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Ján Klacso, Eva Štulrajterová

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Abstract

In this paper, we analyse labour market flows based on data from the Labour Force Survey. This survey enables us to analyse the impact of socio-demographic characteristics on flows between employed, unemployed and inactive stage. Our analysis is based on the period 2005Q1 – 2020Q1 and, also separately on the crises period 2009 – 2010. Education, marital status, or the number of years in the current job are the main factors impacting the flows in case of employed. The higher the educational level and the longer employed, the lower the probability of becoming unemployed. Also, married persons and persons working full-time have lower probability to become unemployed. In case of unemployed or inactive persons, the level of education is also an important factor, as the higher the education the higher the probability of finding a job. Estimation results for the crises years are in general qualitatively similar to results for the whole period. It is mainly the impact of educational level that changes. In case of employed persons, tertiary education significantly increases the probability of remaining employed during crisis times compared to at most secondary education.

Keywords: unemployment, labour market transition, multinomial logistic regression

JEL classification: J64, J24

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1 Introduction

Unemployment ratio is one of the mostly followed macroeconomic indicators in general. Due to the COVID pandemics, this ratio started to increase in Slovakia again after a long-lasting decreasing trend since 2013 and after reaching its historical minimum in 2019. What are the drivers of unemployment? Naturally, global economic development and the actual situation in the respective economic sectors are strong factors. On the other hand, it is also important to know, how socio-demographic factors, such as education or marital status, influence the flows between employed and unemployed. Also, it is important to follow not only the flows between employed and unemployed, but to include flows out an into the labour market, it means to include inactive persons as well.

Chart 1 Unemployment ratio in Slovakia

Source: NBS, Slovak Statistical Office

Another reason pointing to the need of a proper assessment of the drivers of labour market flows is the increasing importance of the use of micro data for monetary and financial stability analysis. Simulations of unemployment are often an inseparable part of models including micro data used for the assessment of macroprudential policies or stress testing (see, e.g., Jurca et al, 2020 or Gross and Población, 2017). However, to conduct proper simulations, it is inevitable to map the main drivers of labour market flows.

In this paper, we analyse these labour market flows based on data from the Labour Force Survey. This survey is conducted quarterly and 80 % of the respondents remain in the sample also in the next quarter. Thus, the survey enables us to analyse the flows between the respective states of the labour market and the impact of socio-demographic characteristics. The paper is organised as follows. The next sextion gives a helicopter view on the studies focusing on labour market flows. Section 3 describes the data. Section 4 contains the results of empirical estimations. Finally, we conclude.

2   Literature review

The importance of assessing factors affecting the flow between the employed, unemployed and economically inactive part of the working age population is well recognised for a long time. Holt et al (1974) focus on different demographic groups in the US delineated by age, race and sex. They find that in case of a recession, there are indeed some selected groups of the population suffering more form a reduction in job opportunities, e.g. younger people or female. They also show that it is important to follow the flows to and from the economically inactive population, as it counts for a non-negligible part of the overall flows. Clark and Summers (1978) are focusing on the determinants of young unemployment in the US. They also find evidence of differences between certain groups of young people and again, evocate the importance of following the flows not just between employed and unemployed but also focusing on the flows in and out of the labour force.

A very detailed data for analysis of flows is used in DiPrete et al (2001) for France and Sweden. Authors use not only data about flows between respective states (employed or unemployed), but also follows whether a given person employed at the beginning of a given period changed its job or changed its position within the current job. The main focus of the paper is to test different hypothesis about the structure of unemployment in these two countries based on their different welfare-state structures, labour-market institutions and the linkages between their educational system and labour market. Based on the estimations, France has a flexible two-tier labour marker that produces relatively high entry rates into employment and a strong impact of age and education on exit rates. Even during the deep recession of the early 1990s, Sweden was also characterized by a strong impact of age in the rate of exit from an employment. However, Swedish rates do not show a strong education gradient, which is the expected consequence of Sweden's loosely linked school and work institutions, and extensive active labour-market policies.

The consequences of the great financial crisis on the development of the labour market flows is studied in Verick (2009). The author concludes that after synchronised and global crisis unemployment rates across the world rise continuously and remain high for a longer period. Also, it is in general young people that are hit the hardest by the crisis. Especially, younger men are affected the most, reflecting that these individuals are employed in such sectors as construction and manufacturing, which are heavily impacted by such recessions. Young women nonetheless experience increasing unemployment rates often in a similar fashion to young men as well. In some countries, they are in fact the group that suffers the most.

