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Migration from Ukraine: Brawn or Brain?
New Survey Evidence

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Summary

This paper studies selection and labour market outcomes among Ukrainian migrants using unique data from a survey conducted in Ukraine between August and October 2011. We found that migrants are positively selected in terms of age and education yetthis is not associated, as might be expected, with their labour market outcomes. Notably, around half of the migrants are employed in occupations for which they are over-qualified. We suggest that this downshifting in occupation can be partly explained by the absence of the conventional link between education and skills in Ukraine. We compare pre- and post-migration labour market outcomes and find that the probability of downshifting decreases with the duration of stay in a foreign country and knowledge of English or the local language. Significantly, someone who downshifted prior to migration in their home country was more likely to downshift abroad. Further, we found that migrants to the EU are more likely to downshift when compared to other destinations.

Keywords: migration, selection, occupation downshift, survey data

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1. Introduction

In recent decades, Ukraine has seen a significant increase in cross-border migration as well as a diversification in the direction of that migration away from other former Soviet states. This paper looks at the properties of cross-border Ukrainian migration, particularly in terms of the attributes of migrants. It is based on unique survey data that we collected in the second half of 2011.

The main aim of the research was to understand more about the characteristics of migrants and therefore the survey was designed to permit testing for self-selection on some key observable characteristics. It was also designed to track details of employment history both prior to and after migration, a feature that distinguishes our data from the existing studies. We are also able to address directly the issue of whether migration from Ukraine constitutes a brain drain or gain; in other words, whether it subtracts from, or ultimately contributes positively to, the amount of human capital available to the economy.

Respondents were classified into several migrant categories which allowed us to make comparisons that are absent in much of the literature due to lack of data. In particular, we were able to observe the status of individuals once they migrated. Our survey allows for a fuller picture of the migrants'characteristics as sampling of the source population is known from the Ukrainian census.

Earlier research has found that the bulk of Ukrainian migrants were relatively low-skilled but not much has been known about the type of employment outcomes associated with migration. Our data shows that migrants tend to be positively self-selected on age and education. However, their occupational choice while abroad mostly did not correspond with observable education levels. Under the assumption that skills and education are tightly correlated, this suggests that migrants tend to downshift when finding work abroad. Part of this may be motivated by the fact that there are large income gaps between better paid and more skilled occupations in Ukraine and low paid occupations abroad. The gap is in favour of the latter, which implies that there might be incentives for an individual with relatively low migration costs to downshift or choose an occupation that is seemingly a bad match for their educational background.

We found that nearly half of the migrants in the survey data were employed in occupations for which they are clearly overqualified. This is a common feature of some other studies of migrants' occupational choices.[1] The phenomenon of occupation downshifting, also sometimes referred to in the literature as "brain waste", persists across all education categories irrespective of the destination country. In this paper, we look at the nature and determinants of downshifting and link it to the issues of migrant self-selection as well as pre-migration employment. We consider two sets of factors in particular that may help account for downshifting. The first is the quality (or degree of transferability) of human capital acquired in Ukraine. The second concerns the search costs associated with looking for an occupation abroad. These costs could be expected to be related to factors such as knowledge of the local language or English, as well as the duration of a migrant's stay in a given country or their pre-migration work experience.

[1] See, for example, Mattoo et al.(2008) and Kostenko et al.(2012).

2. Literature review

Our study correlates with several strands of the migration literature. It is primarily linked to the body of research on self-selection that investigates how the characteristics of migrants differ from non-migrants as well as the local population.[2] These characteristics define how migrants affect receiving and sending economies, which links our study to the literature on the labour market performance of migrants as well as the brain drain/brain gain literature.[3]

Borjas (1987) first applied the self-selection framework to study the quality of migrants in the United States. He defined three types of selection:

- positive selection (migrants are above average in income distribution, and thus in unobservable skills or ability, in both sending and receiving countries)
- selection of refugees (migrants are above average only in the receiving country)
- negative selection (migrants are below average in both countries).

Using data from the 1970 and 1980 population censuses, he found evidence for positive selection and increase in earnings over time for migrants from Western Europe and negative selection and a decrease in earnings over time for those from less developed countries. Further empirical evidence on selection has been mixed.

In the context of Mexico-US migration flows, Chiquiar and Hanson (2005) and McKenzie and Rapoport (2010) found that the probability of emigration increases for those in the middle and high sections of the education distribution (positive selection). Moraga (2011), using longitudinal data, found negative selection of migrants and shows that the distribution of the would-be-migrants' earnings drops in the pre-migration quarter. Elsewhere, Rooth and Saarela (2007) found that Finnish migrants to Sweden during 1989-1990 had on average one year of schooling less than non-migrants, consistent with the fact that, for a decade prior to the period considered, Sweden had a smaller return to observable skills than Finland.

In part due to data availability, the majority of studies research the self-selection phenomenon from the point of view of the receiving country. This approach can be problematic due to lack of representativeness of the migrant population and of under-representation of certain categories of migrants (including illegal migrants). For example, Hanson (2006) estimates that the undercounting of the illegal migrants in the stock data in the US Census to be of the order of 10-25 per cent while Moraga (2011) finds his negative selection results differ from the positive selection of Chiquiar and Hanson (2005) only due to the undercounting of the low-skilled migrants in the data used by the latter.

Literature on the labour market performance of migrants can be subdivided into two strands – earnings assimilation and occupational attainments.[4] Mattoo et al. (2008) found that migrants in the US labour market from Latin America and eastern Europe are more likely to be employed

[2] See Borjas (1987), Chiquiar and Hanson (2005) and Moraga (2011), amongst others.

[3] See Gibson and McKenzie (2012).

[4] Mattoo et al.(2008) for the US; Kostenko et al.(2012) for Australia; and Turner (2010) for Ireland.

in low-skilled jobs than migrants from Asia and developed countries with similar characteristics. According to them, this variation is explained by low or poorly transferable skills obtained in certain source countries, as well as by selective US immigration policy. Poor quality or transferability of skills is also related to expenditures on tertiary education and use of English as a medium of instruction in the source countries. US immigration policy is an important factor as migrants from certain countries are admitted through family reunification and visa lotteries whereas migrants from other countries have to make their way through the labour market.

