PROBABILITIES OF TRANSITION AMONG HEALTH STATES: A COMPARISON BETWEEN OLDER IMMIGRANTS AND NATIVE-BORN PEOPLE IN EUROPE

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Introduction

A growing body of research conducted in Northern and Western European countries, such as Great Britain, Sweden, Germany and France have shown that some immigrant groups tend to have poorer health status in later life with respect to native-born people (Vaillant and Wolff, 2010; Leão et al., 2009; Solé-Auròand Crimmins, 2008; Pudaric et al., 2003; Silveira and Ebrahim, 1998). It has been suggested that socioeconomic disadvantages, cultural and linguistic barriers, the unequal access of health care and social service, discrimination, psychological stress of living in a new environment, lack of social and familiar relationships and housing conditions are all factors which may explain the increased risk of perceiving a worse health among foreign-born groups with respect the majority of population (Ringbäck *et al*., 1999, Ronellenfitsch & Razum, 2004, Silveira *et al*. (2002). Moreover, according to the theory of cumulative disadvantage (Dowd & Bengtson, 1978) the successive addition of adverse circumstances - as social and economic disadvantage – does not promote successful aging but, in contrast, potentially result in the onset of poor mental and physical health which deteriorate with duration of residence. For this reason, in the past two decades many researchers have paid considerable attention to immigrants' health as a possible burden on health and social welfare system, considering the growing proportion of ageing immigrants in Europe, their ethnic diversity and different socio-economic background. The notion of "sick immigrants" is emphasized for older immigrants who are more likely to experience higher risk of health deterioration with respect to the overall population of immigrants, since most negative changes in health occur in middle and old age.

The 'health vulnerability' of immigrants aged 50 and over living in Northern and Western Europe have been highlighted in a recent study (Lanari and Bussini, 2012). The authors found that some immigrant groups are more likely to perceive worse self-rated health and to suffer from depression than native-born groups, even when demographic and socio-economic variables are taken into account. In particular, the fact of being born and living in a specific country, in addition to duration of residence and citizenship, determines an increased risk for health status in specific immigrant

groups. As an example, people born in Eastern Europe living in Germany, France and Sweden have poorer health with respect to natives.

In light of the above, it is important for policy makers to know whether differences in health status between immigrant and non-immigrant populations do exist, and to analyse the changes over time in different aspects of immigrants health status so that clearly defined policy measures can be adopted to improve their health and planning relevant health services. Apart the inevitability of death, among individuals there is a wide variation in the ageing process: certain groups may experience successful ageing while others do not. Understanding the health transition process that occur with age towards bad health, the permanence in a state or the resolution of sickness in different groups may be useful to better target interventions in reducing mortality and morbidity or to estimate health trajectories over time to analyse the effect of various determinants (Diehr and Patrick, 2001).

We aim to investigate the probabilities of transition among health states for middle-aged and older adults and examine how they vary by age and immigrant status. Given the theoretical and practical background above evidenced, we hypothesize that immigrants are more likely to experience a deterioration of health during aging, that is, the probability that a person with certain characteristics (foreign born and living in specific countries) will move from a "healthy state" to a "sick state" is higher with respect to others (non-immigrants), especially for older adults.

The longitudinal dimension acquired by the Survey of Health, Aging and Retirement (SHARE) allows us to do another step in our research on health inequalities towards the knowledge of how successful is the immigrants' aging with respect to natives.

The paper seeks to advance in the general understanding of the relationship between immigration and health by investigating the following themes: 1) Do health transitions vary by immigrant status/ethnicity? 2) Which health conditions, among the various health measures used, show negative transition effects for immigrants and which do not? 3) Which is the role of socioeconomic factors in influencing health transitions?

Data and Methods

This study is based on data obtained from three waves of SHARE collected every two years starting from 2004 to 2010; we use the first two waves (2004 and 2006) and the fourth (2010) since the third wave is SHARELIFE and focuses exclusively on people's life histories, and include individuals conditional on being part of the sample in 2004, which is our initial state. Consequently, we may

estimate the probability of transition from one health state to another by 2 to 4 year interval, a considerable time lag in which important changes in health can occur.