Another angle, the impact of globalisation on unemployment, is analysed in Mohler et al (2018). Authors are focusing on the hypothesis that globalisation can increase unemployment between the low-skilled labour, because Switzerland experienced between 1991and 2014 the highest relative increase in the low-skilled unemployment rate among all OECD countries. However, they were not able to find any evidence of this hypothesis.

3 Data

To analyse labour market flows, we use data from the Labour Force Survey (LFS). This is a quarterly survey where each quarter 80% of the respondents remain the same as in the previous quarter, thus enabling us to map flows between three stages: employed, unemployed and inactive (i.e. outside the labour market). We have available these quarterly flows from 2005Q1 until 2020Q1.

Chart 2 Labour market flows in the LFS
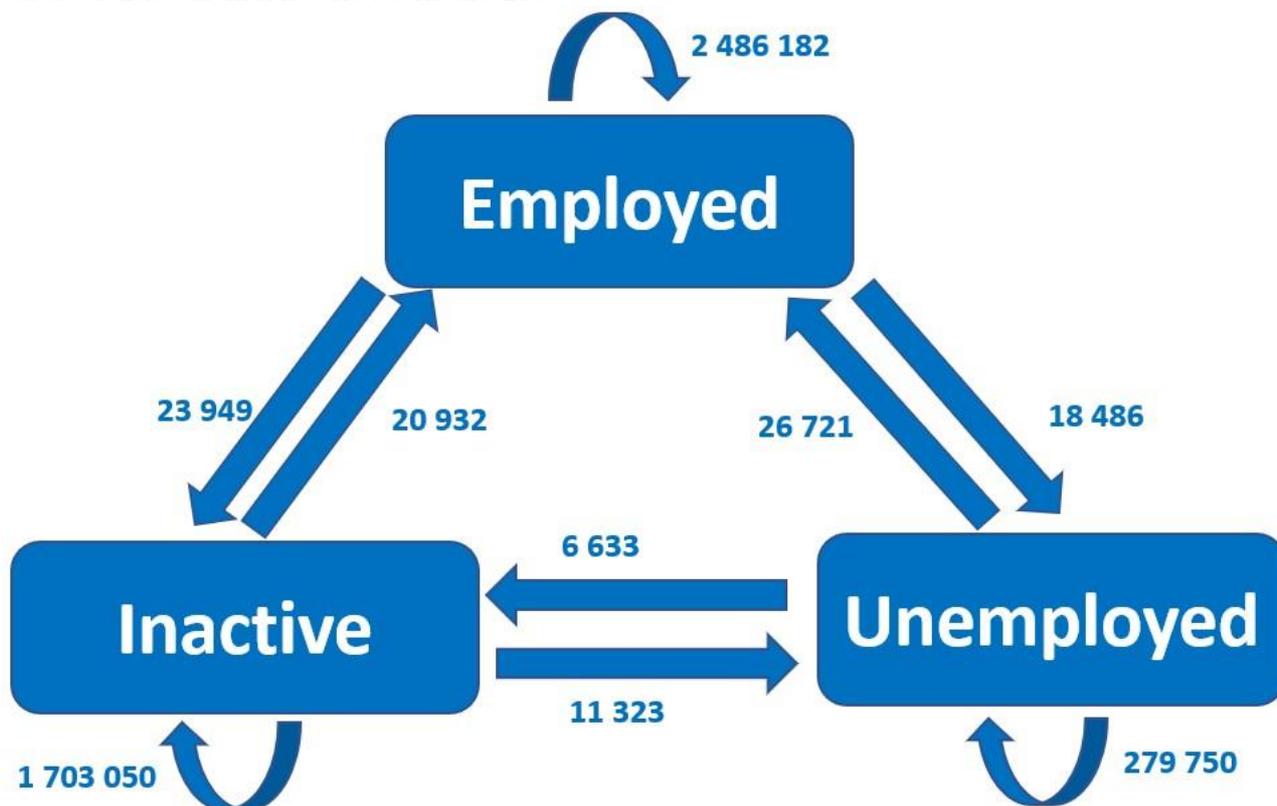
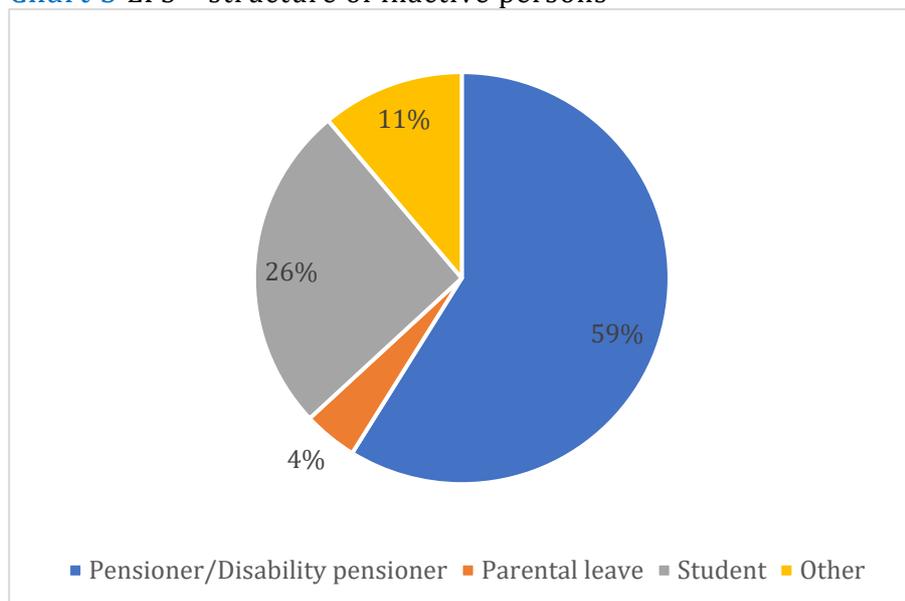Source: NBS, Slovak Statistical Office
Notes: Numbers next to arrows show the flow (number of persons moving) between the respective categories in one quarter calibrated to the average number of active persons in Slovakia during the considered period. Arrows pointing to the same category show the number of persons without a change in their stage.

