Wadim Strielkowski[1], **Sergii Troshchenkov**[2]
ECONOMIC IMPACT OF IMMIGRATION ON UNEMPLOYMENT IN DENMARK

This paper measures the effects of immigration on the aggregate unemployment rate in Denmark. We composed the cross-sectional data from 99 municipalities of Denmark for the period of 3 years and employed a regression model in order to analyze and draw conclusions from effect of immigration on the unemployment rate in Denmark, paying particular attention to immigrants from non-Western countries. Our results indicate that changes in the foreigner population and in population with non-Western origins do not lead to significant changes in the unemployment rate.

Keywords: international migration, immigration, labour market, unemployment rate, Denmark.

Вадим Стрєльковскі, Сергій Трощенков
ЕКОНОМІЧНИЙ ВПЛИВ ІММІГРАЦІЇ НА БЕЗРОБІТТЯ В ДАНІЇ

У статті досліджено вплив імміграції на загальний рівень безробіття в Данії. Зіставлено міжгалузеві дані по 99 муніципалітетах Данії за трирічний період, застосовано регресійну модель для аналізу та оцінювання впливу імміграції на рівень безробіття в Данії, з урахуванням іммігрантів з "незахідних" країн. Результати дослідження показали, що зміни серед іммігрантського населення і населення незахідного походження не призводять до значних змін у рівні безробіття.

Ключові слова: міжнародна міграція, імміграція, ринок праці, рівень безробіття, Данія.

Форм. 2. Табл. 1. Літ. 35.

Вадим Стрельковски, Сергей Трощенков
ЭКОНОМИЧЕСКОЕ ВЛИЯНИЕ ИММИГРАЦИИ НА БЕЗРАБОТИЦУ В ДАНИИ

В статье исследовано влияние иммиграции на общий уровень безработицы в Дании. Сопоставлены межотраслевые данные по 99 муниципалитетам Дании за трехлетний период, применена регрессионная модель для анализа и оценки воздействия иммиграции на уровень безработицы в Дании, с учетом иммигрантов из "незападных" стран. Результаты исследования показали, что изменения среди иммигрировавшего населения и населения незападного происхождения не приводят к значительным изменениям в уровне безработицы.

Ключевые слова: международная миграция, иммиграция, рынок труда, уровень безработицы, Дания.

1.Introduction. International migration and its social and economic impacts have become widely discussed in the 21st century. Among various impacts of migration, the economic one became, by far and large, the topic that attracted the greatest attention. Economics of migration distinguishes the economic impact of migration on sending and receiving countries and researchers are trying to estimate these impacts quantitatively. It is possible to select several criteria which could assist to evaluate country's attractiveness for immigrants. These criteria could be economy, employment, health, welfare, and education (Beton, 2011).

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Denmark is one of the most attractive countries in the world for international migration. It has a really large multicultural society with approximately 5% of foreign population mainly from North Africa, Middle East, countries of former Soviet Union and "socialistic camp". Also, Denmark has a high employment level as well as developed social and health systems (Statistics Denmark, 2011).

Denmark looks very tempting for immigrants from different countries. What could be detected in terms of the impact of immigrants on different socioeconomical coefficients of the country? This process has produced a sharp debate in Denmark. The culmination of this discussion entailed the restrictions which were introduced in the immigration law in 2002 and permanently strengthen since that. Recently, the government of Denmark received an accusation in breaching human rights while strengthening immigration law from international society.

The main objective of our paper is to study the relationship between unemployment rate and immigration in Denmark during 3 years (2007−2009). We focus on measuring the influx of total amount of immigrants and immigrants with non-Western origin on the unemployment rate.

2. Immigration and unemployment rate. Economic theory predicts that the welfare impact of immigration on the emigrant-receiving countries depends on the characteristics of migrants as well as on the domestic labour market conditions. If high-skilled native workers have complementary inputs to low-skilled immigrants then the presence of migrants positively affects labour productivity, economic growth and real wages in target countries (Chani, Hassan and Shahid, 2012).