SHARE is a multidisciplinary and cross-national panel database of micro-data, and covers a broad range of topics, including health, income, assets, employment, retirement, insurance, and family structure of non-institutionalized individuals aged 50 and over. The information on birthplace, citizenship and duration of residence allow us to test the different impact of "being immigrant" on health inequalities. Eleven European countries were examined in the analysis taken from the dataset: Austria, Belgium, Denmark, France, Germany, Sweden, Switzerland and The Netherlands, which became the most important European receiving countries after the Second World War, for immigrants who moved from South to North or from East to West within Europe mainly for economic or political reasons and limited opportunities in their countries of origin (Fassmann and Munz, 1992). We included also the three Mediterranean countries Italy, Greece and Spain even if the proportion of middle-old immigrants is negligible[1]. The baseline survey included 26,019 persons, whom 2,339 were defined "immigrants" as people born in a country different from that of their residence (about 9%). We distinguish three broader immigrant groups, independent of citizenship: immigrants from "Eastern Europe", "Other Europe" and "Extra Europe". In choosing these groups, we tried to maintain a sufficient number of observations in each subgroup and to examine, in particular, the health transition of immigrants from Eastern Europe, the most vulnerable group (Lanari and Bussini, 2012). The health measures included self-rated health, depression and ADLs. Following the approach of Thielke and Diehr (2012), each health variable was dichotomized into "Healthy" and "Sick", by using cutoff validated in the international scientific literature. Since evidence suggests that a poor health response category is highly correlated with mortality (Idler and Benyamini 1997), self-rated health (SRH), assessed in all countries on a 5-point scale ranging from "excellent" to "poor", was then collapsed into two groups: "positive" (good, very good, excellent) and "negative" health perception (less than good). Self-reported "excellent" "very good" and "good" general health were defined as "Healthy", while "fair" or "poor" were classified as "Sick". Depression (DEP) was measured by the self-report of a diagnosis, and individuals were asked to indicate whether they were suffering from any of the symptoms of which the most common are listed below: sad or depressed mood, lack of concentration, sleeping disorder, fatigue, no energy, no appetite, thoughts of suicide. Individuals' answers were recoded according to the EURO-D scale, and then summarized in two categories: three or more symptoms (modality 1) and less than three (modality 0). This cut-off point had been validated in an earlier cross-European study of depression prevalence (EURODEP) against other clinically significant indicators. People reporting three or

[1] From the original dataset we did not consider Israel since it is not a European countries.

more depressive symptoms were likely to be diagnosed as suffering from depression, for which medical intervention would be desirable (Prince *et al.* 1999a, b). For ADL limitations (ADL), people who suffered from one or more impairments were considered to be sick in that domain. In addition, individuals face mortality risk so we considered death as one of the possible health states, denoted as "Dead". Individuals were grouped into the following three categories according to their age: 50-64, 65-74, and 75 and over. People could contribute data to more than one age category, depending on their age at the start of each transition. We use transition probabilities models to assess prevalence and incidence of health and sick states for various group distinguished according to age and immigrant status. First we calculated transition probabilities through the count method used in Diehr and Patrick (2001) which consist in counting the number of transition from initial state to states two period ahead. For example, an individual can transition from "Healthy" state to healthy/sick/dead or inversely from "Sick" to healthy/sick/dead. This is a non-parametric method which involves a simple counting procedure (Jung 2006). Then we use predictions of logit specifications so that we can condition these matrices on various individual characteristics as demographic variables (age, gender, immigrant status, marital status) and socio-economic conditions (education).

Results

Table 1 shows the prevalence of a healthy state by age category and nativity status for the three indicators used in the analysis. Natives had a significantly higher prevalence of a healthy state. For example, for SRH, about 72% of natives aged 50–64 were "healthy," since they reported to be in "good, very good or excellent" health. For immigrants in the same age range, the prevalence of a healthy state was lower, 64.3%. Over the three age groups, natives' prevalence for SRH declined from 72% to 60.2% to 49.7%, while immigrants' prevalence declined from 64.3% to 51.3% to 35.7%. The same pattern was found for DEP since natives had a significantly higher prevalence of a healthy state (not depressed) with respect to immigrants, showing differences from 6 to 9 point percentages over the three age groups. For ADL there was no significant difference between natives and immigrants. All of the prevalence values in Table1 declined with age; the prevalence values were significantly lower at each subsequent age group compared with the younger one. In the last line the number of observations (transition pairs) are reported.