When analysing the flows, we will focus on the socio-demographic characteristics of the persons included in the survey. The estimation of the probability of the transition from a given state in quarter t-1 to another state in quarter t will be based on the characteristics of the persons in quarter t-1. Therefore, below we present some basic characteristics of the persons included in the survey in "quarter t-1".

Most of the persons in inactive state are pensioners or disability pensioners (Chart 3), this is one of the reasons why most of them stays in the same state in the next quarter as well. The generally positive development of employment in Slovakia during the period under consideration is reflected in the relatively high inertia also in case of employed – the majority of employed persons stayed employed in the next quarter as well, but also the flow from unemployed to employed is larger than from employed to unemployed. The high inertia in the

unemployed state is probably to a large extent caused by the very high long-term unemployment rate in Slovakia (see, e.g., EP, 2016 or D'Apice, 2014).

Chart 3 LFS – structure of inactive persons

Source: NBS, Slovak Statistical Office

The highest share of persons with tertial education is among employed. The highest share of persons with at most primary education is, on the contrary, among inactive. However, the later is to a large extent the consequence of children and students of primary schools included in this category. Also, the share of at most primary education is relatively high in case of disability pensioners.

Chart 4 Educational structure of the respective states
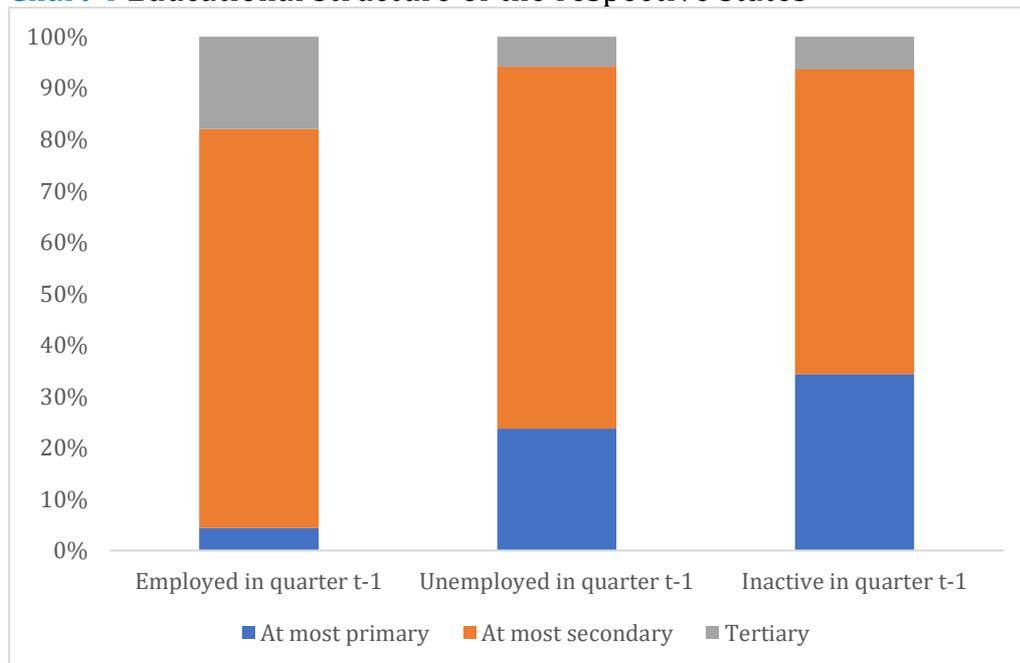
Source: NBS, Slovak Statistical Office

The share of male and female persons is almost identical within every state. In case of employed and unemployed the share of males is a bit higher than 50% and in case of inactive persons a bit below 40%, probably also caused by women on parental leave.

