the near future, the insurance industry will face a revolution as significant as the invention of the car. It is not possible to stop the automation of transport, which is the direct result of technological development and the common pursuit of safety, economy and comfort in transportation. The insurance industry still has time to adjust to these inevitable changes, which bring both opportunities and risks. Furthermore, the scale and the manner of mass usage of vehicles will change drastically.

To sum up: the biggest threat for the industry is the reduction of the motor vehicle insurance market and a change in the retail sale model. This is confirmed by the following factors:

– leaving the model of owning a vehicle, and therefore, the marginalisation of individual obligatory motor Third Party Liability (OC),

– transferring the liability for caused accidents from the driver to the broadly understood transport services provider,

– the possibility to take over risks covered by comprehensive motor insurance (AC) by the owners of large fleets of autonomous vehicles,

– disappearance of the classic risk of vehicle theft.

These changes create many opportunities and possibilities for developing new markets and insurance products.

The problems presented in this article require further research. It will also be necessary to monitor the subsequent directions set for the development of the technology of autonomous vehicles as well as the effect this development will have on the automotive and transport industries.

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# MIGRATION PROCESSES AND THEIR CONSEQUENCES FOR THE LABOUR MARKET IN THE VISEGRAD GROUP COUNTRIES – SELECTED ASPECTS

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K e y  w o r d s: labour market, migration processes, aging population.

A b s t r a c t

This article concerns the demographic problems particularly focusing on the migration processes, population ageing and their consequences for the European labour market. The author also takes into account the problem of unemployment in selected EU countries by appropriate analysis of selected labour markets in Visegrad group countries (to show their diversity and specificity). Hence, the aim of this article is to indicate the impact of the observed demographic processes (migration and changes in the population structure) on the labour market in the Visegrad countries. Applied quantitative and qualitative analyses were conducted based on data from Eurostat statistical databases with the use of demographic projections. Absolute increases of dynamics and indicators were the methods used for time series changes. The temporal scope of the analyses was largely determined by data accessibility and the fact that the Visegrhd Group countries started the process of system transformation around the same time as joining the European Union in 2004.

## PROCESY MIGRACYJNE I ICH KONSEKWENCJE DLA RYNKU PRACY W KRAJACH GRUPY WYSZEHRADZKIEJ – WYBRANE ASPEKTY

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S ł o w a  k l u c z o w e: rynek pracy, procesy migracyjne, starzenie się populacji.

Abstrakt

Artykuł dotyczy problematyki demograficznej ze szczególnym uwzględnieniem procesów migracyjnych, starzenia się ludności oraz ich konsekwencji dla europejskiego rynku pracy. Analiza rynku pracy dotyczy krajów Grupy Wyszehradzkiej. Celem artykułu jest wskazanie wpływu obserwowanych procesów demograficznych (migracji międzynarodowych i zmian w strukturze wieku ludności) na rynek pracy w wybranej grupie krajów UE. Analizy ilościowe i jakościowe przeprowadzono na podstawie danych pochodzących z bazy statystycznej Eurostat oraz z uwzględnieniem prognoz demograficznych. Zastosowano metody zmian szeregu dynamicznego. Zakres czasowy analiz w dużej mierze był wyznaczany dostępnością danych, a także faktem, że kraje Grupy Wyszehradzkiej w podobnym horyzoncie czasowym rozpoczęły proces transformacji systemowej oraz w 2004 roku przystąpiły do Unii Europejskiej.

## Introduction

There is a view among numerous scientists that the present changes in the global economy and its problems are not easy to understand based on classical economic knowledge alone. They think that at present, the dominant role is played by demographic processes such as increased migration and an increasing process of population ageing resulting from, among other things, a decline in the birth-rate below the replacement threshold and longer life expectancy; especially in European Union countries.

Currently, the dynamics of changes in population figures depends in many countries on the fertility rate, death rate and international migration. In the post-war period, the birth rate was the main factor in population growth in Europe. As a result of a systematic decline in the birth rate and increased international migration, the roles have changed. In the last decades, it is international migration that has determined the dynamics in the change and structure of the population in numerous European countries, but with varying intensity. At the micro level, the changeability and intensity of demographic processes is significantly higher than at the macro level. Thus in the modern world, we can see the growing importance of international migration, which can be examined both at the macro- and micro-economic level. In both these perspectives, they have various consequences. It is however important to stress the existence of feedback in this area, i.e. the flow of the labour force depends on the economic and social situation. Macro-economic effects of migration refer to the situation in the labour market, salary transfer and foreign trade, whereas the micro-scale is directly connected with household incomes and economic activity. Thus in all these aspects, there are also other factors determining the current situation in this area.

This paper is an attempt to assess the impact of international migration on population age structure, and hence on the size of the potential labour force,

using Visegrad Group countries as an example. Moreover, it analyses selected labour market indicators such as unemployment and employment rates, showing relationships between them and migration processes. Due to the wide scope of this subject, this publication will present only the most significant relationships.

## Methodological information

Statistics on international migration for European Union countries provide a great deal of information concerning the migration scale, resources and directions. However, the quality of presented quantitative data varies. This is probably due to the existence of numerous information sources in each of the countries which are based on different legal regulations and also due to lack of a unified set of terms used in statistics. Analysis that is based on different statistical data for Visegrad Group countries gives, on the one hand, a more complete picture of examined processes; while on the other hand, it reveals significant differences between them. In view of the above observations, the author of this publication conducted a quantitative and qualitative analysis, relying on data published by Eurostat. Absolute increases and dynamic indicators were the methods used for time series changes. The temporal scope of the analyses was largely determined by data accessibility and the fact that the Visegrád Group countries started the process of system transformation around the same time, joining the European Union in 2004. The year 1990 was chosen as the beginning of the period of temporal comparison. The following study periods were selected to indicate the dynamics of changes: (before the EU accession: 1990–2004), (after the EU accession: 2004–2015, 2015–2060 – including demographic projections). For each of the characteristics discussed, spatial comparisons were made, with a country accepted as a comparison unit.

## Theoretical background

A review of the literature on the subject shows that the phenomenon of migration is inseparably connected with the process of globalisation and occurs with different intensity in most countries worldwide (MASSEY et al. 1993, p. 431–466, PORTES, BOROCZ 1989, p. 606–630, DIVINSKY 2007, p. 75). In every economy, there are factors that facilitate and limit emigration. The former ones include the state of the economy, demographic pressure, high unemployment rate, higher remuneration in the emigration country, family reunification, etc. (KRITZ, GURAK 2001, p. 133–145). On the other hand, people working

abroad, when considering the decision to return, look at the state of the economy, the prospect of the country's development, the possibility of achieving a desired standard of living, the possibility for a professional career, etc. At this point, it is worth indicating the causes of international migration[1]. A review of the literature on the subject shows that there are cyclic and structural causes (BODNAR, SZABO 2014, p. 10, 11). Cyclic causes include:

– the unemployment rate, as well as differences in employment opportunities in sending and receiving countries. Job opportunities play a key role in migration decisions. Unemployment rises during times of recession which, as a push factor, increases the probability of emigration, while low unemployment rates and high job-finding rates in host countries are perceived as pull factors. Structural causes are as follows:

– wage differentials – according to neo-classical theories, wage differentials (which reflect the differences between the relative amount of capital and labour and thus their productivity in home and host countries) have a significant impact on migration decisions. The international migration of labour may contribute to the equalisation of wages between countries. However, the wage gap should be high enough to cover the costs of relocation and integration,

– similarities between languages and the number of home country individuals in the destination country: the probability of migration is increased by similarities between the languages of the home and host countries and the number of immigrants in the host country,

– administrative obstacles: the easing of the administrative burdens of migration between countries has a positive effect on international migration,

– differences in welfare expenditures between the home and the host countries, welfare system, education system: the level of welfare expenditures, the generosity of the welfare system and a well-developed education system may be particularly relevant in the case of permanent emigration.

– cultural environment: the general political climate, instability or cultural exclusion may heighten the probability of emigration, while host countries can typically offer better conditions in this regard.

In the context of the impact of international migration on the labour market, BORJAS (1995, p. 3–22) indicates that the impact of immigration on the labour market critically depends on the skills of migrants, the skills of existing workers, and the characteristics of the host economy. They also differ between the short and long run when the economy and labour demand can adjust to the increase in labour supply. The immediate short run effects of immigration on

[1] The causes of migration have been presented in many theories of migration. For example they take into account: the economical aspect – the theory of dual labour market, neoclassical theories, new economics of migration, the social aspect – the theory of migration networks, institutional theory, the geographical aspect – mobility transition theory.

the wages and employment of existing workers depend particularly on the extent to which migrants have skills that are substitutes or complements to those of existing workers. If the skills of migrants and existing workers are substitutes, immigration can be expected to increase competition in the labour market and drive down wages in the short run. The closer the substitute, the greater the adverse wage effects will be. Whether and to what extent declining wages increase unemployment or inactivity among existing workers depends on their willingness to accept the new lower wages. If, on the other hand, the skills of migrants are complementary to those of existing workers, all workers experience increased productivity which can be expected to lead to a rise in the wages of existing workers (BORJAS 1995, p. 3–22).

On the other hand RUHS, VARGES-SILVA (2015, p. 3–15) indicate that in addition to expanding labour supply, immigration can also increase the demand for labour. Migrants expand consumer demand for goods and services. In the medium to long run, immigration can be expected to lead to more investment. Both effects result in greater demand for labour and thus increased wages and employment in the economy. In other words, the number of jobs in an economy is not fixed (the "lump of labour fallacy"). Immigration can increase competition for existing jobs but it can also create new jobs. The extent to which investment and labour demand respond to immigration depends on the characteristics of the economy. During an economic downturn, labour demand may respond more slowly than during times of economic growth (RUHS, VARGES-SILVA 2015, p. 3–15).

Migration processes can also be examined in the social and economic context. In the social context, migration has a demographic impact, not only by increasing the size of the population but also by changing the age pyramid of receiving countries. Migrants tend to be more concentrated in the younger and economically active age groups compared with natives and therefore contribute to reduce dependency ratios (Migration Policy Debates 2014, p. 1, KRYŃSKA 2000, p. 11). On the other hand, in the economic context, migrants arrive with skills and abilities, and so supplement the stock of human capital of the host country. More specifically, evidence from the United States suggests that skilled immigrants contribute to boosting research and innovation, as well as technological progress (HUNT 2010, p. 251–269).