The bulk of existing research[5]suggests that on arrival migrants face a significant wage gap compared to locals in the same occupation with similar observables. However, it appears that migrants' wages grow faster and eventually converge to those of natives, with some exceptions. Adsera and Chiswick (2007) find the gap to be 40 per cent on average for all migrants but the gap widens for those born outside of the EU and varies across destination countries. Berman et al. (2003) found that wages for migrants from the former Soviet Union in Israel converge to those in the upper part of the occupation distribution but the rate of convergence is closely linked to knowledge of Hebrew. They report no convergence in wages, irrespective of Hebrew proficiency, for occupations at the bottom of the distribution.

Self-selection has implications for sending and receiving economies. For the sending countries, the literature on brain drain argues that the dominant channel is through depriving the sending or developing country of skills required locally, thereby subtracting from the sending country's growth potential.[6] On the contrary, the brain gain literature suggests that, with a positive migration probability, individuals will tend to obtain more human capital. Since only a small fraction actually emigrates, the sending country has a higher supply of human capital.[7] Gibson and McKenzie (2012) add to the discussion by suggesting that the probability of migration principally affects the choice of field of education rather than the level. For the receiving economy, self-selection primarily affects migrants' labour market performance in terms of wages and occupational choice.

In the light of the above overview of the literature, we studied self-selection of Ukrainian migrants from the perspective of the sending country. Quite recently, there have been two other large-scale migration surveys conducted in Ukraine: ETF (2008) and Libanova (2009). Both of these surveys suffered from under-classification of the migrant categories to a varying extent and deficiencies in survey design as far as extracting relevant information about migrants is concerned. Compared to these surveys, our study has several advantages. First, we explicitly modelled migrant categories to allow for testing self-selection effects. Second, we collected information on the pre- and post-migration employment history of respondents and use it to explain the choice of current occupation. Our study contributes to the literature on the occupational distribution of migrants, linking the phenomenon of occupation downshifting with self-selection of migrants and their pre-migration employment details. Lastly, we directly asked respondents about any human capital accumulation in order to test the brain gain hypothesis directly.

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[5] See Adsera and Chiswick (2007) for migrants in the EU and Berman et al.(2003) for migrants in Israel.

[6] Bhagwati and Hamada (1974).

[7] See Commander et al.(2003) and Batista et al.(2012).

3. Survey design

The current study is based on a tailor-made survey. The population of interest was defined as persons in the labour force, males and females aged 15-59, residing in non-institutionalised dwellings in settlements with a population size of 50,000 people and more. The decision to ignore the rural population was dictated by several considerations including difficulties in achieving adequate coverage as well as the fact that historically Ukrainian domestic migration from rural to urban areas has been significant. As a consequence, earlier evidence suggests that the bulk of potential external migrants are resident in urban areas.[8]

Due to the differences in cultural and historical backgrounds across various geographical parts of Ukraine, as well as infrastructural diversities across settlements of various sizes, we stratified our sample by region and town size. Four geographical regions (west, centre and north, east and south) and four town sizes (50-100,000, 100-200,000, 200-500,000, 500,000 – 1 million residents) resulted in a 4-by-4 stratification map. Large cities (> 1 million residents) were further included as a separate stratum. The final individual observation weights on gender and 10-year age brackets were calculated using the relevant information from the Ukrainian State Statistical Office.

The data were collected by means of direct interviews with households in accordance with specific search routes that maximised the distance between each pair of sampling points in towns that had been randomly chosen within a particular stratification cell. Depending on availability within a selected household, responses were collected from one randomly chosen member without any external migration experience and from all members with such experience. To be considered a person with migration experience, a person had to fulfill one of the following criteria at the time of conducting the interview:

- be residing, working or studying abroad
- having been abroad for the purpose of residence, employment or education in the last three years
- be planning to leave abroad for the purpose of residence, employment or education elsewhere in the next 12 months.

When it was not possible to gather information about a person directly we had to rely on other household members to respond.

The data were collected between August and October 2011. Altogether, we obtained information on 6,676 individuals from 5,985 households living in 63 towns of Ukraine.

[8] There is one obvious exception. In the western part of Ukraine much of the external migration to neighbouring countries has been from rural areas.

4. Descriptive statistics

Table 1 provides some basic descriptive statistics concerning the sample and shows the unweighted (weighted given in brackets) distribution of migrants across the categories. Those currently abroad were 409 (369), returnees numbered 216 (266) and prospective migrants were 320 (320) while non-migrants were 5,739 (5,720). In the discussion below, we weight the observations to generalise our results for the whole urban population. We further classify respondents from categories currently abroad and returnees as migrants.

Table 1 shows that, on average, a migrant is more likely to be a married man, aged below 40 and come from the middle or upper part of the education distribution.

Table 1: Basic descriptive statistics

Variable	Currently Abroad		Returnees		Prospective		Non-Migrants	
	N	%	N	%	N	%	N	%
Male	245	66.4	196	73.7	199	62.2	2534	44.3
Age:								
Mean	36.8		37.3		31.0		37.5	
s.d.	11.4		10.3		11.7		12.8	
15-19	9	2.4	4	1.5	56	17.5	536	9.4
20-29	121	32.8	76	28.6	121	37.8	1342	23.5
30-39	82	22.2	66	24.8	56	17.5	1229	21.5
40-49	90	24.4	85	32.0	58	18.1	1286	22.5
50-59	67	18.2	35	13.2	28	8.8	1328	23.2
Marital status:								
Single	97	26.3	46	17.3	151	47.2	1435	25.1
Married	235	63.7	173	65.0	124	38.8	3270	57.2
Cohabitation	14	3.8	14	5.3	14	4.4	248	4.3
Divorced	20	5.4	29	10.9	27	8.4	563	9.8
Widowed	3	0.8	4	1.5	4	1.3	204	3.6
Education:								
Primary	0	0.0	0	0.0	0	0.0	12	0.2
Basic secondary	4	1.1	1	0.4	11	3.4	230	4.0
Complete secondary	33	8.9	16	6.0	50	15.6	790	13.8
Vocational	82	22.2	114	42.9	60	18.8	1435	25.1
Basic higher	86	23.3	65	24.4	79	24.7	1441	25.2
Complete higher	158	42.8	67	25.2	119	37.2	1786	31.2
Candidate of sciences	5	1.4	3	1.1	1	0.3	25	0.4
Doctor of sciences	1	0.3	0	0.0	0	0	1	0.0
Total weighted	**369**		**266**		**320**		**5720**	

Source: Survey results.