Table 1: Prevalence of a healthy state among natives (left columns) and immigrants (right columns)

	Natives			**Immigrants**		
	50-64	*65-74*	*> 75*	*50-64*	*65-74*	*> 75*
SRH: high self-rated health	72,03	60,17	49,75	64,35	51,32	35,67
DEP: not depressed	76,62	74,57	66,87	70,14	67,77	57,56
ADL: no ADL difficulties	93,92	89,64	77,55	92,33	87,75	73,24
Number of Observations	26.047	15.778	11.951	2.228	1.228	890

Table 2 describe the observed health transitions by age for each measure used in the analysis (self-rated health, depression and ADL) for natives and immigrants. The first two lines of each table show the transition probabilities for natives who were initially in the healthy and sick state, while the second part of the table refers to the whole sample of immigrants then split into three subgroups of immigrants in order to examine the role of country of birth on health transitions. For example, if we look at the self-rated health indicator, age 50–64 natives who were healthy (who reported excellent, very good and good health) had a 85.6% probability of remaining healthy, a 13.7% probability of becoming sick (reporting poor or fair health), and a 0.7% probability of dying. Natives were more likely than immigrants to remain healthy and less likely to become sick in all of comparisons, even if natives were more likely to die. Health deterioration was particularly evident for people born in Eastern Europe aged 65 and over with respect to natives and the other groups of immigrants. Indeed the proportion of immigrants from Eastern Europe who experienced a transition from an initial healthy status to sick health was 30% in the age group 64-75 and 39% for people 75 and over, the highest values with respect to the other groups. In general, in all three transitions (remaining healthy, becoming sick, and dying from a healthy state), there was a significant decline with advancing age, as well as for the other domains of health. Transition probabilities for DEP confirmed the previous results, showing a health deterioration for immigrants, characterised by lower percentages of people staying healthy. Smaller and less consistent differences between natives and immigrants were found for ADL.

Table 2a: Observed transition probabilities of self-rated health by immigrant group

State in t-1	State at time t								
	Age (50- 64)			Age (65- 74)			Age (> 75)		
	Healthy	*Sick*	*Dead*	*Healthy*	*Sick*	*Dead*	*Healthy*	*Sick*	*Dead*
Natives									
Healthy	85.58	13.7	0.71	75.33	22.5	2.17	62.52	29.53	7.95
Sick	34.99	62.49	2.52	28.15	67.67	4.18	20.64	67.17	12.2
All immigrants									
Healthy	81.92	17.56	0.51	73.67	24.45	1.88	61.11	31.94	6.94
Sick	23.1	74.83	2.07	21.82	74.55	3.64	17.12	71.92	10.96
Eastern-Europe									
Healthy	81.69	18.31	0	70	30	.	56.52	39.13	4.35
Sick	15	82.5	2.5	17.65	82.35	.	18.52	70.37	11.11
Other-Europe									
Healthy	80.29	19.14	0.57	73.6	23.6	2.81	65.06	30.12	4.82
Sick	21.31	76.23	2.46	24.14	70.11	5.75	17.44	72.09	10.47
Extra-Europe									
Healthy	83.47	15.68	0.85	69.39	28.57	2.04	50	30.77	19.23
Sick	32.47	64.94	2.6	19.23	76.92	3.85	22.22	55.56	22.22

Table 2b: Observed transition probabilities of depression by immigrant group

State in t-1	State at time t								
	Age (50- 64)			Age (65- 74)			Age (> 75)		
	Healthy	*Sick*	*Dead*	*Healthy*	*Sick*	*Dead*	*Healthy*	*Sick*	*Dead*
Natives									
Healthy	86.55	12.44	1.01	83.49	14.27	2.24	72.59	18.78	8.63
Sick	50.73	47.83	1.43	44.17	51.18	4.65	31.27	55.6	13.14
All immigrants									
Healthy	84.59	14.34	1.06	81.95	16.05	2.01	74.29	18.29	7.43
Sick	44.66	54.58	0.76	37.82	57.98	4.2	30.43	59.78	9.78
Eastern-Europe									
Healthy	86.3	12.33	1.37	85	15	.	76.92	15.38	7.69
Sick	52.94	47.06	0	37.5	62.5	.	35	60	5
Other-Europe									
Healthy	85.84	13.03	1.13	82.83	13.64	3.54	72.9	22.43	4.67
Sick	43.4	55.66	0.94	35	60	5	28	60	12
Extra-Europe									
Healthy	86.85	11.74	1.41	83.33	16.67	0	75	10.57	14.43
Sick	42.25	56.34	1.41	36.67	56.67	6.67	25	58.33	16.67