For example, some early papers by Grossman assume that immigrants are a distinct factor of production, i.e. labour consists of immigrants and natives, and that immigrants and natives are not perfectly substitutable. However, it seems quite difficult to argue that two equally qualified workers, one a native, and the other one an immigrant, are not easily substitutable in production. It seems more reasonable to draw a distinction between different groups of labour inputs along the skill dimension (GROSSMAN 1982, p. 596–603).

Later studies indicate a production technology that distinguishes between skilled and unskilled labour, and assumes that immigrants are perfect substitutes with their corresponding native skill category. How skills are defined in detail varies by study, but typical dimensions are educational attainment and occupation or experience and education (BORJAS 2006, p. 221–258). The relationship between migration and social/professional mobility of the population has been explored by WITKOWSKI (1985, p. 47) and ORGANIŚCIAK-KRZYKOWSKA (2013, p. 11–36). From the perspective of a social policy, the in-flow of migrants can, thanks to rejuvenation of the population age structure, change the structure of demand for educational and medical services as well as social and medical care (ZDROJEWSKI 2003, p. 199–211). Meanwhile, JOŃCZY (2010, p. 17) highlights self-regulation of labour markets in the conditions of economic migration to foreign countries.

Table 1

Self-regulation of labour markets under the conditions of migration to foreign countries

| Labour market | |
|---|---|
| Initial balance | demand and supply balance |
| Processes upsetting the market balance<br>– departure of part of the labour force<br>– return transfer and redistribution of incomes | decrease of labour supply<br>increase of labour demand |
| Transitional state of imbalance | demand surplus |
| Market balancing processes<br>– increase of prices and salaries<br>– increase of imports and economic immigration<br>– substitution of labour and production | increased demand and prices on the product market and limited supply on the labour market implicate an increase in pay<br>higher pay causes an in-flow of the labour force from outside a country, region and reemigration<br>substitution of work for capital |
| Migration balance | increased share of immigrant labour force in employment and that of capital expenditure in production |

Source: JOŃCZY (2010, p. 17).

Summing up, migration processes are examined by a number of scientific disciplines, such as demographics, economics, geography, the political sciences and sociology. Due to the interdisciplinary character of migration analyses as a research subject and the complexity of this phenomenon, there is no one unambiguous research method or a common explanatory approach. For the reasons discussed above, work on migration shows a multitude of approaches to and interpretations of this process.

## The impact of international migration on changes in population figures and structures in the Visegrad Group countries and their consequences

The population figure is a result of natural changes in the number of people (the number of live births decreased by the number of deaths) and net migration (the number of immigrants decreased by the number of emigrants and increased by statistical correction) (OKÓLSKI 2005, p. 82, RAUZIŃSKI 2010, p. 71–76). An increase in population is observed when the result of net migration increased by the number of births and decreased by the number of deaths is positive. From the perspective of the labour market (the size of the potential labour force), it is interesting to evaluate the impact of migration on population figures and structures. According to the literature on the subject, migrations are usually relevant in economic terms, as they modify the regional labour force, both quantitatively and qualitatively. Let's look at some selected demographic indicators presented in table 1 for the Visegrad Group countries.

Table 2

Selected demographic indicators for the Visegrad Group countries taking into account demographic projections for the period 1990–2060

| Countires | Total of population [in 1000] | | | | | |
|---|---|---|---|---|---|---|
| | Years | | | | | |
| | 1990 | 2004 | 2009 | 2015 | 2030* | 2060* |
| EU 28 | 475,187.71 | 492,555.79 | 502,090.23 | 508,293.36 | 508,223.62 | 522,946.53 |
| Czech Rep. | 10,362.10 | 10,195.34 | 10,425.78 | 10,538.27 | 10,536.04 | 11,081.33 |
| Hungary | 10,374.82 | 10,116.74 | 10,030.97 | 9,855.57 | 9,679.36 | 9,165.30 |
| Poland | 38,038.40 | 38,190.60 | 38,135.88 | 38,005.61 | 37,525.74 | 33,293.80 |
| Slovakia | 5,287.66 | 5,371.87 | 5,382.40 | 5,421.35 | 5,314.02 | 4,574.33 |
| Natural change of population [in the persons] | | | | | | |
| EU 28 | 927,158 | 383,171 | 510,559 | –135,183 | –724,843 | –1,410,446 |
| Czech Rep. | 1,398 | –9,513 | 10,927 | –409 | –26,922 | –28,096 |
| Hungary | –19,983 | –37,355 | –33,972 | –39,440 | –36,281 | –35,676 |
| Poland | 157,377 | –7,391 | 32,649 | –25,613 | –122,044 | –179,581 |
| Slovakia | 25,370 | 1,895 | 8,304 | 1,776 | –19,322 | –35,876 |
| Net migration [in the persons] | | | | | | |
| EU 28 | 721,368 | 1,659,353 | 714,284 | 1,897,836 | 1,244,057 | 1,036,681 |
| Czech Rep. | –58,893 | 13,021 | 25,378 | 15,977 | 35,777 | 21,240 |
| Hungary | 18,313 | 18,162 | 17,321 | 14,354 | 20,936 | 14,014 |
| Poland | –12,620 | –9,382 | –1,196 | –12,792 | –903 | 11,566 |
| Slovakia | –2,322 | –1,085 | –295 | 3,127 | 2,464 | 2,403 |

* projections data

Source: own calculation based on: Eurostat data, http://ec.europa.eu/eurostat/data/database (access: 23.07.2016).

In the first period of analysis, i.e. 1990–2004, an increase in the total population figure was recorded in Poland and Slovakia, mainly due to a positive birth rate. Meanwhile, the fall in the population figure for the Czech Republic was caused by negative net migration, whereas in Hungary it was caused by a negative birth rate. In the second period of analysis, i.e. 2004–2009, an increase in the population figure was recorded for the Czech Republic, due to positive net migration and a positive birth rate. In the case of Slovakia, the increase resulted mainly from a positive birth rate. Meanwhile, the fall in population in Poland was caused not only by the birth rate, but also by decreasing negative net migration, whereas in Hungary it was mainly due to a negative birth rate. In the third period of analysis, i.e. 2009–2015, the increase in population figures for the Czech Republic and Slovakia was mainly due to positive net migration. The fall in the population figure for Poland was mainly caused by a negative birth rate and net migration. In the case of Hungary, it was due to the birth rate. Based on demographic projections, it can be presumed that an increase in population figures will be recorded in the Czech Republic until 2060, mainly due to positive net migration. In the rest of the Visegrad Group countries, the total population figures are expected to fall, mainly due to negative birth rates. Thus, it can be concluded that in countries where the increase or fall in the total population figure is less affected by migration, the process of increased population ageing will grow compared to countries where net migration is a decisive factor in the change in the population figure. Of importance in this respect is certainly the median age of immigrants arriving in EU countries.

Figure 1 shows that immigrants entering EU Member States in 2015 were, on average, much younger than the total population already resident in their country of destination. In 2015, the median age of the total population of the EU-28 was 42 years. By contrast, the median age of immigrants to the EU-28 in 2014 was 28 years (Eurostat yearbook, 2016). However, considering the median age of immigrants, it is worth presenting this migration by economic age groups in the countries analysed[2].

The data above shows that the intensity of the impact of migration on population structures and figures depends not only on total net migration but also on net migration by economic age groups. The data indicates an increase in the number of immigrants aged 65+ between 2009 and 2015 in the Visegrad Group countries, except for the Czech Republic. This means that acceleration of the process of population ageing in the countries analysed can also be affected by migrations of population belonging to older age groups. Thus,

[2] Due to data availability, available Eurostat statistical data for the period 2009–2015 was used for the purpose of analysis. The data contained in table 2 is indicative and refers to total migration.

international migrations are and will be relevant to the dynamics of the ageing of the potential labour force. Table 4 presents changes in population structure by economic age groups.

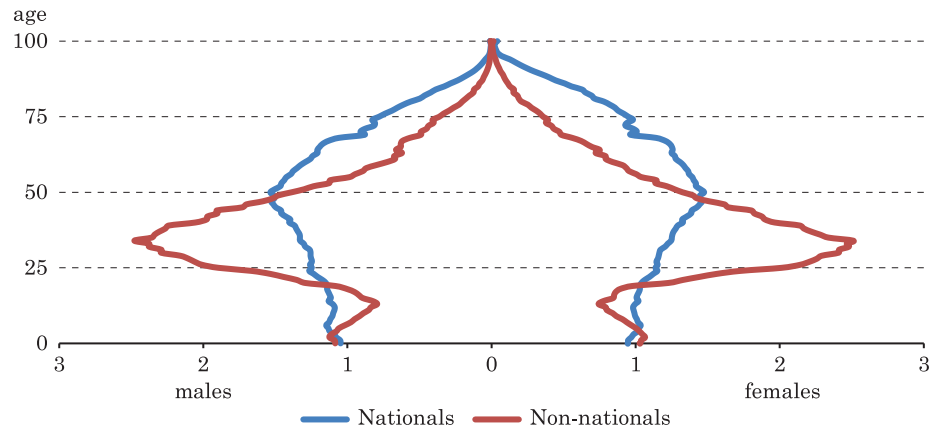


Fig. 1. Age structure of the national and non-national populations, EU-28 in 2015
Source: Eurost data base, http://ec.europa.eu/eurostat/data/database (access: 14.08.2016)

Table 3

Migration figure by economic age group in the Visegrad Group countries

| Countries | Immigration by economic age group (total) | | | Emigration by economic age group (total) | | | Net migration | |
|---|---|---|---|---|---|---|---|---|
| | Years | | Dynamics indicator | Years | | Dynamics indicator | 2009 | 2015 |
| | 2009 | 2015 | 2009 – 100 | 2009 | 2015 | 2009 – 100 | | |
| 0–15 | | | | | | | | |
| Czech Rep. | 5,131 | 4,008 | 78.1 | 2,983 | 2,146 | 71.9 | 2,148 | 1,862 |
| Hungary | 4,418 | 4,817 | 109.1 | 1,040 | 1,005 | 96.6 | 3,378 | 3,812 |
| Poland | 15,722 | 32,247 | 205.1 | 30,940 | 37,749 | 122.0 | –15,218 | –5,502 |
| Slovakia | 1,416 | 556 | 39.3 | 408 | 652 | 159.8 | –1,008 | –96 |
| 15-64 | | | | | | | | |
| Czech Rep. | 69,551 | 25,213 | 36.2 | 58,340 | 25,119 | 43.1 | 11,211 | 94 |
| Hungary | 22,129 | 47,671 | 215.4 | 9,217 | 40,140 | 435.5 | 12,912 | 7,531 |
| Poland | 168,922 | 177,125 | 104.8 | 190,602 | 217,856 | 114.3 | –21,680 | –40,731 |
| Slovakia | 13,773 | 4,110 | 29.9 | 4,267 | 2,887 | 67.6 | 9,506 | 1,223 |
| 65+ | | | | | | | | |
| Czech Rep. | 538 | 676 | 125.6 | 459 | 1,203 | 262.1 | 79 | -527 |
| Hungary | 1,347 | 2,093 | 155.4 | 226 | 1,068 | 472.6 | 1,121 | 1,025 |
| Poland | 4,522 | 12,903 | 285.3 | 7,778 | 12,694 | 163.2 | -3,256 | 209 |
| Slovakia | 454 | 163 | 35.9 | 78 | 105 | 134.6 | 376 | 58 |

Source. as in table 2.