We identify five categories for analysis of selection. They are: (1) those currently abroad as opposed to non-migrants; (2) returnees as opposed to non-migrants; (3) returnees as opposed to those currently abroad; (4) prospective as opposed to non-migrants; and (5) prospective as opposed to those currently abroad.

The currently abroad tend to be younger than non-migrants. More than 40 per cent of the currently abroad have completed higher education (Master's degree or equivalent) compared to 31 per cent amongst the non-migrants. There is evidence of positive self-selection in terms of age and education. The returnees are likely to be married males coming from the middle part of the education distribution. Based on the education criterion alone there seems to be some selection on the part of the returnees as compared to the currently abroad and non-migrants. The prospective migrants tend to be particularly young and are largely dominated by single males. A significant share have completed higher education (>37 per cent).

The survey data yield a total migration rate of 10 per cent. However, there is large variation across administrative regions (see Table 1A and Figure 1A in Appendix). In general, there has been a small amount of migration from the central regions with relatively high migration rates in the Western parts, notably Odessa and Lugansk regions. The picture is also quite diverse in terms of the destination countries, as can be seen in Table 2.

Table 2: Destination countries

Destination	**Currently Abroad**		**Returnees**	
	N	%	N	%
Russia	144	39.0	134	50.2
Italy	36	9.8	20	7.6
Poland	25	6.9	31	11.7
Germany	23	6.2	15	5.8
USA	20	5.3	5	1.9
Israel	15	4.0	1	0.3
Spain	12	3.3	7	2.7
Czech Republic	9	2.4	12	4.5
Greece	7	1.8	8	2.9
Portugal	7	1.8	2	0.6
UAE	5	1.5	1	0.5
UK	5	1.3	3	1.1
Other	62	17.0	27	10.1
Total	**369**		**266**	

Source: Survey results.

There is a clear trend for respondents from the western regions of Ukraine to go to the EU27 countries and for those from the eastern part to go mainly to former Soviet Republics, primarily Russia. Indeed, the most frequently chosen destination was Russia – 40.1 per cent and 50.2 per cent of the currently abroad and return migrants respectively. The three most frequent EU destinations were Italy, Poland and Germany while the USA, Israel and UAE were the three most favoured destinations in the rest of the world category. Even though this paper does not directly address the question of the reasons for the choice of destination, we did find a non-linear effect between the size of the origin city in Ukraine and the probability to migrate, as well as different labour market outcomes for migrants across the destination country groups.

The existing research unambiguously suggests that the primary reason for migration is the difference in wage rates net of the total migration costs. In our survey nearly 77 per cent of all migrants indicated "better pay" and "better employment opportunities" as their primary reasons for migration. Table 3 summarises data on self-reported average monthly incomes.[9] For an average non-migrant working in the manual labour sector in Ukraine, the reported income was US$ 555. A migrant working in the manual labour sector abroad could earn on average at least twice as much. The reported income ranged from US$ 1295 in the EU15 to US$ 2043 in the EU10. The income gap increases further up the occupation ladder. In addition, the highest income sector in Ukraine has an average level of income that is in fact lower than most unskilled jobs abroad. This implies that for a skilled Ukrainian with relatively low migration costs it may be attractive to take an unskilled job abroad, thus avoiding the occupation search and integration costs. The data also suggests that return migrants do not necessarily get a "migration premium" for their experience abroad, a phenomenon also found by other authors.[10]

Table 3: Self-reported average income for 6 months prior to survey date (PPP US$)

Sector	EU15	EU10	Russia	ROW	Ukraine
Manual	1294.8	2042.6	1717.8	1871.4	554.9
Specialized manual	1231.6	1689.9	1796.4	2048.2	672.4
High-skilled	1830.1	1563.3	2092.4	2097.5	737.9
Narrow high-skilled	4538.6	2551.0	1489.1	3314.1	876.8
Administrative	1924.1	2506.1	2701.1	2677.6	1158.0

Source: Survey results.

As regards the reasons for returning home, 55 per cent of return migrants chose "personal reasons" and 31 per cent report "employment contract expiration, end of education etc". Therefore it seems that the decision to return is not entirely at the migrant's discretion, a fact that potentially reduces the selection bias if we consider returnees as opposed to those currently abroad. Around 40 per cent of the migrants send remittances home, the rate being a bit higher for those currently abroad than for the returnees (45 per cent and 40 per cent respectively). The average weighted amount remitted is US$ 535 for the currently abroad and US$ 760 for the returnees.[11]

The survey also asked respondents whether they had taken additional education or training in an attempt to improve their chances of migrating. Respondents' answers are summarised in Table 4.[12] The evidence in support of the brain gain hypothesis is weak.

[9] Note that for the income question we obtained high response rates – 58 per cent for the currently abroad; 77 per cent for the returness; 76 per cent for the prospective migrants; and 87 per cent for the non-migrants.

[10] For example, Co et al.(2000) for returning Hungarians and Ambrosini and Peri (2012) for returning Mexican migrants.

[11] The remittances were predominantly in cash.

[12] In the non-migrant category, the question was asked to those who had considered migrating which is why the number of answers drops to 1015.

Table 4: Responses to "Have you tried to improve your chances to migrate by any of the following?"

	Currently Abroad		Returnees		Prospective		Non-Migrants	
	N	%	N	%	N	%	N	%
Additional years of schooling	11	3.0	0	0.0	7	2.2	16	1.6
Language classes	59	16.0	14	5.3	61	19.1	115	11.3
Professional skills building	55	15.0	20	7.5	33	10.3	48	4.7
Private classes	14	3.8	0	0.0	4	1.3	16	1.6
Preparation for SAT	16	4.3	6	2.3	7	2.2	10	1.0
Have not tried	200	54.2	216	81.2	176	55.0	730	71.9
Other	3	0.8	0	0.0	9	2.8	26	2.6
Do not know	49	13.3	10	3.8	23	7.2	54	5.3
Respondents in category	**369**		**266**		**320**		**1015**	

Source: Survey results.