Chart 5 LFS – Share of male and female
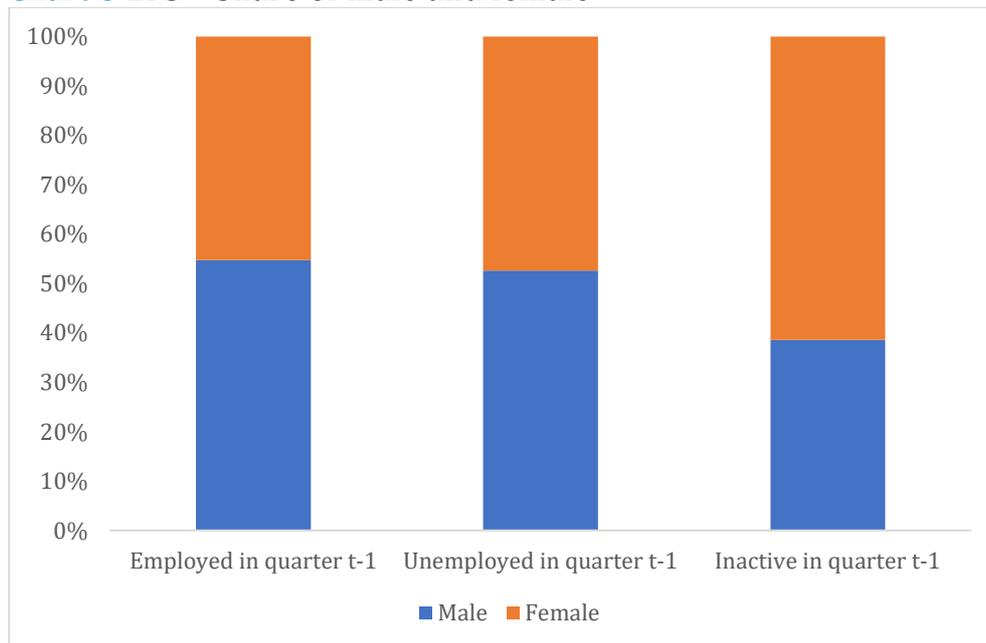
Source: NBS, Slovak Statistical Office

The share of single persons is around 50% in case of unemployed and inactive. This share is lower, around 36%, in case of employed. Naturally, this share is increased in the inactive state by children and students.

Chart 6 LFS – Share of single/married

Source: NBS, Slovak Statistical Office

4 Empirical estimations

We estimate determinants of flows between all economic states, i.e. altogether 9 possible transitions. For analysing the determinants of respective flows, we use explanatory variables available from the survey. The list of variables used is included in