Table 4
Changes in the population figures by economic age groups in the Visegrad Group countries taking into account demographic projection

| Country | Years | | | | | | Dynamics indicator | |
|---|---|---|---|---|---|---|---|---|
| | 1990 | 2004 | 2009 | 2015 | 2030 | 2060 | 2015/1990 1990 – 100 | 2060/2015 2015 – 100 |
| Percentage of pre-working age people (0–14) | | | | | | | | |
| EU 28 | – | 16.4 | 15.7 | 15.6 | 14.9 | 15.0 | 95.1* | 96.1 |
| Czech Rep. | 21.7 | 15.2 | 14.2 | 15.2 | 14.7 | 15.4 | 70.0 | 71.0 |
| Hungary | 20.5 | 15.9 | 14.9 | 14.5 | 14.4 | 14.4 | 70.7 | 99.3 |
| Poland | 25.3 | 17.2 | 15.3 | 15.0 | 13.7 | 13.0 | 59.3 | 86.7 |
| Slovakia | 25.5 | 17.6 | 15.6 | 15.3 | 12.9 | 11.5 | 60.0 | 75.2 |
| Percentage of working-age people (15–64) | | | | | | | | |
| EU 28 | – | 67.2 | 67.0 | 65.5 | 61.2 | 56.6 | 97.4* | 86.4 |
| Czech Rep. | 65.8 | 70.8 | 70.9 | 67.0 | 63.1 | 56.3 | 101.8 | 84.0 |
| Hungary | 66.3 | 68.6 | 68.7 | 67.6 | 63.7 | 56.2 | 102.0 | 83.1 |
| Poland | 64.7 | 69.8 | 71.2 | 69.6 | 63.7 | 54.1 | 107.6 | 77.7 |
| Slovakia | 64.2 | 70.8 | 72.2 | 70.7 | 65.7 | 53.3 | 110.1 | 75.4 |
| Percentage of people outside of working age 65+ | | | | | | | | |
| EU 28 | – | 16.4 | 17.3 | 18.9 | 23.9 | 28.4 | 115.2* | 150.26 |
| Czech Rep. | 12.5 | 14.0 | 14.9 | 17.8 | 22.2 | 28.3 | 142.4 | 158.9 |
| Hungary | 13.2 | 15.5 | 16.4 | 17.9 | 21.9 | 29.4 | 135.60 | 164.2 |
| Poland | 10.0 | 13.0 | 13.5 | 15.4 | 22.6 | 32.9 | 154.0 | 213.6 |
| Slovakia | 10.3 | 11.6 | 12.2 | 14.0 | 21.4 | 35.1 | 135.9 | 250.7 |

* for the EU 28 – dynamic indicator (2015/2004)
Source: as in table 2.

A few important detailed conclusions can be drawn by analysing data from table 4. First, in the period between 1990 and 2004, a clear increase in the percentage of working-age people was observed in the Visegrad Group countries. However, the growth rate of this age group varied in the countries analysed. The biggest growth in working-age population was recorded in Slovakia (increase of 11.7%) and in Poland (increase of 7.8%), whereas the lowest one was in Hungary (increase of 0.7%) and in the Czech Republic (increase of 5.8%). Secondly, a different situation was observed between 2004 and 2015. There were clear differences in the dynamics of growth of the working-age population. Each of the countries analysed saw a decrease in the share of working-age population in the total population. Thirdly, trends are expected to continue with further shrinking of the potential labour force but with slightly different dynamics, based on the projection data the presented above. It can thus be concluded that the decrease in the growth rate of the working-age population has become especially evident in these countries since 2004. Direct causes of labour force ageing and a general decrease include, among other things, a decrease in fertility rate and a longer life expectancy; whereas indirect causes are migration processes, as post-accession migration

means, especially in Poland, not only outflow of adults but also a decline in births of a dozen or so thousands annually (e.g. – 37.5 thousand for 2011). On the other hand, for the receiving country migration means an increase in the number of births (more and more children of Polish mothers are born abroad). Thus, it has far-reaching consequences for an emigration country in terms of population processes (decline of the potential labour force), and even if part of the migrants return to their homeland in the future, the impact of EU expansion will be visible for a long time in the age structure of the population, especially in Poland.

## Labour market and migration processes

Analysis of relationships between the labour market and migration intensity can be considered in two ways: as the impact of migrations on the labour market and as the impact of the labour market on the scale and intensity of migrations. Following the earlier assumption, the analysis will be narrowed down to impacts of the effects of migrations on labour markets in individual countries of the Visegrad Group.

The downward trend in labour market participation of people aged 55 and over has been present for many years in European countries with a developed market economy, causing concern due to a predicted decrease in the number of working age people and the accelerated ageing of the labour force and the population. After 1989, similar changes have been observed in Central and Eastern European countries. According to KOTOWSKA (2005, p. 117–169) and LERIDON (2005, p. 68–74), various activities undertaken in the 1990s in an increasing number of countries looking for ways to increase labour market participation of older people at working age reflect how important it is for governments to reverse the early retirement trend. Also in the context of migration intensity, governments of the individual countries of the Visegrad Group have undertaken appropriate actions in this respect. In the face of the process of population ageing, the Czech government is attempting to attract especially qualified workers from developing countries. The country does not have any barriers to external labour migration with the exception of illegal migration. Labour migration is supported principally with regard to the future needs of the economy. Czech Government migration policy is relatively liberal and supports legal external immigration and the integration of immigrants. A state supported concept of immigrant integration was adopted in 1999 which emphasizes the integration of foreigners and the stabilization of migration flows. The aim of the migration policy of the Czech government during the economic crisis was to keep new immigration under control (slowdown or stop)

and to retain those labour migrants who had already been living long-term (over 1 year) in the Czech Republic (BRYCHTA 2013, p. 1, DRBOHLAV 2005, p. 1, HORAKOVA, 2000, p. 18–22)

As for Slovakia, the current demographic development shows that the Slovak labour market and the system of social security are significantly dependent on the inflow of human capital from abroad. Therefore in the upcoming years, the economic migration must be based on active and flexible control of receiving aliens who decide to come to that country. The economic migration control must resolutely react to the challenges brought by the global competition for talents and this especially through an active search and creation of preconditions for their arrival in Slovakia. Therefore the Slovak Republic will adopt policies aimed at an active support for economic migrants and employment of migrants from third countries in compliance with the needs of the national economy and labour market with an emphasis on receiving and employment of highly qualified employees, scientific workers, and other qualified migrants as necessary (The Government of the Slovak Republic Resolution No. 574. 2011).

As for Hungary, this country started to become a potential magnet for immigration in the 1990s, i.e. the period of transformation and democratic changes. However, the Hungarian immigration policy is incoherent. Under the policy, immigrants arriving from the European Union, those from outside it and those of Hungarian origin are subject to different treatment, with the latter having all privileges. Generally, the current government has an unfriendly attitude to the phenomenon of immigration of people of non-Hungarian origin, stating that an active pro-immigration policy following Western European models cannot be a remedy for the demographic crisis and the low birth rate. Instead, the government often emphasises an alternative need to pursue a strong family-friendly policy and "national solidarity of all Hungarians". On the other hand, Hungary leads among European countries in terms of antidiscrimination laws. This shows that the Hungarian immigration policy has both weaknesses and strengths (KWIDZIŃSKI 2014). As for Poland, the country also undertook important activities in the area of migration policy, especially in the context of observed demographic tendencies. Due to the access to EU labour markets and the resulting post-accession mass migrations, the Polish migration policy faced completely new challenges, which include the necessity of increased protection of the interests of Polish citizens staying outside the country, supporting return migrations and maintaining contacts with Polish emigrants (the last emigration wave is mainly temporal mobility of young population with unspecified migration plans) as well as the necessity of filling the gap in the Polish labour market as a result of an increased wave of emigration from Poland (*Polityka migracyjna Polski – stan obecny i postulowane działania* 2012).

Table 5

Selected characteristics of migration in the Visegrad Group countries

| Country | Effects of migration | Migration type | Net migration | Selected causes |
|---|---|---|---|---|
| Czech Republic | in-flow of immigrants with high qualifications. Mitigation of population ageing effects | dominating economic migration | prevalence of immigrants – increased share of immigrant work force in employment | favourable situation on the labour market. Salary relation Economic situation Liberal migration policy Population policy. Dominant role of attracting factors |
| Hungary | in-flow of immigrants with different level of education. Selective outflow of highly qualified human capital. Filling the gap in work force in the different sectors of the economy. Mitigation of population ageing effects. Strengthening of the position of immigrants of Hungarian origin Improving the labour market situation and filling in shortages of work force | dominating economic migration Repatriation prevalence of immigrants of Hungarian origin Reemigrations | prevalence of immigrants – increased share of immigrated work force in employment | dominating role of administrative and political pull factors Lack of a coherent migration policy, partly connected with migration crisis Economic situation Salary relation |
| Poland | In-flow of immigrants to fill in shortages of workers on the labour market in the different sectors of the economy industry, construction, agriculture, medical services. Improving situation on the labour market. Selective outflow of human capital with varied level of skills and education Increasing emigration of medical staff | dominating economic migration, reemigrations | lack of balance – prevalence of emigrants Projected balance through increasing the share of immigrant work force | dominant role of pull factors. Economic situation Unfavourable situation on the labour market. Chronic surplus of labour supply. Salary relation Structural mismatches on the labour market Migration policy |
| Slovakia | in-flow of immigrants to mitigate effects of population ageing and fill in employee shortages in the different sectors of the economy, industry, agriculture Selective outflow of human capital with varied level of education | dominating economic migration Reemigrations to a lesser degree | approaching the balance Increasing share of immigrant work force | dominant role of pull factors. Economic situation Migration policy Salary relation |

Source: own work.