As might be expected, prospective migrants are more active in obtaining additional skills than non-migrants. In particular, 19 per cent of the prospective migrants took language classes, 10 per cent had professional skill building and 2 per cent took additional years of schooling. This compares to 11.3 per cent, 4.7 per cent and 1.6 per cent respectively amongst the non-migrants where there is little evidence of additional years of schooling.

5. Labour market outcomes and occupational choice

Looking at the labour market performance of migrants in their destination countries, a striking feature is that Ukrainian migrants abroad commonly downshift and take up work for which they are seemingly overqualified. A standard definition of a downshifter relates educational attainments at home to labour market matches abroad (Mattoo et al., 2008). The former is considered to reflect a person's unobservable skills while also setting an aspiration level. To gauge the nature of the match, our survey questionnaire not only collected information on educational attainments but also contained a five-point ranking of skills by which respondents ranked their current occupation. These categories were manual labour, specialised manual labour, general high-skill, specialised high-skilled and administrative. These two pieces of information allow contrasting education with occupation. A downshifter was defined as someone for whom one of following holds:

- involuntarily unemployed
- employed in manual labour if the skill level is medium or high
- employed in specialised manual or manual labor if the skill level is higher.

Table 5 gives the occupational distribution of respondents controlling for their educational attainment. For the latter, the broad categories were applied; low-skilled people defined as having primary and/or basic secondary education; medium-skilled people with complete secondary and vocational education, high-skilled individuals with tertiary education. Migrants classified as downshifters are shaded grey in Table 5. It appears that 43 per cent of medium-skilled and 56 per cent of high-skilled respondents had to downshift whilst working abroad. In total, 288 individuals or just over 44 per cent of migrants downshifted.

Table 5: Occupational distribution of respondents[13]

	Low-Skilled			Medium-Skilled			High-Skilled		
	Migrants		Non-	Migrants		Non-	Migrants		Non-
	Before	After	Migrants	Before	After	Migrants	Before	After	Migrants
Unemployed	.	.	8	38	3	193	28	4	162
Manual Labour	2	1	24	48	71	329	19	79	132
Spec. Manual Labour	.	.	26	102	144	972	84	131	663
General High-Skilled	.	.	3	9	7	224	110	86	1318
Spec. High-Skilled	1	.	.	.	.	10	24	25	141
Administrative	.	2	1	5	5	35	10	13	282
Study	2	2	163	12	8	224	73	22	229
Other			17	31	7	239	37	25	325
Downshifters	**.**	**.**	**8**	**86**	**74**	**522**	**131**	**214**	**957**
Non-Downshifters	**5**	**5**	**234**	**159**	**171**	**1704**	**254**	**171**	**2295**

Source: Survey results.

Although the baseline definition is widely used in the literature, we have reasons to believe that its core assumption – namely that education is a good signal of an individual's labour market skills – may be questioned in the context of many transition economies such as Ukraine. Aside from the fact that education may not proxy well unobservable skills (see, for example, Heckman and Rubinstein, 2000) there is also evidence that in transition countries the inherited system of education has not been well adapted to the needs of a market economy. This implies that the signal from education to skills has become less robust than might normally be the case. This suggests that using the conventional measure may be misleading.

A novel feature of our survey was the collection of information on migrants' labour market status *ex ante* and *ex post* migration. This information allows us to relate a migrant's occupational choice abroad to their prior occupational choice at home by including an additional set of covariates. Table 6 relates whether a person downshifted abroad to whether they had downshifted at home.

It is clear that 169 out of 288 downshifters (or slightly less than 60 per cent) had not been well-matched in Ukraine prior to migration, implying that downshifting abroad may not be understood simply in terms of their inability to find appropriate work or other related explanations.

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[13] Shaded area contains downshifters according to our baseline definition. Skills levels are defined as follows: Low= primary and basic secondary education; Medium= complete secondary and vocational; High= Tertiary. A dot indicates zero value.

With this in mind, we provide an alternative definition of downshifting. A downshifter has to meet either of the following criteria:

- Involuntarily unemployed abroad if employed in Ukraine
- Employed in an occupation abroad that is below the pre-migration level.

Table 6: Tabulation of downshifters abroad *vs* downshifters in Ukraine

		Downshift Abroad		
		No	Yes	**Total**
Downshift in Ukraine	No	299	119	**418**
	Yes	48	169	**217**
	Total	**347**	**288**	**635**

Source: Survey results.

When applying this filter, instead of the total of 288 people classified as downshifters in the standard or baseline case, the number shrinks to 116 or less than 20 per cent of the 635 migrants in our dataset. This suggests that the baseline estimate with its underlying and strong assumptions concerning the relation between education and skills may be inappropriate in this context.

Table 7: Downshifters: baseline definition vs alternative definition

		Downshift Baseline		
		No	Yes	**Total**
Downshift Alternative	No	342	177	**519**
	Yes	5	111	**116**
	Total	**347**	**288**	**635**

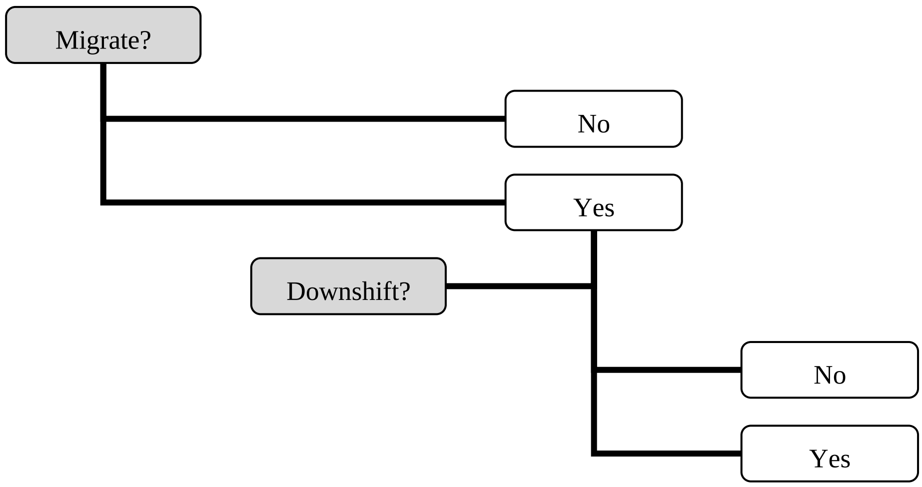
Source: Survey results.