Table 1 Explanatory variables used

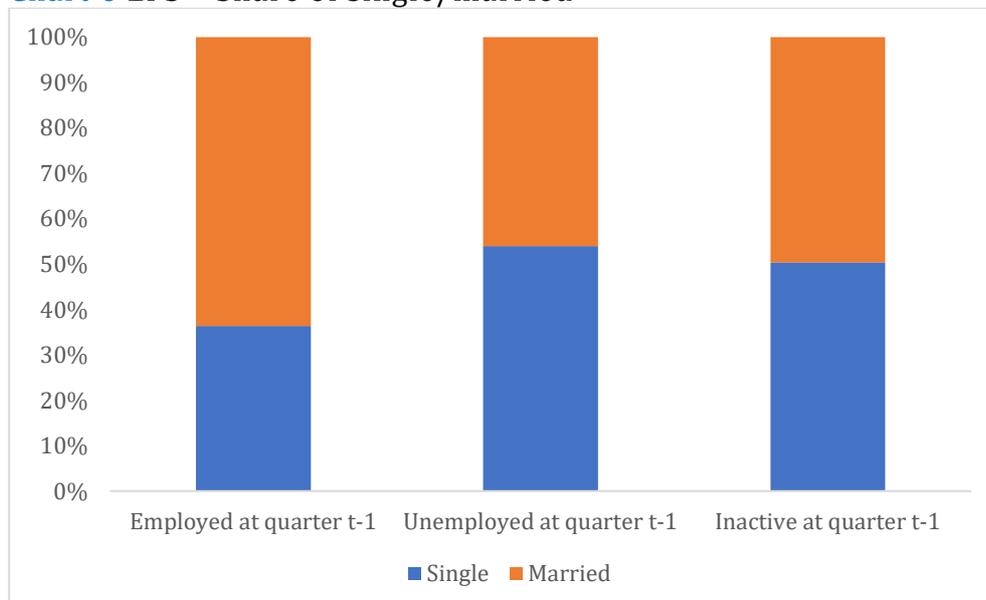| Variable	Values
Sex	1 - male
	2 - female
Marital status	1 - single
	2 - married
Education	0 - at most primary
	1 - at most secondary
	2 - tertiary
Type of economic activity	1 - employed
	2 - self employed
Character of economic activity	1 - full-time
	2 - part-time/seasonal
Disability	1 - yes
	2 - no
Age category	Up to 25 years
	From 25 to 35 years
	From 35 to 45 years
	From 45 to 55 years
	From 55 to 60 years
	From 60 to 65 years
	Over 65 years
No. of years employed - actual job	In log(years)
No. of years unemployed	In log(years)
Region of employment*	Bratislava
	Trnava
	Trenčín
	Nitra
	Žilina
	Banská Bystrica
	Prešov
	Košice
No. of employees of the firm	1 – 1 person
	2 – Up to 10 persons
	3 – 11 to 19 persons
	4 – 20 to 49 persons
	5 – 50 or more

Source: NBS, Slovak Statistical Office
* In case of unemployed and inactive persons we use region of permanent address.

As there are more than two possible flows from each category, we use multinomial logistic regression to study the determinants of flows. As described, e.g., in (Zhao and Cen, 2014), MLogit regression is a generalized linear model used to estimate the probabilities for the m categories of a qualitative dependent variable using a set of explanatory variables:

$$P(Y_{ik}) = P(Y_i = k | x_i; \boldsymbol{\beta_1}, \boldsymbol{\beta_2}, \dots, \boldsymbol{\beta_m}) = \frac{exp(\beta_{0k} + x_i \boldsymbol{\beta'_k})}{\sum_{j=1}^{m} exp(\beta_{0j} + x_i \boldsymbol{\beta'_j})}$$

where Y is the dependent variable, X is the set of explanatory variables and $\boldsymbol{\beta_k}$ is the row vector of regression coefficients of X for the kth category of Y. As there are weights available from the survey, we perform weighted MLogit regressions.

Estimation results for flows from state "employed" are summarized in Table 2. Estimations are provided for the whole period and also for years 2009-2010, when the labour market was the hardest hit by the great financial crisis. Based on the results for the whole period, there is no significant difference between the probability of male and female employees to became unemployed. There is a higher probability for female employees to became inactive, which can be driven by parental leave. Having at most primary education increases the probability of becoming unemployed compared to at most secondary education, while having tertiary education decreases this probability. Both at most primary and tertiary education increases the probability of moving to inactive state. In case of lower education, this can be related also to student going back to school after seasonal/part-time jobs. Being married decreases the probability of becoming unemployed and increases the probability of becoming inactive. The later one can be, again, related to parental leave, but can be related also to earlier retirement (consistent to some extent with the findings of Szinovacz et al, 2001 or Henkens, 1999). Considering the type of economic activity, self-employed persons have a lower probability of becoming unemployed, however, the coefficient is not significant. Naturally, having a part-time or seasonal job increases the probability of becoming unemployed or inactive compared to having full-time job. Disabled employees have a lower probability of becoming unemployed and a higher probability of becoming inactive. The probability of becoming unemployed or inactive decreases with the number of years being employed.

Chart 7 Impact of tertiary education – comparison
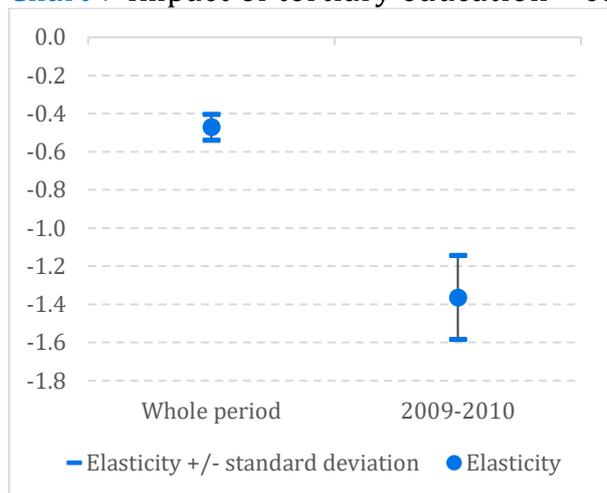
Source: NBS, Slovak Statistical Office