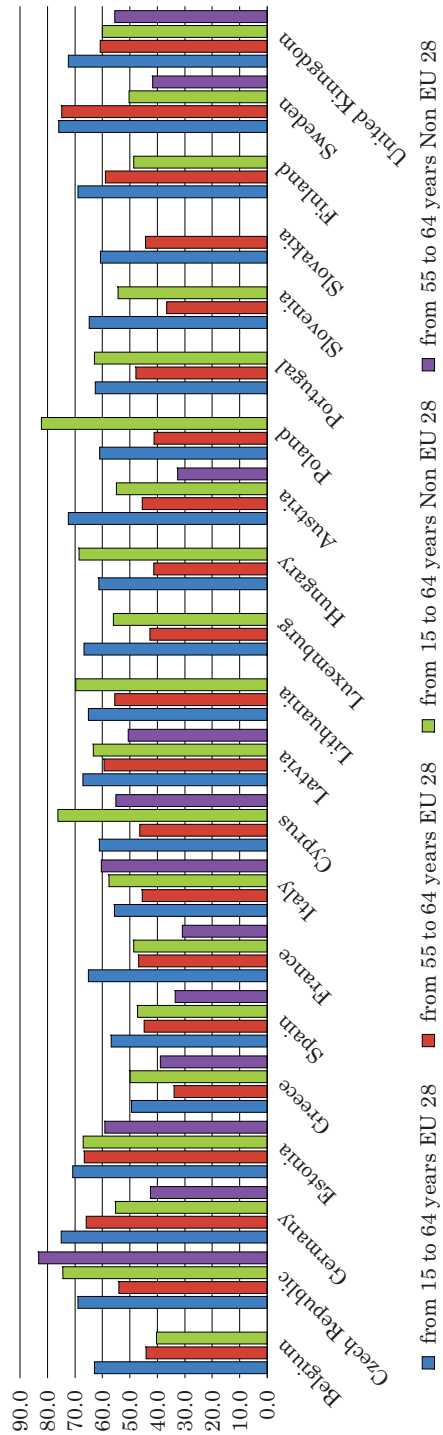


Fig. 2. Immigrant employment rate by age and origin in selected EU countries in 2014 [in %]

Source: as in table 2.

In the context of observed demographic tendencies, the main aim of a migration policy in the different countries from the Visegrad Group is, as mentioned earlier, to take actions to mitigate the effects of population ageing, among other things. Now let's look at the economic activity of immigrants in EU countries.

Analysing labour market participation rates for immigrants, several important detailed conclusions can be drawn. First, in the Visegrad Group countries employment rates for immigrants aged 15–64 from outside the EU were significantly higher than in Western European countries and Scandinavia. The reverse situation can be observed in Western European countries and Scandinavia. Employment rates for immigrants from EU countries were significantly higher in Western European and Scandinavian countries than in the Visegrad Group countries, except for the Czech Republic. It can be thus concluded that incoming foreigners are complementary to the local labour force. This situation is connected, among other things, with migration policies pursued in the Visegrad Group countries in connection with consequences of

Table 6

Employment rate in the Visegrad Group countries between 2004–2015

| Countries | Years | | | Dynamics of changes 2015/2004 2004 – 100 |
|---|---|---|---|---|
| | 2004 | 2009 | 2015 | |
| | Employment rate in selected age of group | | | |
| 15–24 | | | | |
| UE 28 | 35.6 | 34.8 | 35.0 | 98.3 |
| Czech Rep. | 27.7 | 26.5 | 28.4 | 102.5 |
| Hungary | 23.3 | 18.1 | 25.7 | 110.3 |
| Poland | 21.1 | 26.8 | 26.0 | 123.2 |
| Slovakia | 26.3 | 22.8 | 23.3 | 88.6 |
| 15–64 | | | | |
| UE 28 | 62.7 | 64.5 | 65.6 | 104.6 |
| Czech Rep. | 64.1 | 45.4 | 70.2 | 109.5 |
| Hungary | 56.6 | 55.0 | 63.9 | 112.9 |
| Poland | 51.4 | 59.3 | 62.9 | 122.4 |
| Slovakia | 56.7 | 60.2 | 62.7 | 110.6 |
| 55–64 | | | | |
| UE 28 | 40.4 | 45.9 | 53.3 | 131.9 |
| Czech Rep. | 42.5 | 46.8 | 55.3 | 130.1 |
| Hungary | 30.1 | 31.9 | 45.3 | 150.5 |
| Poland | 26.1 | 32.3 | 44.3 | 169.7 |
| Slovakia | 26.0 | 39.5 | 47.6 | 183.1 |

Source: as in table 2.

the process of population ageing. As for Western European and Scandinavian countries, immigrants from the EU have the best chances to find employment. Summing up the discussion above, it is impossible to clearly establish to what extent the migration policies of the different countries impact the improvement of their demographic situations, but undoubtedly the inflow of immigrants can only mitigate the effects of population ageing in these countries and fill in shortages of employees with specific qualifications. In the context of observed demographic tendencies, it is worth analysing the basic economic quantities characterising labour market.

In the first period of analysis, i.e. between 2004 and 2009, a decline in employment rates for the 15–24 age group was observed in all the countries of the Visegrad Group, except for Poland. For the 15–64 age group, a decline in employment was recorded in the Czech Republic and Hungary.

The other countries saw an increase. Meanwhile, for the 55–64 age group, employment indicators recorded an increase in these countries. The reversal of unfavourable trends in changes in labour market participation, in particular for older people of working age, may have resulted, among other things, from pension system reforms and labour market reforms implemented in several EU countries (SCHERER 2008, p. 61, ZSUZSA 2013, p. 9) Changes of employment indicators were also connected, among other things, with the emergence of a global crisis, but also, indirectly with migrations. In the subsequent period, i.e. between 2009 and 2015, there was an increase in employment rates in all age groups, especially in the age group of 55+, which is very important from the perspective of an ageing labour force. The biggest growth was recorded in the Czech Republic and Slovakia, whereas the lowest growth was recorded in Hungary and Poland, where labour market participation rates, especially for the 55–64 age group, are among the lowest in the European Union. Now let's also look at the changes in unemployment rates for identified age groups.

The data in fig. 3 shows that the impact of migration on the unemployment rate can be observed in a short time horizon. Emigration of population, especially younger age groups, leads to a decrease in the unemployment rate in the short-term. This relationship is particularly visible in the period between 2004 and 2009, especially in Poland and Slovakia. Increased immigration to such countries as the Czech Republic and Hungary may lead to an increase in the unemployment rate. An example of this can be changes in the unemployment rate in the periods between 2009 and 2015 and between 2004 and 2009 in Hungary. Analysis of the 15–64 age group also shows some correlations. Emigration contributed to the fall in the unemployment rate, especially between 2004 and 2009 in Poland and Slovakia.

In the case of the Czech Republic, increased immigration did not cause an increase in the unemployment rate in the time periods analysed. Some

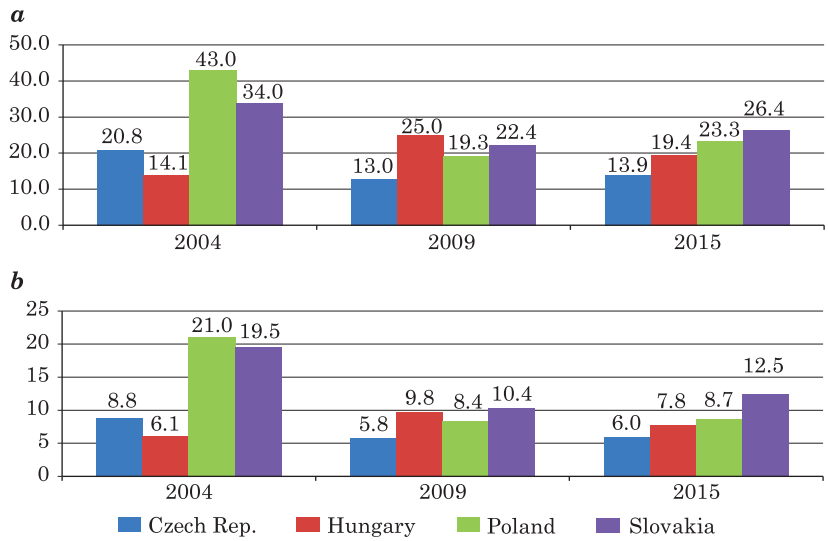


Fig. 3. Unemployment rate by age group in the Visegrad Group countries between 2004 and 2015: *a* – 15–24, *b* – 15–64

Source: as in table 2.

patterns can also be identified in the impact of the unemployment rate on migration intensity. Countries with relatively low unemployment rates see increased immigration, observed also in Poland and Slovakia, especially between 2009 and 2015. It should be stressed however that correlations between unemployment rate and migration intensity must be treated with caution. Based on the analyses conducted, it can be concluded that an in-flow of immigrants does not contribute significantly to an increase in the unemployment rate in a given country. Thus, the statement that the level of migration potential depends on the unemployment rate cannot be fully justified, especially in the longer time horizon, as in some countries a high unemployment rate (Italy) did not cause a sharp increase in emigration levels and immigration levels did not decrease. It can be thus concluded that what is important is not the situation in the labour market at a given time, but hope for its improvement in the near future (Sitek 2008, p. 108–111, Kaczmarczyk, Okólski 2008, p. 599–624). In a longer time horizon, demographic conditions are and will be an important premise for the migration of the labour force. They do not have a negative impact on the labour market, but rather fill in a gap in it.

## Conclusion

The discussion above shows that migration processes have a significant impact on labour markets in the Visegrad Group countries with varying intensity in the form of:

– impact on the age structure of the population, causing population ageing and as a consequence ageing and shrinking of the potential labour force,

– outflow of labour force, in particular the working-age mobile population, especially in Poland and Slovakia,

– in-flow of immigrants to all the Visegrad Group countries, especially in the Czech Republic and Hungary (bigger share of immigrants from outside the EU),

– in the context of the process of population ageing, there is an increase in labour market participation of the population belonging to older age groups of 55+ in all the countries analysed and higher employment rates for immigrants from outside the EU than e.g. in Westerns European and Scandinavian countries,

– analyses showed a short-term impact of migration processes on the unemployment rate,

– in the Visegrad Group countries, economic migrations dominate, with their causes being mainly the economic situation, the situation in the labour market and migration policy.

Summing up, population mobility is apart from birth rate one of the most important factors impacting the demographic situation of a given country and as a consequence the number of potential employees. In the face of a low birth rate and the related problem of the ageing of European populations, the role of international migration on the state and structure of the population is growing and will probably continue to grow.