We now proceed to formalise a simple model and then estimate it using data collected in the survey. In so doing, we will work with both the baseline and alternative definitions of downshifting.

6. Model and identification

Our framework is based on a random utility model. We assume that each individual has two distinct decisions to make - to migrate or not and then whether to downshift or not, provided the first one is positive. That is, the decisions are made sequentially as indicated in the decision tree below (Figure 1).

Figure 1: Decision tree



The utility levels associated with each of the decisions have both individual specific and random components that can be represented by the following two equations:

$$y_1^* = X_1^{'}\beta_1 + \varepsilon_1, \qquad (1)$$

$$y_2^* = X_2^{'}\beta_2 + \varepsilon_2. \qquad (2)$$

Here, y_1^* is the individual utility associated with the decision to migrate, y_2^* is the individual utility associated with the decision to downshift, $X_1^{'}$ and $X_2^{'}$ are vectors of individual characteristics, ε_1 and ε_2 are the respective random components modeled as a bivariate normal distribution with zero means and correlation ρ, that is, $(\varepsilon_1, \varepsilon_2) \sim N(0, 0, \varepsilon_1^2, \varepsilon_2^2, \rho)$.

There are two technical issues that have to be worked around in order to estimate β_1 and β_2.

First, instead of the actual utility levels y_1^* and y_2^*, we can only observe the final choices made by an individual:

$$y_1 = \begin{cases} 1 & iff\ \ y_1^* > 0 \\ 0 & iff\ \ y_1^* \leq 0 \end{cases}$$

and:

$$y_2 = \begin{cases} 1 & iff\ \ y_2^* > 0 \\ 0 & iff\ \ y_2^* \leq 0 \\ - & iff\ \ y_1^* \leq 0 \end{cases}$$

Second, there are three types of observations, not four, available in the sample. While we can always observe y_1, y_2 can only be observed for those individuals for whom $y_1 = 1$. And since we cannot rule out the possibility of the two equations being interrelated (i.e. $\rho \neq 0$), they cannot be estimated using a standard probit. Effectively, we have a potential sample selection issue in the second equation and will have to use a natural extension of the celebrated Heckman (1979) sample selection model to the binary outcome variable case. The probit model with sample selection (see de Ven and Praag, 1981), sometimes referred to as "Heckprob", implies that three types of observations in our sample are to be observed with the following probabilities:

$$
\begin{array}{ll}
y_1 = 0 & P(y_1 = 0) = \Phi(-X_1^{'}\beta_1) \\[2ex]
y_1 = 1,\ y_2 = 0 & P(y_1 = 1, y_2 = 0) = \Phi(X_1^{'}\beta_1) - \Xi(X_1^{'}\beta_1, X_2^{'}\beta_2, \rho) \\[2ex]
y_1 = 1,\ y_2 = 1 & P(y_1 = 1, y_2 = 1) = \Xi(X_1^{'}\beta_1, X_2^{'}\beta_2, \rho).
\end{array}
$$

where, $\Phi(.)$ is the normal cdf, and $\Xi(.)$ is the bivariate normal cdf. Using the above probabilities and individual weights, w_i, it is then possible to construct the log-likelihood function:

$$
\begin{aligned}
\ln L = & \sum_{i=1}^{N} w_i \{(1 - y_{i1}) \ln \Phi(-X_1^{'}\beta_1) + \\
& + y_{i1}(1 - y_{i2}) \ln[\Phi(X_1^{'}\beta_1) - \Xi(X_1^{'}\beta_1, X_2^{'}\beta_2, \rho)] + \\
& + y_{i1} y_{i2} \ln \Xi(X_1^{'}\beta_1, X_2^{'}\beta_2, \rho)\}.
\end{aligned}
\tag{3}
$$

The covariates used in the selection equation (1) and the outcome equation (2) are defined in Appendix Table 2. As the identifying restrictions in the selection equation we use two blocks of covariates: a migrant’s education and the presence of another migrant in the family. We expect that a migrant’s education level could affect the probability of emigration because of factors such as skill selection immigration policies. Skilled individuals tend to be mobile (for a host of reasons) and policy regimes – particularly in the advanced economies – tend to be far more welcoming to skilled as opposed to unskilled migrants. The presence of a migrant in a household captures possible network effects that have been found to be important. This effect decreases information acquisition, migration and assimilation costs for a potential migrant that comes from a household that has already been exposed to some migration experience (Beine et al., 2011).

7. Estimation results

The estimation results of the log-likelihood function in (3) are presented in Tables 8 and 9. The estimates of the selection equation converge for both definitions although the estimates of the downshift equation provide slightly different but consistent results.

Regarding the decision to migrate, an average migrant is a married male most likely to originate from the west or south of Ukraine and who typically comes from the middle (vocational training) or upper (Master's degree and above) parts of the education distribution. Regarding age, there is some concavity as the emigration probability increases to around 35 years and then declines. Household income levels add to the migration probability in a non-linear manner. Being from an average and above-average income family adds 5.7 per cent and 14.6 per cent to the migration probability respectively. City size, as a proxy for average income, also reveals a concave shape on the probability to migrate – respondents from both small and large cities are less likely to be migrants. It can be conjectured that this effect may arise through different channels – in small towns people have fewer opportunities and lower resources/information to cover migration costs. By contrast, relatively good work opportunities in large cities may deter migration.