Generally, immigration impacts the wages of low skilled and young native workers and previous migrants who have to compete for their jobs. In addition, there is also a slight influx of immigration on unemployment in the short run (Winter-Ebmer and Zweimuller, 2000; Beton, 2011). In the long run, immigration creates new work places and decreases the level of unemployment. Hence, it can be concluded that the influx of immigration, in the long run, is positive (Gross, 2002). Overall, it is possible to say that labour market is slightly influenced by immigration with ambiguous results (Okkerse, 2008).

Galloway and Josefowicz (2008) examined the employment situation in 26 regions of the Netherlands from 1996 to 2003 employing the panel data analysis. The ordinary least square (OLS) method revealed slight volatility in the unemployment rate from change of the population of foreigners and no meaningful volatility from the change in the number of foreigners from non-Western countries.

Pischke and Velling (1997) used the same approach to measure the effect of immigration on the employment and the unemployment rate for all residents and the Germans. They collected the data from 328 regions, aggregated them into 167 labour market regions from 1985 to 1989 and applied mean reversion model to derive the result. They used 2 indicators of immigration: the change in the share of foreigners and one year net and gross flow of immigrants. Their result revealed no effect of immigration.

Card (2005) analysed the data from the US 2000 Census and proved that immigration inflow had no impact of the wages of less-skilled native employees despite the increase in supply on the dropout's labour market.

Winter-Ebmer and Zeimuller (1999) constructed pooled cross-sections and random effects panel probit model on the data collected in Austria. They measured the

influx of immigration on unemployment probability for existed workers and employed immigrants. They obtained only slight effect of immigration on native employees and more significant on time labour and already employed immigrants.

Chiswick (2000) studied job searching behaviour of immigrants considering the variety of different factors. He found that employment among immigrants is significantly lower in short and middle run.

Gross (2002) performed the panel data analysis of the data sample from 1975 to 1994, France. He identified some detrimental effects in the short run perspective. In the long run, he revealed negative relationship between immigration and unemployment rate assuming that additional demand created by immigrants would establish more positions than foreigners can occupy. His results showed that the influx of immigration on the labour market indicators was not significant and most likely temporary.

3. The data and the model. In order to study the impact of immigration on unemployment, we collected the data in 99 Danish municipalities for 3 consecutive years (2007−2009). All the data were obtained from Statistics Denmark. The interesting aspect of this time period is an obvious shock, which occurred in 2008−2009 due to the world's economic and financial crises.

Assuming that the dependent variable is influenced by the compilation of independent variables, we have composed the collection of independent variables which captures the local labour market structure.

Our dependent variable is the unemployment rate. It denotes the total unemployment rate in Denmark, including the people of Danish origin, immigrants and descendants. Two control predictors were set to observe the effect of immigration on unemployment rate. These variables are the total amount of foreigners in the labour age in the economy divided by the labour force population and amount of foreigners of non-Western origin divided by the labour force population. In accordance with the fact that dependent variable is impacted by the ample combination of independent variables, apart from the influence of the control explanatory variables, the set of the other independent variables involves the variables which explain the local labour market structure. These variables embrace the share of employed on high-, medium- and low-qualified positions as well as self-employed persons, fractions of people with high (Master or PhD level), medium (population with associate degree) and low education (school and vocational education), labour force above 55 and the share of female employees as well as the ratio labour force divided by the total population in the age from 16 to 66 (Galloway and Josefowicz, 2008).

The impact of immigration on the unemployment rate is obvious. Immigration increases the supply at the labour market and increases the unemployment rate. But generally, the unemployment rate is typically affected by the set of independent variables other than immigration of Western and non-Western citizens. In fact, unemployment rate can be affected by the structure of labour market, including educational, qualification, gender and age structure of labour force (Galloway and Jozefowicz, 2008).