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# BANKS' CREDIT RATINGS INFLATION

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K e y w o r d s: banks' credit ratings, credit rating inflation, financial indicators, probit panel data models.

A b s t r a c t

The aim of the paper is to verify the significance of the credit ratings' inflation phenomenon of banks' notes. First, a literature review was prepared. The following hypotheses were then put: Banks' credit rating inflation has been observed. There are differences between the impact of the financial factors on banks' credit ratings between notes that are given by one or more credit rating agencies to the same entity. The analysis was prepared by using probit panel data models. Data has been collected from the Thomson Reuters database. Long term issuer credit ratings proposed by S&P, Fitch and Moody were used as a dependent variable. As independent factors the financial indicators and macroeconomic variables were measured. The comparison of notes given by credit rating agencies suggests that notes that are given by all CRAs are similar. The same results were received when the notes given by two agencies were compared. Differences are observed only in the case of ratings given by one institution. If a CRA is bigger, notes proposed by them are higher. A list of variables that are taken by a particular credit rating agency can be created regardless of whether the evaluation is one or more CRAs. The strength of impact of the described factors is differentiated.

## INFLACJA RATINGÓW KREDYTOWYCH BANKÓW

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S ł o w a k l u c z o w e: rating kredytowy banków, inflacja ratingów kredytowych, wskaźniki finansowe, panelowe modele probitowe.

A b s t r a k t

Celem pracy była weryfikacja występowania zjawiska inflacji ratingów kredytowych. Przygotowano przegląd literatury. Postawiono następujące hipotezy: „istnieje inflacja ratingów kredytowych banków"; „obserwuje się różnice między wpływem poszczególnych wskaźników

finansowych na ratingi kredytowe banków, które są nadawane przez jedną lub więcej agencji ratingowych temu samemu podmiotowi". Do weryfikacji hipotez zastosowano probitowe modele panelowe. Dane zebrano z bazy Thomson Reuters. Zmienną zależną wykorzystaną do badania były długoterminowe ratingi kredytowe emitenta proponowane przez S&P, Fitch i Moody. Jako zmienne niezależne zastosowano wskaźniki finansowe poszczególnych banków i zmienne makroekonomiczne wpływające na sytuację i stabilność finansową banku. Porównanie not ratingowych nadawanych przez agencje sugeruje, że ratingi są podobne. Te same wnioski otrzymano po porównaniu ratingów dwóch agencji. Różnice występują tylko w przypadku not nadawanych przez jedną agencję. Jeżeli agencja jest większa, proponowane noty są wyższe. Lista zmiennych wykorzystywanych przez poszczególne agencje zależy od tego, czy noty są proponowane przez jeden podmiot czy kilka podmiotów. Siła wpływu opisanych czynników jest zróżnicowana.

## Introduction

Credit rating agencies (CRAs) are responsible for the reduction of information exchanged between investors and issuers. The measure of the risk assessment relies on credit ratings presented by them. The last financial crisis caused their reputation to decrease because of their too slow reaction to the financial condition of the assessed entity.

The presented literature suggests that two phenomena can be observed here. The first of them is the "credit rating shopping", which relies on the assumption that an issuer is not likely to pick the highest rating if it discloses all the ratings from agencies they have approached (STROBL, XIA 2012). The second phenomenon that has been noticed during the last financial crisis is the "credit rating inflation", which relies on giving higher notes to an issuer to acquire new customers or retain the existing ones. The aim of the paper has been to analyse the second of the mentioned phenomenon. The previous researches that take into consideration the credit rating inflation have been prepared for non-financial entities. There is a lack of analyses that verify the differences between credit ratings given by CRAs to banks.

As a result, the aim of the paper was to verify the significance of the credit ratings' inflation phenomenon of banks' notes. The following hypotheses were put: Banks' credit rating inflation has been observed. There are differences between the impact of the financial factors on banks' credit ratings between notes that are given by one or more credit rating agencies to the same entity. The analysis has been prepared by using probit panel data models for banks' long-term issuer credit ratings.

The paper is organized as follows. Section 2 presents the broader literature researches. Section 3 describes the methodology and data. Next, the results of exploring the relation between the differences between notes that are given by CRAs to the same bank are presented. The factors influencing banks' credit ratings were also analysed. Section 4 concludes.

## Literature review

Issuers can receive notes from different credit rating agencies. In previous researches a phenomenon has been observed according to which higher notes are given by CRAs to an entity to acquire a new client. As a result, credit ratings can be higher than the financial condition would suggest. The main group of CRAs that try to compete for a customer are the biggest three credit rating agencies, that is, S&P, Fitch and Moody. In the current literature review the credit rating inflation of the non-financial institutions has been taken into consideration.

The differences between credit ratings can be connected with the competition between CRAs (SKRETA, VELDKAMP 2009, BOLTON et al. 2010, MATHIS et al. 2009, CAMANHO et al. 2012, MANSO 2012, GOEL, THAKOR 2015). In the opinion presented by researches such an increased competition can create a credit inflation phenomenon. The mentioned situation is strictly connected with the fight for a market share. Credit rating agencies offer better notes to attract a new customer or keep an existing one. Ratings higher than those received during the estimation process are strictly connected with their quality decrease. On the other hand, DOHERTY et al (2012) find that the new credit rating agencies can compete in credit ratings quality. In their opinion a new credit rating agency entering the market could help to improve the quality and accuracy of notes. Such a situation could be beneficial to issuers with low risk, even though a reduction in broadcasting costs has not been observed.

The inflation of credit ratings can relate to the type of financial instruments that has been emitted by issuers and the goal of using credit ratings. A higher inflation of notes has been observed if credit ratings are used for analysing the risk and hedging against the risk required by the regulations (OPP et al. 2010, SKRETA, VELDKAMP 2009).

The next reason for giving to high notes is connected with the unclear methodology of the risk assessment used by CRAs (SKRETA, VELDKAMP 2009, PAGANO, VOLPIN 2012). Credit rating agencies publish only the basic information about the factors that have been taken into consideration during the estimation of the default risk. They use qualitative variables and non-describe indicators.

The next group of factors influencing the rating inflation are the value of fines and the restrictiveness of the policy about credit ratings and CRAs that has been implemented by governments, and the frequency of control (SANGIORGI et al. 2009, CHODNICKA-JAWORSKA 2016, KARTASHEVA, YILMAZ 2012). If the policy connected with CRAs and notes given by them is more restrictive, credit ratings are lower. On the other hand, the moment of the business cycle (BOLTON et al. 2010, BAR-IZAAK, SHAPIRO 2010, CHEN et al. 2013) can also have

a significant impact on the mentioned phenomenon. During a recession ratings are lower, because CRAs take care of their reputation risk. The risk of a decline of the image of an agency is lower during an economic boom, and as a result they can give higher notes than results of estimation of default risk suggest. The impact of the reputational risk on credit rating inflation has also been described by HARTMAN-GLASER (2013). The reputational risk can be analysed in two ways. On the one hand, CRAs should be treated as those that properly analyse the issuer risk and reduce the asymmetry of information between investors and issuers, and on the other hand they want to acquire customers (BOUVARD, LEVY 2012, FRENKEL 2013).

Credit rating agencies publish also two types of notes. The first one are ratings paid by issuers, the second one are those unpaid. FULGHIERI et al. (2013) and BANNIER et al. (2010) found that the issuance of unfavourable unsolicited credit ratings enables rating agencies to extract higher fees from issuers. The described situation relies on encouraging the issuer to apply for assigning ratings. On the other hand, higher unsolicited ratings increase agencies' reputation. Unsolicited credit ratings are lower than solicited ratings.

Differences between notes given by particular CRAs have been observed. The credit rating inflation has been observed in the case of notes given by bigger agencies and those notes that are paid by issuers rather than investors (STROBL, XIA 2012, XIA 2012, 2010, HIRTH 2013). The change of the source of financing has also an impact on the quality of credit ratings. JIANG et al. (2012) found that changes from the investor on issuer paid notes cause a credit rating inflation. CRAs that rely on investor paid models react faster to the changes of the financial condition of an issuer (CORNAGGIA, CORNAGGIA 2013). On the other hand, MORGAN (2002) and LIVINGSTON et al. (2010) suggest that Moody's notes are lower than the S&P's, that can be an effect of the share of the market (BECKER, MIBOURN 2011). BENMELECH and DŁUGOSZ (2009) found that notes that are given only by one CRAs are lower.

Also the size of the assessment issuer has got a significant impact on the credit rating inflation phenomenon. If the issuer is bigger, the credit rating is higher than in the case of a smaller entity in a similar financial condition (HE et al. 2011). The same situation has been observed for the size of tranche (JOSEPHSON, SHAPIRO 2015). On the other hand, KIM and PARK (2016) suggest that a credit rating inflation is observed especially in the case of countries' notes.

The next factor that has been analysed is the period of cooperation time between an issuer and a CRA. If the mentioned period is longer, notes are higher and increase the credit ratings inflation (MÄHLMANN 2011). CRAs do not want to lose customers, and as a result propose higher notes.

The way of solving the problem of credit rating inflation is sought in the restrictiveness of law and the way of financing notes. The most popular is the issuer-paid model with a restrictive credit rating and CRAs policy (BONGAERTS 2014, CHODNICKA-JAWORSKA 2016). The next way is to finance ratings by investors with a financial assistance from the government (DEB, MURPHY 2009).

Also issuers can have an impact on the inflation notes. They sometimes try to manipulate financial data to receive higher ratings (COHN et al. 2016). In literature we can also find information about a more conservative credit ratings trend (BAGHAI et al. 2013), but the mentioned situation is not an effect of the quality of the financial statements (GU, ZHAO 2006). BAE et al. (2010) suggest that credit rating agencies do not want to change their notes.

Despite the credit rating inflation, the financial market reacts significantly to credit rating changes (KING et al. 2016). As a result, credit ratings comply with their role.

Differences in the previous researches and a lack of analysis of the banking sector or inflation notes have been observed. As a result, the aim of this paper was to verify the significance of the credit ratings' inflation phenomenon of banks' notes. The following hypotheses have been put: A banks' credit rating inflation has been observed. There are differences between the impact of the financial factors on banks' credit ratings between notes that are given by one or more credit rating agencies to the same entity.

## Methodology

Long-term issuer credit ratings proposed by the three largest rating agencies for European banks are used for the analysis. The mentioned data and financial statements are collected from Thomson Reuters database. Credit ratings are taken from the end of the quarter for the period of time between 1998–2015 for 643 banks in 24 countries[1]. Credit ratings have been decomposed linearly (FERRI et al. 1999). Using the linear method of decomposition has been strictly connected with the small number of banks' CDS spreads observations. The mentioned data are used to preparing the code classification. The advantage of using the nonlinear method is taking during the analysis the stage of the business cycle. The linear method can be prepared in two ways.