The assumption of the exogeneity of income to the migration/downshift decision needs to be briefly discussed. Reverse causality may be an issue here. Migrants emigrate because of the income differential, therefore migrants are likely to be wealthier, which affects the probability to emigrate and/or downshift. However, in the context of our study, we addressed the issue in two ways. First, we included family income, not that of the migrant. Family income is affected by emigration mainly through the remittance channel. It appears that those families that do receive remittances use them to finance consumption, rarely investment. Second, we did not find evidence of migrants employed in highly paying occupations.

Table 8: Selection equation estimates {* – 1 per cent, ** – 5 per cent, * – 10 per cent significance levels respectively. Standard errors are clustered by family id}**

Variable	Baseline Definition						Alternative Definition					
	Estimate		S.E.	dy/dx		S.E.	Estimate		S.E.	dy/dx		S.E.
reg_west	0.345	***	0.085	0.080	***	0.019	0.330	***	0.085	0.077	***	0.020
reg_east	0.160	*	0.085	0.037	*	0.020	0.154	*	0.085	0.036	*	0.020
reg_south	0.396	***	0.082	0.092	***	0.019	0.371	***	0.082	0.087	***	0.019
town_100	-0.268	***	0.092	-0.062	***	0.022	-0.274	***	0.091	-0.064	***	0.022
town_200	0.059		0.074	0.014		0.017	0.056		0.075	0.013		0.017
town_500	0.017		0.114	0.004		0.026	0.024		0.115	0.006		0.027
town_1000	-0.130	*	0.070	-0.030	*	0.016	-0.146	**	0.071	-0.034	**	0.017
male	0.465	***	0.077	0.108	***	0.019	0.488	***	0.080	0.114	***	0.020
age	0.142	***	0.022	0.033	***	0.005	0.147	***	0.024	0.034	***	0.006
age2	-0.002	***	0.000	0.000	***	0.000	-0.002	***	0.000	0.000	***	0.000
family_above	0.631	***	0.110	0.146	***	0.026	0.638	***	0.113	0.149	***	0.027
family_avg	0.247	***	0.068	0.057	***	0.016	0.245	***	0.069	0.057	***	0.016
educ_secondary	0.199		0.192	0.046		0.045	0.330		0.222	0.077		0.052
educ_vocational	0.525	***	0.197	0.122	***	0.047	0.674	***	0.214	0.157	***	0.051
educ_bachelor	0.235		0.201	0.054		0.047	0.535	**	0.221	0.125	**	0.052
educ_master	0.381	*	0.201	0.088	*	0.047	0.588	**	0.229	0.137	**	0.054
educ_phd	0.994	***	0.338	0.230	***	0.079	1.183	***	0.359	0.276	***	0.085
single	-0.254	***	0.085	-0.059	***	0.020	-0.260	***	0.087	-0.061	***	0.020
hh_head	-0.544	***	0.099	-0.126	***	0.023	-0.532	***	0.102	-0.124	***	0.024
hh_spouse	-0.662	***	0.120	-0.153	***	0.028	-0.651	***	0.123	-0.152	***	0.029
hh_med	-0.059		0.075	-0.014		0.017	-0.069		0.075	-0.016		0.018
hh_large	0.006		0.103	0.001		0.024	-0.007		0.104	-0.002		0.024
unempl_y_ua	0.393	***	0.118	0.091	***	0.028	0.488	***	0.136	0.114	***	0.032
unempl_o_ua	0.440	***	0.090	0.102	***	0.021	0.494	***	0.099	0.115	***	0.023
migr_fam	0.410	***	0.110	0.095	***	0.026	0.475	***	0.121	0.111	***	0.029
cons	-4.436	***	0.486				-4.758	***	0.515			
	log pseudolikelihood: -2044.018						log pseudolikelihood: -2000.270					
	Censored obs.: 5721											
	Uncensored obs.: 614											

Source: Authors' calculations.

Table 9: Downshift equation estimates {* – 1 per cent, ** – 5 per cent, * – 10 per cent significance levels. Standard errors are clustered by family id}**

Variable	Baseline Definition						Alternative Definition					
	Estimate		S.E.	dy/dx		S.E.	Estimate		S.E.	dy/dx		S.E.
shift_ua	0.671	***	0.107	0.092	***	0.019						
Reg_west	0.212		0.138	0.029		0.019	0.269		0.203	0.020		0.015
Reg_east	0.117		0.135	0.016		0.019	0.228		0.188	0.017		0.015
Reg_south	0.153		0.132	0.021		0.018	0.458	**	0.185	0.033	**	0.016
town_100	-0.137		0.155	-0.019		0.021	-0.295		0.221	-0.022		0.018
town_200	-0.030		0.115	-0.004		0.016	-0.181		0.157	-0.013		0.013
town_500	0.261		0.170	0.036		0.023	0.078		0.243	0.006		0.017
town_1000	-0.305	***	0.114	-0.042	**	0.017	-0.387	**	0.160	-0.028	*	0.016
male	0.285	**	0.120	0.039	**	0.016	0.257		0.160	0.019		0.011
Age	0.167	***	0.029	0.023	***	0.004	0.171	***	0.049	0.012	***	0.004
Age2	-0.002	***	0.000	0.000	***	0.000	-0.002	***	0.001	0.000	***	0.000
family_above	0.429	**	0.192	0.059	**	0.026	0.196		0.308	0.014		0.023
family_avg	0.337	***	0.110	0.046	***	0.016	0.208		0.156	0.015		0.012
single	-0.091		0.116	-0.012		0.016	-0.179		0.155	-0.013		0.011
hh_head	-0.411	***	0.122	-0.056	***	0.017	-0.368	**	0.163	-0.027	**	0.013
hh_spouse	-0.317	**	0.155	-0.044	**	0.021	-0.397	**	0.226	-0.029	*	0.017
hh_med	-0.129		0.110	-0.018		0.015	-0.240		0.150	-0.018		0.012
hh_large	0.057		0.147	0.008		0.020	-0.234		0.201	-0.017		0.016
times_traveled	0.015		0.021	0.002		0.003	0.022		0.034	0.002		0.003
russia	-0.043		0.125	-0.006		0.017	0.282		0.233	0.021		0.019
europe	0.098		0.115	0.013		0.016	0.405	*	0.218	0.030		0.019
Usa	0.204		0.212	0.028		0.030	0.323		0.331	0.024		0.025
Stay_duration	0.000		0.001	0.000		0.000	-0.002	**	0.001	0.000	*	0.000
status_work	-0.047		0.087	-0.006		0.012	-0.055		0.170	-0.004		0.013
status_residence	-0.201		0.145	-0.028		0.020	-0.045		0.236	-0.003		0.017
reason_pay	0.217	**	0.104	0.030	*	0.015	0.143		0.154	0.010		0.012
language	-0.144		0.104	-0.020		0.015	-0.306	*	0.163	-0.022		0.014
migraid_received	-0.008		0.077	-0.001		0.011	0.011		0.128	0.001		0.009
sponsor_nat_ua	0.004		0.157	0.001		0.022	-0.619	**	0.288	-0.045	*	0.025
sponsor_nat_cy	0.021		0.085	0.003		0.012	0.125		0.157	0.009		0.012
cons	-5.033	***	0.621				-5.407	***	1.025			
Rho	2.182	***	0.515				1.098	***	0.419			