Variables representing professional structure of labour force were included into the model to capture the shares of workers employed in the high- and low-qualified positions and the share of self-employed. Their signs are ambiguous. It depends upon

the requirements of a particular labour market. The signs of the variables capturing the educational structure of labour force depend upon the requirements of a local labour market. Variables measuring the effects of presence of female employees and employees who are above 55 on the unemployment rate are also impossible to predict.

The variable representing the share of labour force in the total population should positively affect the unemployment rate. The bigger the amount of labour force in total population is, the bigger the supply of labour force is. It should lead to the consequent increase in unemployment.

4. Empirical model estimations and results. Our model is largely based on similar models by Pischke and Velling (1997) as well as Galloway and Josefovicz (2008). Although these authors used panel data analysis with the lagged independent variable, we applied pooled cross-sectional analysis with the introductions of 2 time dummies.

With the purpose to explore the influx of the immigration on the unemployment rate, we defined next polled cross-sectional models with time dummies:

$$LnUR_{it} = \beta_0 + \beta_1 FORSH_{it} + \beta_2 FORNWSH_{it} + \beta_3 POPRAT_{it} + \beta_4 SESH_{it} +$$
$$+ \beta_5 HESH_{it} + \beta_6 MLESH_{it} + \beta_7 HESH_{it} + \beta_8 MEDSH_{it} + \beta_9 LEDSH_{it} +$$
$$+ \beta_{10} FESH_{it} + \beta_{11} OESH_{it} + A_1 Y_t + A_2 Y_2 + \varepsilon_{it}$$
$$t = 2007, 2008, 2009.$$

(1)

In this case, UR is unemployment rate. FORSH is the total share of foreigners in the labour force. FORNOWSH is the share of immigrants of non-Western origin in the labour force. POPRAT is the ratio of the labour force to the total population in the age groups of 16−66. SESH is the share of self-employed in the labour force. HESH is the share of employees, who occupied high-skilled positions in the labour force. MLESH explains the share of labour force which occupied medium and low-skilled positions. HESH is the share of labour force with high education. MEDSH is the share of labour force with medium education. LEDSH is the share of labour with low education. FESH is the share of female labour in the labour force. OELSH represents the share of the labour force elder than 55. Y_1 and Y_2 are the time dummy variables, where the reference year is 2007.

This is the basic model which was used to measure the influence of immigration on the unemployment rate, where some variables contained multicolinearity. Due to this reason, we represented 4 adaptations to this model. The additional models were created by the substituting the corresponding one by one each of the control independent variables (FORSH or FORNWSH) without changing the form of the model for 2 sets of independent variables.

To prove the result of the previous model, we constructed the model with the lagged independent variables. We run the models for 2 sets of years to measure the effect of immigration on unemployment before and after shock.

$$LnUR_{it} = \beta_0 + \beta_1 FORSH_{it-1} + \beta_2 FORNWSH_{it-1} + \beta_3 POPRAT_{it-1} + \beta_4 SESH_{it-1} +$$
$$+ \beta_5 HESH_{it-1} + \beta_6 MLESH_{it-1} + \beta_7 HESH_{it-1} + \beta_8 MEDSH_{it-1} + \beta_9 LEDSH_{it-1} +$$
$$+ \beta_{10} FESH_{it-1} + \beta_{11} OESH_{it-1} + \varepsilon_{it}$$
$$t = 2007, 2008, 2009.$$

(2)

The variables in equation 2 are the same as in the previous model. The aim of the second model was to capture the effect of lagged independent variables on the unem-

ployment rate. The model was run for 2 time periods (before and after the world' economic and financial crisis) to check the effect of immigration within 2 periods. The results of this model were consistent with the result of running previous pooled cross-sectional model with 2 time dummies.