[1] Albania, Armenia, Austria, Belarus, Belgium, Bosna and Herzegovina, Bulgaria, Croatia, Cyrus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Monaco, Netherlands, Norway, Poland, Portugal, Romania, Russia, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom.

The first one relies on starting from the lowest credit rating and putting it the smallest number, and giving one point more for the higher credit ratings. According to the second method, at first, there have been established the smallest and the highest numerical value of credit ratings and then between them putting the linearly intermediate values. In this paper it has been used the second of the described method. The linear method of decomposition has been introduced in the table below.

Table 1

Decomposition of Moody's, S&P's, Fitch long-term issuer credit ratings

| Moody's Long-term Issuer Rating | | S&P's Long-term Issuer Rating | | Fitch Long-term Issuer Rating | |
|---|---|---|---|---|---|
| Rating | Code | Rating | Code | Rating | Code |
| Aaa | 100 | AAA | 100 | AAA | 100 |
| Aa1 | 95 | AA+ | 95 | AA+ | 94.74 |
| Aa2 | 90 | AA | 90 | AA | 89.47 |
| Aa3 | 85 | AA– | 85 | AA– | 84.21 |
| A1 | 80 | A+ | 80 | A+ | 78.95 |
| A2 | 75 | A | 75 | A | 73.68 |
| A3 | 70 | A– | 70 | A– | 68.42 |
| Baa1 | 65 | BBB+ | 65 | BBB+ | 63.16 |
| Baa2 | 60 | BBB | 60 | BBB | 57.89 |
| Baa3 | 55 | BBB– | 55 | BBB– | 52.63 |
| Ba1 | 50 | BB+ | 50 | BB+ | 47.37 |
| Ba2 | 45 | BB | 45 | BB | 42.11 |
| Ba3 | 40 | BB– | 40 | BB– | 36.84 |
| B1 | 35 | B+ | 35 | B+ | 31.58 |
| B2 | 30 | B | 30 | B | 26.32 |
| B3 | 25 | B– | 25 | B– | 21.05 |
| Caa1 | 20 | CCC+ | 20 | CCC | 15.79 |
| Caa2 | 15 | CCC | 15 | CC | 10.53 |
| Caa3 | 10 | CCC– | 10 | C | 5.26 |
| Caa | 5 | CC | 5 | D | –5 |
| C | 0 | D | –5 | – | |
| D | –5 | – | | | |

Source: own elaboration.

Independent variables include the measure of capital adequacy, quality of assets, management quality, profitability and liquidity factors. To the mentioned factors belong variables described in the table 2. The analysis was prepared for the following subsamples: banks that received notes given by one CRAs, proposed by two agencies and given by Moody, S&P and Fitch.

Table 2

List of the independent variables with description

| Name of variable | Description |
|---|---|
| 1 | 2 |
| Capital adequacy | |
| Tier 1 | This item reflects the ratio of Tier 1 Capital at the end of the fiscal year to total risk-weighted assets for the same period and is expressed as percentage. Tier 1 Capital, also known as core capital, is defined as the sum of common stockholder's equity, certain qualifying issues of preferred stock and minority interest, less goodwill, intangible assets, investments in certain subsidiaries and other adjustments. Regulatory requirements generally mandate this ratio to exceed 4% reported for banks. |
| Leverage ratio | This is the ratio of total assets for the fiscal year to common shareholders equity for the same period and is expressed as percentage. |
| Z-score | This is a ratio of return on assets plus capital-asset-ratio to the standard deviation of return on assets. |
| Assets quality | |
| Loan loss provisions as a percentage of the average total loans | This is the ratio of provision for loan losses for the fiscal year as a proportion of total loans for the same period and is expressed as percentage. |
| Non-performing loans to total loans | Nonperforming loans as a percentage of total loans and other real estate owned. It is calculated as non-performing loans at the end of the fiscal year divided by total gross loans for the same period and is expressed as percentage. |
| Management quality | |
| Efficiency ratio | This is the ratio of non-interest expense for the fiscal year to total revenue less interest expense for the same period and is expressed as percentage. Measures the cost to the bank of each unit of revenue. Lower values are better. |
| Securities as a percentage earnings assets | This is the percentage of average earning assets represented by securities at the end of the fiscal year. This ratio measures the extent to which the bank's income is dependent on investment income rather than interest on loans. |
| Earnings | |
| Net interest income ratio | It shows the difference between interest income earned and the interest paid on borrowings by the bank, as a percentage of its earning assets. |
| Return on equity | This value is calculated as the net income before extraordinary Items for the fiscal year divided by the same period average total equity and is expressed as a percentage. Average total equity is the average of total equity at the beginning and the end of the year. Available for industrial and utility companies. |
| Return on assets | It is calculated as income after tax for the quarter divided by the average total assets for the same period and is expressed as percentage. |
| Operating leverage | This is percent change in net revenue less the percent change in operating expenses for the fiscal year. |

cont. table 2

| 1 | 2 |
|---|---|
| Loan growth | This is the change in total loans from the previous period, expressed as a percentage. |
| Deposit growth | This is the change in total deposits from the previous period, expressed as a percentage. |
| | Liquidity |
| Loan to deposit ratio | This is the ratio of end of the fiscal quarters loans to deposits for the same period. |
| Short-term borrowing to total liabilities | This is the ratio of end of the fiscal quarters short term borrowing to total liabilities for the same period. |
| Liquid assets to total assets | This is the ratio of end of the fiscal quarters liquid assets to total assets for the same period. |

Source: own elaboration.

In this study, I conduct ordered probit panel data models. The presented models are unbalanced. The purpose of the model is to estimate the probability that an observation with particular characteristics will fall into a specific one of the categories. Credit ratings are a qualitative variables that belong to the discontinuous variables. The final version of the model has been presented below:

$$y_{it}^{*} = \beta F_{\mathbf{it}}' + \gamma Z_{\mathbf{it}} + \delta(F \cdot (Z))_{\mathbf{it}} + \varepsilon_{\mathbf{it}},$$

where:

$y_{\mathbf{it}}$ – an unobservable latent variable that measures the credit ratings of a bank $i$ in period $t$ (Fitch Long-Term Issuer Rating, S&P Long-Term Issuer Rating, Moody's Long-Term Issuer Rating) for European banks.

$F_{\mathbf{it}}$ is a vector of explanatory variables, i.e.:

$$F_{\mathbf{it}} = [\text{tier}_{it},\text{lev}_{it},\text{score}_{it},\text{llp}_{it},\text{npl}_{it},\text{ef}_{it},\text{sec}_{it},\text{nii}_{it},\text{roe}_{it},\text{roa}_{it},\text{opl}_{it},\text{lg}_{it},\text{dg}_{it},\text{liq}_{it},\text{dep}_{it},\text{sht}_{it},\text{liq}_{it}],$$

where:

$\text{tier}_{it}$ – the Tier 1 ratio,
$\text{lev}_{it}$ – the leverage ratio,
$\text{score}_{it}$ – the $z$-score ratio,
$\text{llp}_{it}$ – are loan loss provisions as a percentage of average total loans,
$\text{npl}_{it}$ – are non-performing loans to total loans,
$\text{ef}_{it}$ – the efficiency ratio
$\text{sec}_{it}$ – the value of securities as a percentage of earnings assets,
$\text{nii}_{it}$ – the net interest income ratio,
$\text{roe}_{it}$ – the return on equity,

$roa_{it}$ – the return on assets,
$opl_{it}$ – the operating leverage,
$lg_{it}$ – the loan growth,
$dg_{it}$ – the deposit growth,
$liq_{it}$ – the value of liquid assets to total asstes,
$dep_{it}$ – the ratio of loans to deposit,
$sht_{it}$ – the value of short-term borrowing to total liabilities,
$Z_{it}$ – contains time invariant regressors that are generally dummy variables,
$\varepsilon_{it}$ – a random disturbance term.

## Findings

The analysis has been prepared separately on credit ratings that are given by particular CRAs, by two agencies and by all of them (S&P, Fitch and Moody). First a descriptive analysis of using data was made. The higher notes are given to banks by Moody and S&P. The average note that has been presented by the mentioned entities is BBB or BAA. Credit ratings proposed by Fitch are lower, because it is meanly BB. The comparison notes between all CRAs suggest that such strong differences have not been observed. The analysis of the mean of notes suggests that the highest credit ratings have been proposed by Moody, but the difference between Fitch and S&P is one degree. Notes presented by Fitch are more differentiated, which suggests a standard deviation. The mentioned situation can be connected with the fear of the loss of reputation, because when we compare notes that have been given by two agencies, the differences are more noticeable. For example, notes presented by Moody are higher than those given by Fitch. The standard deviation in the case of Fitch is higher. The same situation has been observed for S&P and Fitch together. In the case of Moody and S&P the relation is comparable. The mentioned situation suggests that the first hypothesis saying that banks' credit rating inflation has been observed should be rejected. In the case of banks' credit ratings the strong supervisory, reduce the default risk, as a result the credit rating inflation is low or virtually non-exist.

The next part of the analysis relies on defining the more important factors that were taken into consideration by particular credit rating agencies.