Table 2c: Observed transition probabilities of ADL by immigrant group

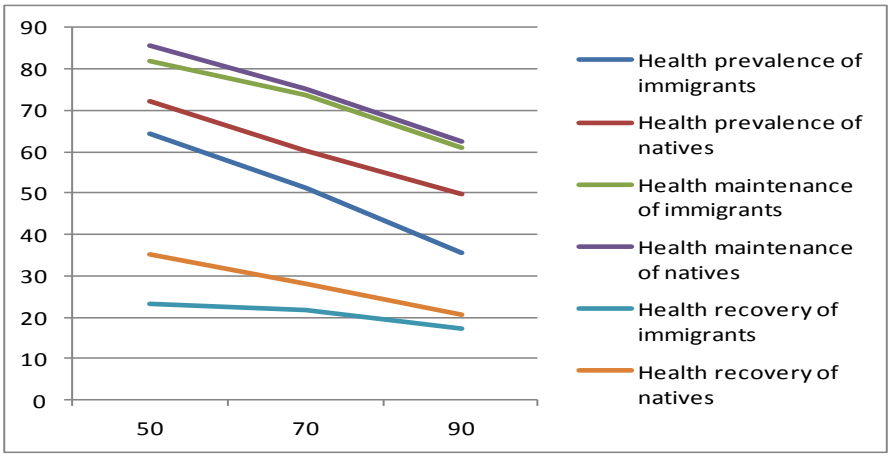
State in t-1	State at time t								
	Age (50- 64)			Age (65- 74)			Age (> 75)		
	Healthy	*Sick*	*Dead*	*Healthy*	*Sick*	*Dead*	*Healthy*	*Sick*	*Dead*
Natives									
Healthy	95.64	3.37	1	91.31	6.35	2.34	77.4	14.69	7.91
Sick	58.32	38.63	3.05	47.33	44.44	8.23	28.63	52.93	18.44
All immigrants									
Healthy	94.07	4.95	0.99	89.82	8.63	1.55	73.82	17.6	8.58
Sick	50.85	49.15	0	34.38	50	15.63	32.14	57.14	10.71
Eastern-Europe									
Healthy	94.23	4.81	0.96	93.59	6.41	.	84.09	6.82	9.09
Sick	71.43	28.57	0	50	50	.	16.67	83.33	0
Other-Europe									
Healthy	94.53	4.33	1.14	90.08	7.44	2.48	73.23	19.69	7.09
Sick	51.52	48.48	0	30.43	52.17	17.39	36.59	53.66	9.76
Extra-Europe									
Healthy	92.76	5.92	1.32	90.54	8.11	1.35	65.79	15.79	18.42
Sick	33.33	66.67	0	.	.	.	33.33	33.33	33.33

The transition probabilities for persons who were initially in the sick state indicate that the probabilities of remaining sick were significantly higher for immigrants with respect to natives, whereas the probability to recover from sickness, or probability of death were higher for natives. We considered the probability to remain sick, as an unfavorable transition, because the person did not recover, but it could also be considered as favorable because the person did not die. In all domains of health, the probability of recovery from a sick state declined significantly with age, while the probability of dying from a sick state increased with age. In particular, natives were significantly more likely than immigrants to recover in all health measures used. Natives were less likely to remain in a sick state than immigrants. For every health variable, natives and immigrants from extra-Europe were significantly more likely to die from a state of sickness than the other groups.