We decided to use log-linear functional form of our model because this form is the most appropriate for proceeding the collected data. The variables responsible for measuring the socioeconomical position and education are likely to cause multicolinearity. With this purpose, we split up our set of independent variables into 2 sets with the purpose to avoid obvious multicolinearity between independent variables (Studenmund, 2005).

The ordinary least square (OLS) results for the unemployment equation are shown in Table 1. Generally, the model's estimations provide a good fit and high significance.

Table 1. **OLS results: 4 regression models with different sets of independent variables and different control variables, unemployment rate in Denmark (2007–2009)**

Variables	Model 1 Coefficient	Model 2 Coefficient	Model 3 Coefficient	Model 4 Coefficient
Constant	-5.7988 (-8.86)**	-1.3538 (8.58)**	-5.3347 (8.15)**	-5.2854 (-8.02)**
POPRAT	2.7233 (3.32)**	2.6879 (3.29)**	3.2276 (3.6)**	3.1509 (3.54)**
SESH	7.5901 (6.57)**	7.7747 (6.59)**	6.4479 (5.92)**	6.6492 (5.88)**
HESH				
MLESH	1.3894 (5.54)**	1.3290 (5.45)**		
HEDSH				
MEDSH			-0.6429 (-0.85)	-0.5386 (-0.74)
LEDSH			0.7284 (2.28)*	0.7375 (2.49)*
FESH	5.7930 (11.86)**	5.7342(11.76)**	5.8016 (11.82)**	5.7524 (11.75)**
OELSH	-2.7388 (-3.74)**	-2.8052 (3.87)**	-2.6964 (-3.65)**	-2.7675 (-3.73)**
FORNWSH		0.7873 (1.37)		0.5659 (0.94)
FORSH	0.53211 (1.03)		0.3309 (0.59)	
Y_1	-0.3495(11.67)**	-0.3490(11.7)**	-0.3477(11.74)**	-0.03476(11.77)**
Y_2	0.3089(10.37)**	0.3097 (10.47)**	0.3022 (10.14)**	0.3027 (10.27)**
R-squared	0.7759	0.7766	0.7788	0.7792
F-test	115.44	115.84	103.86	104.15
P-value	0.000	0.000	0.000	0.000

* – significant at the 10% level; ** – significant at the 5% level; t-values in parentheses are based on the heteroskedasticity corrected standard errors.
Source: Own calculations.

The OLS estimation in the first and third models shows that the control variable FORSH is positive and insignificant, which means that the increase of the share of foreign employees in the labour force leads to the increase of unemployment rate insignificantly.

The second control estimated coefficient share of foreigners on non-Western origin in the labour force (FORNWSH) is positive and insignificant in the second and fourth models. Other relevant studies revealed the correspondent effects (Pischke and Velling, 1997).

In the first and second model the share of medium and low-skilled employees (MLESH) is significant at the 5% level. This fact implies that with the increase of the share of medium- and low-skilled employees by one unit the unemployment rate will increase by 10%.

The medium educated (MEDSH) share of labour force is negative but insignificant in the third model. The same result was obtained from the regression in Model 4.

The low educated share (LEDSH) of labour force is significant at the 10% level and has a positive impact on the dependent variable within Models 3 and 4.

The share of female (FESH) employees in the labour force is significant at the 5% level of significance and affects positively the unemployment rate, in all 4 tested models.

The population of the labour force older than 55 (OELSH) is significant at the 5% significance level and negative in all 4 tested models.

The first time dummy variable (Y_1) is significant at the 5% level of significance. It has a negative sign indicating how much unemployment rate in 2008 differs from the benchmark year.

The second time dummy variable (Y_2) is also significant at the 5% level of significance and positive in all 4 run models and indicates the difference between unemployment rate in 2009 and the reference year.

5. Conclusions and discussions. Our empirical results revealed no positive impact on the unemployment rate by the presence of immigrants in the economy by applying particular model. Hereby, the existence of immigrants reveales no positive influx on the unemployment rate.