Results of estimation of banks' credit ratings determinants have been presented in Table 4. The analysis has been made by using ordinary probit panel data models. The received findings suggest that there are differences between the methodology used by particular credit rating agencies. Differences were also observed between factors influencing notes depending on whether

Table 3

Descriptive statistics

| Variable | Separately | | | | | | | | | | | | | | | S&P, Fitch, Moody | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S&P | | | | | Moody | | | | | Fitch | | | | | S&P, Fitch, Moody | | | | |
| | obs. | mean | std | min. | max | obs. | mean | std. | min. | max | obs. | mean | std. | min. | max | obs. | mean | std. | min. | max |
| ef | 93 | 54.73 | 87.88 | -600.00 | 267.60 | 0 | – | – | – | – | 19 | 49.26 | 13.75 | 22.42 | 82.69 | 0 | | | | |
| opl | 514 | 0.49 | 56.46 | -395.28 | 806.94 | 23 | 18.06 | 205.75 | -662.16 | 514.76 | 277 | -74.8 | 1,267.23 | -21,059.19 | 582.08 | 236 | 2.09 | 49.33 | -218.32 | 470.63 |
| llp | 457 | 0.33 | 0.86 | -7.67 | 13.23 | 22 | 0.32 | 0.32 | -0.11 | 1.23 | 234 | 0.25 | 0.55 | -1.55 | 5.36 | 231 | 0.10 | 0.28 | -0.08 | 2.82 |
| npl | 61 | 10.99 | 13.79 | 0.14 | 74.20 | 0 | – | – | – | – | 73 | 10.32 | 18.72 | 0.43 | 100.88 | 16 | 0.11 | 0.05 | 0.06 | 0.27 |
| tier | 322 | 10.99 | 3.79 | 6.50 | 52.05 | 20 | 9.85 | 1.78 | 6.33 | 13.00 | 72 | 9.94 | 3.14 | 6.30 | 17.70 | 114 | 7.61 | 1.62 | 5.78 | 12.90 |
| dep | 540 | 1.06 | 0.41 | 0.00 | 2.90 | 23 | 0.83 | 0.21 | 0.46 | 1.34 | 279 | 11.97 | 122.47 | 0.20 | 1,917.59 | 237 | 1.26 | 0.50 | 0.40 | 2.77 |
| sec | 584 | 19.44 | 24.77 | 0.08 | 100.00 | 23 | 14.14 | 11.05 | 1.55 | 35.40 | 274 | 20.91 | 17.26 | 0.00 | 62.19 | 195 | 28.54 | 14.46 | 5.23 | 55.13 |
| roa | 598 | 0.12 | 1.54 | -19.80 | 7.65 | 22 | 0.04 | 0.80 | -1.63 | 2.38 | 268 | 0.52 | 1.61 | -11.95 | 16.34 | 231 | 0.15 | 0.11 | -0.58 | 0.77 |
| roe | 44 | -6.02 | 13.72 | -66.94 | 11.27 | 0 | – | – | – | – | 0 | – | – | – | – | 0 | – | – | – | – |
| dg | 531 | 0.05 | 0.48 | -0.91 | 10.14 | 14 | -0.13 | 0.23 | -0.83 | 0.03 | 218 | 0.05 | 0.33 | -1.00 | 3.55 | 204 | 0.03 | 0.10 | -0.41 | 0.91 |
| lg | 493 | 0.06 | 0.95 | -0.95 | 20.89 | 14 | -0.13 | 0.19 | -0.67 | 0.01 | 223 | 0.06 | 0.26 | -0.81 | 1.89 | 204 | 0.02 | 0.11 | -0.49 | 0.96 |
| lev | 631 | 13.08 | 40.30 | -920.50 | 185.99 | 23 | 48.90 | 50.79 | 6.51 | 224.91 | 284 | 13.26 | 8.65 | 1.33 | 44.78 | 237 | 49.92 | 158.48 | 11.90 | 1,892.63 |
| nii | 541 | 0.07 | 0.06 | -0.01 | 0.44 | 23 | 0.03 | 0.02 | 0.01 | 0.11 | 269 | 0.09 | 0.14 | 0.01 | 0.95 | 150 | 0.03 | 0.02 | 0.00 | 0.11 |
| sht | 90 | 0.12 | 0.13 | 0.00 | 0.48 | 1 | 0.46 | . | 0.46 | 0.46 | 111 | 0.15 | 0.27 | 0.00 | 0.94 | 64 | 0.23 | 0.15 | 0.05 | 0.58 |
| liq | 584 | 0.05 | 0.06 | 0.00 | 0.30 | 23 | 0.04 | 0.02 | 0.01 | 0.12 | 279 | 0.07 | 0.07 | 0.00 | 0.36 | 151 | 0.02 | 0.01 | 0.00 | 0.07S |
| Pf | 3,103 | 61.41 | 22.95 | 0.00 | 100.00 | – | | | | | – | | | | | 2,870 | 73.89 | 15.55 | 0.00 | 95.00 |
| MoodyF | – | | | | | 254 | 60.26 | 16.41 | 20 | 85 | – | | | | | 2,580 | 79.09 | 13.64 | 0.00 | 100.00 |
| Fitchf | – | | | | | – | | | | | 1,329 | 44.57 | 27.84 | 0 | 100 | 1,775 | 73.33 | 21.24 | 0.00 | 100.00 |

cont. table 3

| Variable | Fitch, Moody | | | | | Fitch, S&P | | | | | Moody, S&P | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | obs. | mean | std. | min. | max | obs. | mean | std. | min. | max | obs. | mean | std. | min. | max |
| ef | 0 | | | | | 9 | 46.97 | 71.11 | -140.67 | 92.21 | 6 | 46.32 | 12.53 | 28.64 | 65.44 |
| opl | 16 | 0.66 | 21.69 | -41.69 | 58.94 | 328 | -0.03 | 54.34 | -278.90 | 457.72 | 39 | -30.78 | 165.14 | -701.32 | 454.51 |
| llp | 14 | 0.10 | 0.12 | -0.06 | 0.45 | 270 | 0.27 | 0.72 | -1.30 | 8.49 | 35 | 0.18 | 0.14 | 0.01 | 0.71 |
| npl | 3 | 0.19 | 0.02 | 0.16 | 0.21 | 25 | 47.30 | 127.90 | 0.77 | 432.69 | 9 | 4.30 | 1.93 | 1.36 | 6.24 |
| tier | 4 | 9.99 | 1.71 | 8.40 | 11.84 | 150 | 9.37 | 3.21 | 3.39 | 16.50 | 36 | 12.10 | 2.65 | 7.10 | 16.79 |
| dep | 17 | 4.23 | 6.88 | 1.38 | 27.09 | 325 | 1.50 | 5.44 | 0.00 | 75.60 | 24 | 0.83 | 0.05 | 0.71 | 0.93 |
| sec | 17 | 5.93 | 5.68 | 0.50 | 17.42 | 333 | 22.70 | 15.71 | 0.79 | 81.15 | 36 | 34.23 | 6.53 | 1.28 | 42.29 |
| roa | 16 | 0.37 | 0.58 | -0.18 | 1.99 | 323 | 0.24 | 0.94 | -9.02 | 8.66 | 35 | 0.11 | 0.65 | -2.71 | 1.32 |
| roe | 0 | – | – | – | – | 0 | – | – | – | – | 0 | – | – | – | – |
| dg | 13 | 0.09 | 0.33 | -0.12 | 1.16 | 247 | 0.03 | 0.09 | -0.22 | 0.98 | 22 | -0.01 | 0.04 | -0.09 | 0.05 |
| lg | 13 | 0.01 | 0.03 | -0.06 | 0.07 | 243 | 0.03 | 0.13 | -1.00 | 1.62 | 35 | -0.01 | 0.06 | -0.27 | 0.18 |
| lev | 17 | 16.56 | 4.25 | 7.57 | 20.18 | 340 | 19.09 | 9.72 | 4.25 | 50.79 | 36 | 18.93 | 3.99 | 14.79 | 34.27 |
| nii | 17 | 0.20 | 0.05 | 0.10 | 0.27 | 299 | 0.08 | 0.10 | 0.01 | 0.81 | 36 | 0.03 | 0.04 | 0.00 | 0.26 |
| sht | 3 | 0.93 | 0.01 | 0.92 | 0.95 | 110 | 0.10 | 0.09 | 0.00 | 0.30 | 23 | 0.00 | 0.00 | 0.00 | 0.00 |
| liq | 17 | 0.01 | 0.01 | 0.00 | 0.02 | 311 | 0.04 | 0.05 | 0.00 | 0.20 | 36 | 0.02 | 0.01 | 0.01 | 0.05 |
| Fitchf | 178 | 50.09 | 40.25 | 0.00 | 100.00 | 2,991 | 58.03 | 25.27 | 0.00 | 94.74 | – | – | – | – | – |
| MoodyF | 118 | 72.67 | 27.58 | 20.00 | 100.00 | – | – | – | – | – | 475 | 62.66 | 14.31 | 25.00 | 85.00 |
| SPf | – | – | – | – | – | 3,750 | 62.05 | 17.15 | 0 | 90 | 558 | 59.68 | 15.88 | 0.00 | 80.00 |

Source: own calculations.