Estimation results for crisis years 2009-2010 are qualitatively to a large extent the same as results for the whole period. There are two notable differences in the results. The first is that the coefficient for the type of economic activity in the flow from employed to unemployed state changes from negative to positive. It means that while looking at the whole period, self-employed persons have lower probability of becoming unemployed, during crisis times there is a higher probability they lose job/are forced to close their business. However, the coefficient is not significant even in this case. The second one is a significant decrease of the

coefficient for tertiary education. It means that during crisis times people with tertiary education have even higher probability of staying employed, or, the opposite way – during crisis times people with at most secondary education has even higher probability of losing their job as people with tertiary education.

As in this basic specification economic sector, where a given person worked at quarter *t-1* is not included[1], we provide estimations also for an alternative specification including this information[2]. Estimation results are summarized in Table 3. Results are qualitatively the same as for the previous specification. The largest difference is that the probability of becoming unemployed is now significantly higher for women. This holds for the whole period as well as the crisis years. On the other hand, the significant increase of the importance of tertiary education during crises years holds also in this case.

Estimation results for flows from state "unemployed" are summarized in Table 4. Unemployed women have lover probability to be hired in the next quarter and higher probability to become inactive. Again, the later result can be due to parental leave. People with at most primary education have a lower probability to get a job than people with at most secondary education. People with tertiary education, on the contrary, have a higher probability to get a job or become inactive. Married people have higher probability to find a job. Unemployed persons with disability have lower probability to find a job, however the coefficient is not significant. Naturally, they have a higher probability to become inactive. The longer is a person unemployed, the lower is the probability to get a job. This is especially a problem for Slovakia, where structural unemployment is relatively high. Regarding age cohorts, younger people have higher probability to find a job while this probability is decreasing with age[3].

Again, estimation results for crisis years are qualitatively the same. A few differences arise in case of education and marital status. During crisis years, there is no significant difference in the probabilities of getting a job for unemployed with at most primary and at most secondary education. Also, the coefficient for marital status became insignificant, which means that married unemployed have no significantly higher probability to find a job. In case of age cohort, older unemployed people have still lower probability to find a job than the reference category of unemployed in the age category of 35 – 45 years, but the coefficients became insignificant as well.

Lastly, Table 5 summarises estimation results for flows from state "inactive". This category of persons not included in the labour market is rather mixed, as also shown in Chart 3. Based on the estimation, inactive women have a significantly lower probability to move to employed or unemployed state. This can be related partially to parental leave and house persons. Inactive persons with at most primary education have a lower probability to became employed or unemployed. This can be partially due to students in this category remaining in

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[1] As there are some empty buckets of age cohort and economic sector combination, there are less observatons for this specification.
[2] Economic sectors based on 1-letter NACE codes are included.
[3] All estimations control for age, in the tables however, age is displayed only if there were some significant findings.

the educational system. Inactive persons with tertiary education have a higher probability of getting a job. Married persons have lower probability to move out from this state than single persons. Estimations for crises years are again qualitatively very similar. One difference is that persons with tertiary education have no more statistically higher probability to find a job. Another difference is that disabled persons have statistically lower probability to find a job. However, it needs to be stated that, possibly due to the very heterogenous group analyzed, the overall estimation results are rather poor.

Table 2 Estimation results – flows from employment state

Reference category: employed at time t	Whole period				2009 - 2010			
	Unemployed at time t		Inactive at time t		Unemployed at time t		Inactive at time t	
	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios
Intercept	-6.195*** (0.462)		-9.583*** (0.278)		-5.769*** (1.153)		-10.345*** (1.292)	
Sex	0.048 (0.037)	1.049	0.884*** (0.035)	2.421	0.002 (0.085)	1.002	1.036*** (0.109)	2.818
Education: reference category - at most secondary								
At most primary	0.511*** (0.051)	1.667	0.578*** (0.055)	1.782	0.701*** (0.120)	2.016	0.440** (0.178)	1.553
Tertiary	-0.472*** (0.068)	0.624	0.138*** (0.043)	1.148	-1.365*** (0.220)	0.255	0.141 (0.130)	1.151
Marital status	-0.146*** (0.042)	0.864	0.720*** (0.041)	2.054	-0.229** (0.099)	0.795	0.924*** (0.129)	2.519
Type of economic activity	-0.511 (0.437)	0.6	0.149 (0.234)	1.161	0.027 (1.111)	1.027	0.415 (1.216)	1.514
Character of economic activity	1.737*** (0.053)	5.68	1.169*** (0.052)	3.219	1.438*** (0.126)	4.212	1.329*** (0.169)	3.777
Disability	-0.362*** (0.131)	0.696	0.715*** (0.076)	2.044	-0.166 (0.376)	0.847	0.853*** (0.298)	2.347
Log(no. of years employed)	-0.276*** (0.013)	0.759	-0.033*** (0.013)	0.968	-0.333*** (0.030)	0.717	-0.068* (0.038)	0.934
No. of observations	402 125				53 746			
R^2	0.136				0.163			