The increment in the total number of immigrants related to the total labour force does not increase the unemployment rate. This result could be explained by segmentation of the labour market, where immigrants occupy positions at the labour market which were rejected by native workers (Piore, 1979). Similar results were obtained for the number of immigrants of the non-Western origin related to the total labour force. It is possible to conclude that the most number of immigrants of Western and non-Western origin could be considered as a complement for the native labour force.

The increase in the number of employees who occupy medium and low skilled positions, leads to the rise of unemployment. The share of low qualified labour has significant impact on the unemployment rate. The explanation is that increase in low educated labour force could increase competition at the labour market and consequent increment of unemployment.

The increment in the share of female employees in the total labour force carries the increment of the unemployment rate. The reason could be the unequal occupation of the positions by male and female employees.

The growth in the share of employees who are older than 55 leads to the decrease in unemployment. The explanation for that is the employees older than 55 obtain more skills and practical experience. Due to all above-mentioned reasons they feel no hardship finding new jobs.

Nevertheless, it needs to be mentioned that obtained results do not allow us observe the impact of immigration on unemployment rate clearly. A variety of different factors not included into the model could impact the result in an ambiguous manner. Our results turn to be inconsistent in terms of the influence of total amount of immigrants on the unemployment rate. In comparison with earlier studies by Pischke and Velling (1997), our results revealed different effects. The explanation of these differences could be that the situation at the labour market in Germany and Denmark

are quite different. In addition, it might be divergent economical conditions, structure of labour force and financial crisis which impacted all fields of economical life in Denmark. Apart from economic and geographical reasons, our results appear to be different because of the technical reasons such as: short period of analysis, obvious shock of the world's economy in 2008, choice of variables and other reasons.

In accordance with the obtained results it is possible to state that immigrants have no detrimental effect on the situation at the labour market. This is in disaccord with the recent efforts of Danish government to adopt the set of reforms which complicate the procedure of immigration and limit immigration inflows.

Generally, it is impossible to test the immigration effects. Many other causes which could drastically affect the relationship between unemployment and immigration were not taken into consideration. Adjustment time, language proficiency, cultural differences, trap of benefits and many other reasons can impact the participation rate and consequent unemployment in the short- and long-run perspective.

What could be interesting for further research is to measure the effect of highly qualified immigration on the labour situation and wage level in Denmark and other Nordic countries, and to compare the possible outcomes for these countries. Also, it might look attractive to measure the effect of immigration on the employment and occupation of high and low qualified positions in Nordic countries.

References:

Adams Jr., R.H., Page, J. (2005). Do International Migration and Remittances Reduce Poverty in Developing Countries? World Development, 33(10): 1645—1669.

Beton, D. (2011). Application of migration Hatton's model in Turkish migration case. Actual Problems of Economics, 118: 256—264.

Blanchflower, D., Shadforth, C. (2007). Fear, unemployment and migration. NBEG Working paper No. 13506, National Bureau of Economic Research, Washington, DC.

Brucker, H., Kohlhaas, M. (2004). International migration to Germany: a CGE analysis of Labour Market Impact. Conference Paper. In: 7th Annual Conference on Global Economic Analysis. Washington, DC.

Card, D. (1990). The Impact of the Mariel Boatlift on the Miami Labor Market. Industrial and Labor Relations Review, 43(2): 245—257.

Card, D. (2001). Immigrant Inflows, Native Outflows, and the Local Market Impacts of Higher Immigration. Journal of Labor Economics, 19(1): 22—64.

Card, D. (2005). Is the new immigration is really so bad? NBEG Working paper No. 115447.

Chani, M.I., Hassan, M.U., Shahid, M. (2012). Human capital formation and economic development in Pakistan: an empirical analysis. Actual Problems of Economics, 132: 486—495.

Chiswick, B., Hurst, M. (2000). The employment, unemployment and unemployment compensation benefits of immigrants. IZA Discussion paper #129.