Source: Authors' calculations.

As far as the estimates of the determinants of downshifting are concerned, we have results from both the baseline and alternative definitions. For both definitions it is true, though at varying significance levels, that a downshifter is unlikely to be a household head or spouse of the head. Downshifters also do not come from large cities (with populations >1 million). The former effect holds because the household head or spouse is more likely to be selective in their occupation and migration decisions. The large city effect comes in through the budget constraint. As in the selection equation, there is a concave shape with respect to age – the probability of downshifting increases with age up to around 42 years and then steadily declines.

For a typical baseline downshifter – mostly male – the main reason for migration is higher wage and better employment opportunities. The aim of higher earnings means that migrants may accept lower level occupations than their educational attainments might suggest. Migrants' details about employment prior to emigration seem to account for much of variation in the baseline downshifting. Migrants' prior position in the labour market proves a decent predictor of their future position. Thus, if a respondent was a baseline downshifter in Ukraine, he is 9.2 per cent more likely to be a downshifter abroad.

The probability of being a downshifter when using the alternative definition decreases with the duration of stay in a foreign country and knowledge of the local language or English. Those employed by a Ukrainian employer are also less likely to be alternative downshifters. Alternative downshifters are both female and male and are likely to come from the south of Ukraine. For somebody who speaks the language of the host country at an intermediate level or above, the probability of downshifting decreases by 2.2 per cent. Knowledge of the language, as well as the duration of stay, might correlate with unobserved ability, whereby more able migrants may learn the local language and stay longer. Migrants westwards to the EU states are - by a small margin, 3 per cent – more likely to be downshifters.

8. Conclusions

Our paper has focused on patterns of self-selection and labour market outcomes among Ukrainian migrants. It confirms significant selection on gender and education – migrants in particular are more likely to be males from the higher end of the education distribution. However, when it comes to the labour market outcomes of migrants in the receiving country, we find that there is a pattern of occupational downshifting. Indeed, over 45 per cent of the migrants have a level of education that by far exceeds the job requirements. This might be attributed to the migrants having a disadvantageous position in local labour markets – whether through discrimination or informational shortcomings – or it might be related to their 'true' attributes which are not necessarily well captured by an education level. To address this, we looked at labour market outcomes both before and after emigration. We found that a person who had previously downshifted in Ukraine was over 9 per cent more likely to be a downshifter abroad. This suggests that education is indeed a noisy signal of individual unobserved ability and an alternative measure may be called for. We set up a simple model that focuses on the migration and downshifting decisions sequentially and estimate it using our survey data. When using the alternative measure of downshifting, we found that the duration of stay, knowledge of the local language (or English) or having an employer that is Ukrainian is less likely to be associated with downshifting. The title of our paper asked whether Ukrainian migration has been mainly about skilled (brain) or unskilled (brawn) migration. The answer is qualified. For those migrants currently abroad, the picture is one where, in terms of educational attainments, a clear majority has some level of tertiary education. The profile appears biased towards skills. However, when looking at what Ukrainian migrants do when they migrate, a significant number work in occupations that appear to match poorly to their prior educational attainments. This suggests that migration involves downshifting but this picture is itself somewhat misleading as our analysis shows that a significant number of these downshifters had already downshifted at home prior to migrating. We consider that drawing strong conclusions about the efficiency of occupation-education matching may not be warranted. Rather, what may be a more promising avenue of enquiry – particularly from a policy perspective – is to consider why it is that the educational attainments of Ukrainians have such an attenuated link to labour market outcomes. The answer is likely to lie in the deficiencies of the current educational system and the limited adaptation that has been made to the needs of the labour market in a market economy, whether at home or abroad.