Source: NBS, Slovak Statistical Office
Note: *p<0.1; **p<0.05; ***p<0.01.
Estimations controlled for regional effects, age effects and effects of no. of employees in the current job.

Table 3 Estimation results – flows from employment state, alternative specification counting for economic sectors

Reference category: employed at time t	Whole period				2009 - 2010			
	Unemployed at time t		Inactive at time t		Unemployed at time t		Inactive at time t	
	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios
Intercept	-6.836*** (0.571)	0.001	-9.167*** (0.395)	0	-5.683*** (1.232)	0	-10.557*** (1.416)	0
Sex	0.105** (0.045)	1.111	0.794*** (0.043)	2.212	0.220** (0.103)	1.246	1.077*** (0.138)	2.936
Education: reference category - at most secondary								
At most primary	0.366*** (0.060)	1.442	0.522*** (0.065)	1.685	0.624*** (0.146)	1.866	0.235 (0.225)	1.265
Tertiary	-0.397*** (0.078)	0.672	0.186*** (0.052)	1.204	-0.912*** (0.246)	0.402	0.204 (0.165)	1.226
Marital status	-0.110** (0.047)	0.896	0.672*** (0.046)	1.958	-0.263** (0.110)	0.769	0.983*** (0.150)	2.672
Type of economic activity	0.266 (0.511)	1.305	0.351 (0.322)	1.42	0.241 (1.117)	1.273	0.339 (1.241)	1.404
Character of economic activity	1.687*** (0.061)	5.403	1.154*** (0.061)	3.171	1.502*** (0.151)	4.491	1.463*** (0.197)	4.319
Disability	-0.368** (0.143)	0.692	0.720*** (0.083)	2.054	-0.349 (0.466)	0.705	1.133*** (0.316)	3.105
Log(no. of years employed)	-0.243*** (0.015)	0.784	-0.030** (0.015)	0.97	-0.307*** (0.035)	0.736	-0.04 (0.047)	0.961
No. of observations	283 534				46 299			
R^2	0.146				0.172			

Source: NBS, Slovak Statistical Office
Note: *p<0.1; **p<0.05; ***p<0.01.
Estimations controlled for regional effects, age effects, economic sectors and effects of no. of employees in the current job.

Table 4 Estimation results – flows from unemployment state

Reference category: unemployed at time t	Whole period				2009 - 2010			
	Employed at time t		Inactive at time t		Employed at time t		Inactive at time t	
	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios
Intercept	-1.460*** (0.093)		-3.861*** (0.183)		-1.519*** (0.246)		-5.117*** (0.570)	
Sex	-0.144*** (0.034)	0.866	0.425*** (0.063)	1.53	-0.167* (0.091)	0.846	0.889*** (0.197)	2.433
Education: reference category - at most secondary								
At most primary	-0.334*** (0.050)	0.716	0.019 (0.079)	1.019	-0.189 (0.130)	0.828	-0.124 (0.241)	0.883
Tertiary	0.427*** (0.064)	1.533	0.268** (0.131)	1.307	0.560*** (0.198)	1.751	-0.712 (0.724)	0.491
Marital status	0.064* (0.037)	1.066	-0.095 (0.067)	0.909	0.101 (0.102)	1.106	-0.109 (0.198)	0.897
Disability	-0.204 (0.126)	0.815	0.602*** (0.159)	1.826	-0.312 (0.427)	0.732	0.762* (0.431)	2.143
Log(no. of years unemployed)	-0.285*** (0.011)	0.752	0.007 (0.023)	1.007	-0.241*** (0.029)	0.786	0.078 (0.064)	1.081
Age: reference category - from 35 to 45 years								
Age up to 25 years	0.242*** (0.061)	1.274	-0.022 (0.158)	0.978	0.331** (0.156)	1.392	0.534 (0.398)	1.706
Age from 25 to 35 years	0.012 (0.046)	1.012	0.01 (0.103)	1.01	0.136 (0.124)	1.146	0.434 (0.299)	1.543
Age from 45 to 55 years	-0.299*** (0.046)	0.742	0.188** (0.091)	1.207	-0.174 (0.124)	0.84	0.439 (0.272)	1.551
Age from 55 to 60 years	-0.436*** (0.065)	0.647	0.949*** (0.096)	2.583	-0.175 (0.182)	0.839	1.315*** (0.297)	3.725
Age from 60 to 65 years	-0.976*** (0.238)	0.377	2.676*** (0.127)	14.527	-1.649 (1.022)	0.192	3.562*** (0.455)	35.234
No. of observations	47 688				7 407			
R²	0.032				0.068			