Christofides, L.N. et al. (2007). The Impact of Foreign Workers on the Labour Market of Cyprus. Cyprus Economic Policy Review, 1(2): 37—49.

Dustmann, C., Fabbri, J., Preston, I. (2005). The impact of immigration on the UK labour market. CreAM Discussion Paper, 01/05.

Ekberg, J. (1999). Immigration and the public sector: Income effects for the native population in Sweden. Journal of the Population Economics, 12: 411—430.

Galloway, R., Josefowicz, J. (2008). The Effects of Immigration on Regional Unemployment Rates in The Netherlands. International Atlantic Economic Society, 14: 291—302.

Greene, W.H. (2008). Econometric analysis. 6th edition. Pearson: Prentice Hall.

Gross, D.M. (2002). Three million foreigners, three million unemployed? Immigration flows and the labour market in France. Applied Economics, 34: 1969—1983

Jean, S., Jimenez M. (2011). The unemployment impact of immigration in OECD countries. European Journal of Political Economy, 27: 241—256.

Kennedy, P. (1998). A Guide to Econometrics. 4th edition. Cambridge: MIT Press.

Kifle, T. (2009). The effect of immigration on the earnings of native-born workers: Evidence from Australia. The Journal of socio-economics, 38: 350−356.

Layard, R., Blanchard, O., Krugman, P. (1992) East-West Migration − The Alternatives. Cambridge: MIT-press.

Longhi, S., Nijkamp, P., Poot, J. (2005). A Meta-Analytic Assessment of the Impact of Immigration on Wages. Journal of Economic Surveys, 19(3): 451−477.

Massey, D.S., Connor, P., Durand, J. (2011). Emigration from Two Labor Frontier Nations: A Comparison of Moroccans in Spain and Mexicans in the United States. Papers: revista de sociologia, 96(3): 781−803.

Okkerse, L. (2008). How to Measure Labour Market Effects of Immigration: A Review. Journal of Economic Surveys, 22(1), 1: 1−30.

Piore, M.J. (1972). Upward Mobility, Job Monotony, and Labor Market Structure. Massachusetts Institute of Technology (MIT), Department of Economics, Working papers: 90.

Pischke, J., Velling, J. (1997). Employment effects of immigration to Germany: An analysis based on local labor markets. The Review of Economics and Statistics, 79(4): 594−604.

Pugel, T.A., Lindert, P.H. (2000). International economics. 11th edition. Boston: McGraw Hill.

Schmidt, C., Stilz A., Zimmermann, K. (1994). Mass migration, unions and government intervention. Journal of public economics, 55: 185−201.

Statistics Denmark (2011). Immigrants, their descendants and foreign nations.

Statistics Denmark (2011). Labour force survey (quarterly).

Studenmund, A.H. (2005). Using econometrics: a practical guide. 5th edition. Pearson: Addison Wesley.

Weyerbrock, S. (1995). Can the European community absorb more immigrants? A general equilibrium analysis of the labor market and macroeconomic effects of East-West migration in Europe. Journal of Policy Modeling, 17(2): 85−120.

Winter-Ebmer, R., Zweimuller, J. (1999). Do immigrants displace young native workers: the Austrian experience. Journal of Population Economics, 12: 327−340.

Winter-Ebmer., R., Zweimuller, J. (2000). Consequences of trade creation and increased immigration for the Austrian labour market. In: M. Landesmann and K. Pichelmann (eds). Unemployment in Europe (Pp. 250−267). Basingstoke: Macmillan.

World Bank (2006). Global Economic Prospects: Economic implications of remittances and migration. Washington: World Bank.

World Bank (2011). Migration and Remittances Factbook 2011. Washington: World Bank.

Zimmermann, K.F., Winter-Ebmer, R. (1998). East-West Trade and Migration: The Austro-German Case. IZA Discussion Paper No. 2, Bonn: IZA.

Стаття надійшла до редакції 14.11.2012.