Findings of estimation of determinants of banks' credit ratings

Table 4

| Variable | Separately | | | | | | ALL | | | | | | Moody, S&P | | | | Fitch, S&P | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | S&P | | Moody | | Fitch | | Fitch | | Moody | | S&P | | Moody | | S&P | | Fitch | | S&P | |
| | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* | Coef. | *P>z* |
| sec | 0.00 | 0.63 | -0.73 | 0.00 | 0.01 | 0.20 | 0.00 | 0.98 | -0.02 | 0.71 | 0.38 | 0.00 | 1.78 | 0.00 | 1.69 | 0.05 | -0.06 | 0.08 | -0.26 | 0.00 |
| roa | 1.91 | 0.00 | -2.11 | 0.03 | 2.81 | 0.00 | 1.36 | 0.77 | 16.90 | 0.00 | 26.72 | 0.01 | -2.32 | 0.12 | -4.34 | 0.07 | 0.07 | 0.84 | 1.13 | 0.77 |
| lev | 0.14 | 0.00 | – | – | 0.12 | 0.00 | -0.11 | 0.00 | -0.03 | 0.00 | -0.15 | 0.00 | – | – | – | – | – | – | – | - |
| liq | -12.36 | 0.01 | -51.68 | 0.06 | 6.31 | 0.00 | -14.78 | 0.47 | 69.08 | 0.11 | -34.06 | 0.73 | 188.58 | 0.01 | 7.48 | 0.15 | 45.68 | 0.01 | -18.91 | 0.21 |
| nii | 9.33 | 0.00 | – | – | -0.78 | 0.56 | – | – | – | – | – | – | – | – | – | – | – | – | – | - |
| opl | 0.00 | 0.07 | 0.01 | 0.03 | 0.00 | 0.97 | 0.00 | 0.83 | -0.04 | 0.03 | -0.11 | 0.01 | 0.01 | 0.08 | 0.02 | 0.07 | 0.00 | 0.54 | 0.01 | 0.69 |
| tier | -0.02 | 0.67 | – | – | – | – | – | – | – | – | – | – | -0.34 | 0.25 | -0.50 | 0.32 | – | – | -1.22 | 0.00 |
| dg | – | – | – | – | 0.20 | 0.67 | 1.46 | 0.29 | 1.35 | 0.71 | 2.52 | 0.77 | – | – | – | – | – | – | – | - |
| lg | – | – | – | – | 0.29 | 0.60 | -1.71 | 0.23 | -0.13 | 0.97 | 0.27 | 0.97 | 8.77 | 0.43 | 27.24 | 0.13 | – | – | -0.87 | 0.48 |
| llp | – | – | – | – | 0.73 | 0.04 | -0.69 | 0.77 | -14.17 | 0.00 | -35.38 | 0.00 | -4.00 | 0.18 | -29.31 | 0.05 | – | – | 0.03 | 0.99 |
| dep | – | – | – | – | 0.01 | 0.70 | 3.05 | 0.17 | -2.55 | 0.08 | -1.82 | 0.59 | – | – | – | – | – | – | – | - |
| _cons | – | – | – | – | -3.89 | 0.00 | – | – | – | – | – | – | – | – | – | – | – | – | – | - |
| /cut1 | -8.91 | 0.00 | -28.05 | 0.00 | – | – | -7.40 | . | -17.01 | 0.00 | -6.43 | 0.00 | 53.68 | 0.00 | 43.97 | 0.13 | -3.18 | 0.00 | -3.97 | 0.00 |
| /cut2 | -5.00 | 0.03 | -26.05 | 0.00 | – | – | -6.68 | 0.00 | -16.54 | 0.00 | -6.33 | 0.00 | 56.45 | 0.00 | 53.73 | 0.09 | -3.00 | 0.00 | -3.70 | 0.00 |
| /cut3 | -0.39 | 0.85 | -22.73 | 0.00 | – | – | 0.84 | 0.79 | -16.22 | 0.00 | -6.32 | 0.00 | 57.69 | 0.00 | 55.27 | 0.09 | -1.54 | 0.00 | -3.38 | 0.00 |
| /cut4 | 1.22 | 0.54 | -20.14 | 0.00 | – | – | 4.22 | 0.18 | -15.67 | 0.00 | -6.31 | 0.00 | 60.04 | 0.00 | – | – | -1.28 | 0.00 | -2.73 | 0.00 |
| /cut5 | 2.63 | 0.18 | -11.38 | 0.00 | – | – | 11.25 | 0.08 | -15.53 | 0.00 | -6.21 | 0.00 | 67.12 | 0.00 | – | – | -1.15 | 0.00 | -2.16 | 0.00 |
| /cut6 | 4.18 | 0.03 | -7.73 | 0.00 | – | – | 14.88 | 0.02 | -14.94 | 0.00 | -5.87 | 0.00 | – | – | – | – | -0.74 | 0.04 | -1.59 | 0.00 |
| /cut7 | 4.44 | 0.02 | -4.82 | 0.02 | – | – | – | – | -12.92 | 0.00 | -5.50 | 0.00 | – | – | – | – | -0.53 | 0.13 | -1.19 | 0.00 |
| /cut8 | 6.27 | 0.00 | – | – | – | – | – | – | -10.52 | 0.00 | -4.31 | 0.00 | – | – | – | – | 0.02 | 0.94 | – | - |
| /cut9 | 8.27 | 0.00 | – | – | – | – | – | – | -7.03 | 0.00 | -3.46 | 0.00 | – | – | – | – | 0.24 | 0.49 | – | - |
| /cut10 | 8.67 | 0.00 | – | – | – | – | – | – | -6.55 | 0.00 | – | – | – | – | – | – | 1.07 | 0.00 | – | - |
| /cut11 | 12.82 | 0.00 | – | – | – | – | – | – | -4.79 | 0.00 | – | – | – | – | – | – | 1.90 | 0.00 | – | - |
| no obs | 194 | | 22 | | 181 | | 131 | | 131 | | 131 | | 33 | | 34 | | 216 | | 89 | |
| no group | 15 | | 1 | | – | | 9 | | 9 | | 9 | | 1 | | 1 | | 25 | | 14 | |
| Wald | 0.0000 | | 0.0184 | | | | 0.0019 | | 0.0000 | | 0.0001 | | 0.0332 | | 0.0438 | | 0.0115 | | 0.0000 | |
| Chi | – | | | | 0.0000 | | – | | | | | | | | | | | | | |
| $R^2$ | | | | | 0.3370 | | | | | | | | | | | | | | | |

Source: own calculations.

they were given by one, two or all CRAs for the same bank. Because of the lack of data it was not be possible to prepare an analysis for banks that received notes from both Fitch and Moody. Among the estimation notes taken as the most significant by S&P are: return on assets, loan loss provisions as a percentage of average total loans, net interest income ratio, loan growth, the value of liquid assets to total assets. Moody during the estimation process takes the value of liquid assets to total assets, the rates of return and the loan loss provisions as a percentage of average total loans into consideration. For Fitch the ratio of loans to deposit and the value of liquid assets to total assets have the most significant impact during the estimation process . The presented results suggest that the mentioned variables are the most significant factors, regardless of whether the evaluation is one or more agencies. The mentioned situation can help create a list of variables that should be taken into consideration during the estimation process. The described factors have got a different impact strength depending on the number of assessment entities.

Credit rating inflation has not been observed for the banking sector. The mentioned situation can be an effect of the restrictiveness of supervisors and law connected with the mentioned institutions. This opinion also confirms the prepared analysis of factors that are taken into consideration by a particular credit rating agency. There are differences between the impact strength of particular determinants on the banks' notes proposed by a particular credit rating agency, when notes are given by one, two or all of the Big Three, but the list of the significant factors is stable. As a result, credit rating agencies are afraid of losing the reputation in the case of banks' credit ratings, because the mentioned institution is one of the most important customers. Credit ratings are used by banks to estimate the default risk according to the internal based approach. They are also need to corresponding banking. The described analysis also suggests that larger banks use notes that are given by the S&P. This relates to the market share. As a result, a credit rating inflation in the banking sector notes has not been observed.

## Conclusions

The aim of the paper has been to verify the significance of the credit ratings' inflation phenomenon for banks' notes. The first hypothesis seems as follows: Banks' credit rating inflation has been observed. The prepared analysis suggests that the mentioned phenomenon has not been observed for the banking sector. The comparison of notes given by credit rating agencies suggests that notes that are given by all CRAs are similar. The same results were received when the notes given by two agencies were compared. Differences are observed only

in the case of ratings given by one institution. If a CRA is bigger, notes proposed by them are higher. It can be connected with the level of risk of the assessed institution.

The second part of the analysis is aimed at verifying differences between the impact of the financial factors on banks' credit ratings between notes that are given by one or more credit rating agencies to the same entity. A list of variables that are taken by a particular credit rating agency can be created regardless of whether the evaluation is one or more CRAs. The strength of impact of the described factors is differentiated and there are differences in the significance of variables.

In future researches will be also take into account the impact of the business cycle on the differences between the credit ratings changes. The analysis will be also expanded by the size of the issuers. The bigger banks can receive higher notes that the smaller financial institutions. It can be connected with two things. The first of it is the lower probability of default. The second one can be connected with the higher fees that pay bigger issuers.

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– description of a chapter in a monograph: last names and initial(s) of the first name(s) of the author(s) of the chapter (small caps), year of publication, title of the chapter (italics), abbreviation In: title of the monograph (in italics), initials of the first name(s) and last names of author(s) of monographs or editor(s) of collected volumes, publisher and the place of publication, e.g.,:
Kleinman M. 2003. *The Economic Impact of Labour Migration*. In: *The Politics of Migration. Managing Opportunity, Conflict and Change*. Ed. S. Spencer. Blackwell Publishing, Malden.
– description of an article in a research journal: initial(s) of the name and last name of the author(s) (small caps), year of publication, title of the article (in italics), title of the journal, volume (number): article pages, e.g.,:
Stead D. 2014. *European Integration and Spatial Rescaling in the Baltic Region: Soft Spaces, Soft Planning and Soft Security*. European Planning Studies, 22(4): 680-693.
– description of electronic and Internet sources (documents):
a) description of a book on CD or a chapter from a book should be the same as in the paper version, indicating the type of electronic carrier, e.g.,:
Kopaliński W. 1998. *Słownik wyrazów obcych i zwrotów obcojęzycznych*. PRO-media CD, Łódź [CD-ROM].
b) article in electronic journal: author;s last name and first name initial (small caps), year of publication, title of the article (in italics), title of the journal, volume (number): article pages (if they are specified), online address or DOI, date of access, e.g.,:
Kozak S., Ochnio E. 2016. *Did the financial crisis impact the level of investment efficiency of equity investment funds in Poland?* EJPAU, 19(2), http://www.ejpau.media.pl/volume19/issue2/art-03.html (access: 3.02.2016).
c) Internet sources (documents) including from Eurostat or GUS: title of the source (documents), date of publication, name of the portal, online address, date of access, e.g.,:
*Population on 1 January by five years age group, sex and NUTS 2 region*. 2016. Eurostat, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=demo_r_pjangroup&lang=en (access: 19.09.2016).
– description of reports, analyses, legal acts:
*Informacja w sprawie zatrudnienia obywateli polskich w państwach Europejskiego Obszaru Gospodarczego i Szwajcarii oraz obywateli państw EOG w Polsce*. 2011. Ministerstwo Pracy i Polityki Społecznej, Warszawa.
Ustawa z 20 kwietnia 2004 r. o promocji zatrudnienia i instytucjach rynku pracy, Journal of Laws of 2004, no 99, item 1001.
– description of unpublished works:
Wierzejski T. 2010. *Makroekonomiczne determinanty internacjonalizacji sektora rolno-spożywczego w Polsce*. UWM w Olsztynie (doctoral thesis).

## TABLES AND FIGURES

Tables and figures should be numbered using Arabic numerals.
Tables should be marked using:
– number (e.g., Table 1) – written to the right, over the table, font size 10 pts,
– title – placed over the table, centred, font size 10 pts,
– source – written underneath the table, font size 10 pts, in the form of a bibliographic reference, e.g.,:
Source: Porter (1998, p. 143); *European Pork Chains* (2009, p. 27, 29).
Or if the table was elaborated by the author: own elaboration on the basis of Porter (1998, p. 143).
Illustrations, charts, maps, diagrams, etc., which are captioned as "Figures" should be marked using:
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References to figures and tables in the text should be made in the 1 to *n* sequence (in accordance with the numbering).

Figures should be prepared using software working in the Windows environment (e.g., Excel, Corel Draw). Figures prepared using other specialist software should be saved in the Windows Metafile format (.wmf), which allows importing to Corel. Units of measurement should be given according to the international SI system.

Mathematical formulas should be written using the formula editor for MS Word. They can be numbered (using Arabic numerals in parentheses, to the right, alongside the formula) and they have to be editable. All variables have to be explained underneath the formula, indicating which letter-based symbols are supposed to be normal, italicized or bold. Reference to a specific formula in the main body of the text should be made by placing the number of the formula in parentheses.