The health patterns above described are graphically represented in Figure 1 which shows how transitions and prevalence for SRH both change over time and differ between natives and immigrants. The transition probability estimates are the likelihoods of remaining healthy and of recovering from sick to healthy status. “Healthy” was defined as reporting “excellent, very good and good health”, and “sick” as assessing less than good health. The two topmost lines in the graph represent the probability of staying in the healthy state, which is initially about 0.85 and is higher for natives than for immigrants. The third and fourth lines from the top represent the healthy prevalence (proportion of those reporting a healthy status), with the red line for natives and the light blue one for immigrants. The prevalence is quite high for the youngest group (more than 70%) and

declines over time. As expected, the healthy prevalence is higher for natives than for immigrants, and the difference increases with age.

Figure 1 : Prevalence, maintenance and recovery for SRH by age and nativity status over the three Share waves (2004-2008-2010)



The lowermost two lines represent the probability of recovering from the sick state (poor or fair health) by transitioning into the healthy state over time which is initially about 0.35 and is higher for natives than for immigrants, especially at younger ages. Indeed we can notice that for older ages the probability to recover is similar for the two groups, even if natives are more likely to recover from being sick.

Robustness analysis: the ordered logit estimates for depression

In this section we estimated ordered logit estimates as a robustness check and, for parsimony, results are presented for depression, distinguishing for natives and immigrants (Table 3). As control variables, our specification includes age, gender, marital status and education as an indicator of socio-economic status. In addition, when estimates are done for the whole sample which includes both natives and immigrants we controlled also for nativity status (being native or immigrant); a second step was to implement estimates for the two sub-groups since the variable "nativity status" was highly statistically significant in accounting for differences in depression between natives and immigrants.

Estimates shown in Table 3 confirms results obtained with the counting method above presented.

The probability to stay healthy (not depressed) is quite high (0.83) while the probability to move from a healthy to sick state (depression) is about 0.12. If individuals start from a sick health state the probability to recover from depression is equal to 0.43. Marginal effects of covariates (data not shown) evidence that female and divorced individuals have higher probabilities to become sick

(depressed) and lower propensity to recover from bad health than men and married persons. Conversely, higher education increases the probability to stay healthy and to recover from a bad to healthy status. People with higher levels of schooling may benefit from greater knowledge, have better decision-making skills and be able to make greater capital investments in health care, due to higher incomes. In addition, the probability of staying healthy declines over the life cycle, whereas the propensity of transiting from health to sick status and do not recover increases for the old.

As already discussed, we re-estimated ordered logit models separately for natives and immigrants (Table 3a and Table 3b) showing consistent differences for transitions from the sickness state. The most striking result is that the probability of transition from sick (depression) to healthy status (no depression) are smaller for immigrants with respect to natives (0.377 *vs* 0.437, respectively); moreover immigrants exhibit higher rates of permanence in sick health status. Most of the differences are thus driven by difference in maintenance of sickness and difficulties to recover from it. In other words, natives seem to be healthier because they are less likely to stay *into* sick states while are more likely to recover from depression.

Table 3. Ordered logit estimates for depression (Whole sample)

	State at time t			
	Healthy	Sick	Dead	Obs.
State at time t-1				
Healthy	0.835	0.124	0.041	13961
Sick	0.432	0.496	0.071	4443

Table 3a. Ordered logit estimates for depression (Natives)

	State at time t			
	Healthy	Sick	Dead	Obs.
State at time t-1				
Healthy	0.840	0.123	0.036	13043
Sick	0.437	0.490	0.072	4081

Table 3b. Ordered logit estimates for depression (Immigrants)

	State at time t			
	Healthy	Sick	Dead	Obs.
State at time t-1				
Healthy	0.834	0.134	0.030	918
Sick	0.377	0.562	0.059	362

Conclusions

Preliminary results show that transition probabilities varied by age and immigrant status. In all domains of health, older immigrants' health status over the 6-years span of the survey deteriorated more frequently compared to natives. Natives and immigrants experienced different types of change in health over time, with natives showing more health and less sickness, but greater likelihood of dying. In particular, results emphasize the heterogeneity found among immigrants as Eastern European people were most likely to experience worsening health and less likely to recover from sickness. All health measures registered a significant decline with increasing age.

Results confirmed the findings of our previous paper (Lanari and Bussini, 2012) since "being an immigrant" can be considered a risk factor in addition to low socioeconomic conditions which may be determinant of health worsening.

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