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Appendix

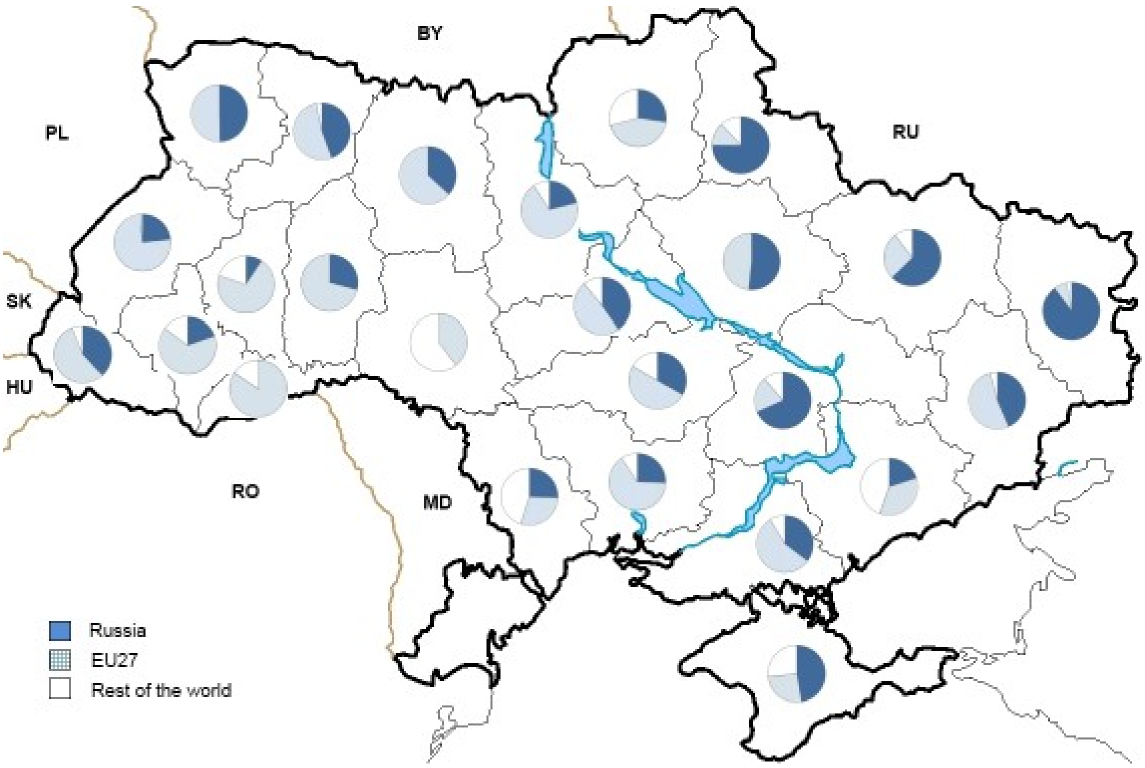
Appendix Table 1: Migration rates and chosen destinations by region

		Migration	Chosen destination, %		
ID	Region	rate, %	Russia	EU27	ROW
1	Zhytomyr	1.8	36.8	63.2	0.0
2	Zaporizhia	3.4	20.1	35.4	44.5
3	Kharkiv	5.2	62.7	26.9	10.4
4	Donetsk	5.7	43.5	52.3	4.2
5	Vinnytsia	5.9	0.0	39.7	60.3
6	Mykolaiv	6.2	25.7	65.0	9.4
7	Kirovograd	6.2	50.0	75.0	25.0
8	Krym	6.7	47.4	25.9	26.7
9	Cherkasy	6.9	40.2	48.9	10.9
10	Poltava	7.1	51.7	48.3	0.0
11	Kyiv	7.2	21.0	69.7	9.2
12	Khmelnytskyi	8.2	29.0	71.0	0.0
13	Chernigiv	9.5	27.3	43.6	29.1
14	Chernivtsi	10.5	0.0	84.4	15.6
15	Lviv	11.6	23.3	75.2	1.5
16	Zakarpattia	11.8	38.2	55.7	6.1
17	Dnipropetrovsk	11.8	68.4	20.4	11.2
18	Sumy	14.3	75.1	13.0	11.9
19	Kherson	14.5	35.3	56.0	8.7
20	Lugansk	15.1	89.7	7.6	2.7
21	Ivano-Frankivsk	17.1	19.7	65.6	14.8
22	Volyn	17.9	49.7	50.3	0.0
23	Odesa	22.3	25.6	29.4	45.0
24	Rivne	37.6	44.4	52.2	3.4
25	Ternopil	41.9	9.4	70.7	19.9

Source: Survey results.

Appendix Figure 1: Migration rates and chosen destinations

(a) Migration Rates, per cent



(b) Destination Choice

Source: Survey results.

Appendix Table 2: Variables dictionary

Variable	Definition
shift_ua	= 1 if the respondent downshifted in Ukraine, and 0 otherwise.
reg_west reg_east reg_south	Set of dummy variables, = 1 if the respondent comes from the west, east or south of Ukraine respectively, and 0 otherwise. The base region is the north.
town_100 town_200 town_500 town_1000	Set of dummy variables, = 1 if the respondent lives in a settlement with population (100–200,000), (200-–500,000), (500-–1 million) and ≥ 1 million people respectively. The base category is (50-–100,000).
male	= 1 if the respondent is male, and 0 otherwise.
age	Respondent's age in years.
family_above family_avg	Set of dummy variables, = 1 if the respondent's self-reported income is above average or average respectively. The base category is below average.
single	= 1 if the respondent is single, divorced or widowed, and 0 otherwise.
hh_head hh_spouse	Set of dummy variables, = 1 if the respondent is the head of the household or the spouse of the head respectively, and 0 otherwise. The base category is all others (son, daughter etc).
hh_med hh_large	= 1 if the respondent comes from a medium-sized (3 or 4 members) or large (5 and above) household, and 0 otherwise. The base group is small households with at most two members.
times_traveled	Number of times the respondent traveled to the same country for the same purpose within the last three years (excluding occasional returns to Ukraine).
russia europe usa	Destination dummy variables, = 1 if the respondent went to a country of the former Soviet Union (excluding the Baltic countries), EU27 or North America respectively, and 0 otherwise. The rest of the world is the base.
stay_duration	Duration of stay (in years) in the destination country.
staus_work status_residence	= 1 if the respondent has a work permit or permanent residency respectively, and 0 otherwise. The base is all other categories.
reason_pay	= 1 if the respondent's primary reason for migration was higher wage or better employment opportunities, and 0 otherwise.
language	= 1 if the respondent speaks the language of the destination

	country or English on the level intermediate or above.
migraid_received	= 1 if the respondent received any help to emigrate from friends / relatives or co-workers in Ukraine, and 0 otherwise.
sponsor_nat_ua sponsor_nat_cy	Set of dummy variable, = 1 if the nationality of the respondent's employer/sponsor is Ukrainian or that of the destination country respectively, and 0 otherwise. The base is all other nationalities.
educ_secondary educ_vocational educ_bachelor educ_master educ_phd	Set of education dummy variables, = 1 if the respondent has completed a respective level of education: secondary, vocational, Bachelor's, Master's or PhD, and 0 otherwise. The elementary level of education is taken for the base.
unempl_y_ua unempl_o_ua	Set of dummy variables, = 1 if the respondent is unemployed and aged (15- 30)or 30- 59) respectively, and 0 otherwise.
migr_fam	= 1 if the family has a migrant (besides the current one), and 0 otherwise.