Source: NBS, Slovak Statistical Office
Note: *p<0.1; **p<0.05; ***p<0.01.
Estimations controlled for regional effects.

Table 5 Estimation results – flows from inactive state

Reference category: inactive at time t	Whole period				2009 - 2010			
	Employed at time t		Unemployed at time t		Employed at time t		Unemployed at time t	
	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios	Elasticity	Relative risk ratios
Intercept	-3.177***		-6.870***		-3.984***		-27.763	
	(0.128)		(0.294)		(0.618)		(19908.380)	
Sex	-0.474***	0.623	-0.389***	0.678	-0.316**	0.729	-0.543***	0.581
	(0.037)		(0.047)		(0.151)		(0.124)	
Education: reference category - at most secondary								
At most primary	-0.658***	0.518	-0.460***	0.631	-0.882***	0.414	-0.491***	0.612
	(0.044)		(0.048)		(0.174)		(0.127)	
Tertiary	0.252***	1.287	-0.084	0.566	0.075	1.078	0.07	1.073
	(0.049)		(0.113)		(0.196)		(0.334)	
Marital status	-0.188***	0.829	-0.623***	0.536	-0.434***	0.648	-0.565***	0.568
	(0.040)		(0.065)		(0.164)		(0.177)	
Disability	-0.059	0.943	-0.352**	0.703	-1.177**	0.308	-0.476	0.621
	(0.067)		(0.164)		(0.511)		(0.489)	
Inactivity type: reference category - pensioner/disability pensioner								
Parental leave	2.344***	10.423	3.252***	25.842	3.047***	21.052	24.263	34457757828
	(0.090)		(0.272)		(0.504)		(19908.380)	
Student	0.689***	1.992	3.880***	48.424	1.150**	3.158	24.421	40355761114
	(0.102)		(0.254)		(0.532)		(19908.380)	
Other	1.664***	5.28	4.764***	117.214	2.130***	8.415	25.768	1.55203E+11
	(0.078)		(0.244)		(0.483)		(19908.380)	

No. of observations   336 905   47 278

R^2 -0.039   -0.008

Source: NBS, Slovak Statistical Office

Note: *$p<0.1$; **$p<0.05$; ***$p<0.01$.

Estimations controlled for regional effects and age effects.

5 Conclusions

The paper is focusing on the impact of socio-demographic characteristics on labour market flows in Slovakia. We analyse all possible flows between states employed, unemployed and inactive (i.e. out of the labour market), as there is a non-negligible number of movements also in and out of the inactive state. Results are largely in line with our expectations. When looking at the whole period available, i.e. form 2005Q1 until 2020Q1, education, marital status, character of economic activity and the number of years in the current job are the main factors impacting the flows in case of employed. The higher the educational level and the longer employed, the lower the probability of becoming unemployed. Also, married persons and persons working full-time have lower probability to become unemployed. In case of unemployed or inactive persons, the level of education is also an important factor, as the higher the education the higher the probability of finding a job. On the contrary, the longer a person is unemployed, the lower the probability of becoming employed. It seems that in general unemployed or inactive women have a lower probability to find a job.

We focused also on crisis years 2009 and 2010. Estimation results are in general qualitatively similar to results for the whole period. It is mainly the impact of educational level that changes the most. In case of employed persons, tertiary education significantly increases the probability of remaining employed during crisis times compared to at most secondary education. At most primary education means higher probability of becoming unemployed, but this probability does not change significantly during crisis times. In case of unemployed persons, having tertiary education means a higher probability to find a job also during crisis times, while this probability does not change significantly compared to the whole period. On the other hand, the difference between at most primary and at most secondary education becomes statistically insignificant. In case of inactive persons, tertiary education increases the probability of finding a job during the whole period, but this impact becomes insignificant during the crisis period.

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