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Welfare Magnets, Taxation and the Location Decisions of Migrants to the EU

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Abstract

Migrants are among the groups most vulnerable to economic fluctuations. As predicted by the "welfare magnet" hypothesis, migrants can therefore be expected to—ceteris paribus—prefer countries with more generous welfare provisions to insure themselves against labor market risks. This paper analyzes the role of the welfare magnet hypothesis for migrants to the EU-15 at the regional level. The empirical analysis based on a random parameters logit model shows that the regional location decisions of migrants are mostly governed by income opportunities, labor market conditions, ethnic networks and a common language. There is no strong evidence for the welfare magnet hypothesis in the EU, but the empirical model shows that the income tax system has a large and consistent effect on locational choice.

Keywords: welfare magnet hypothesis, migration, random parameters logit
JEL Codes: F22, R23, I38

1 Introduction

Migrants are among the groups most vulnerable to economic fluctuations. Arai and Vilehelmsson (2004) and Dustmann et al. (2010) show that the unemployment response to economic shocks is larger for migrants than for natives, a result which persists even after controlling for individual characteristics and differences in skill levels between migrants and natives. Green and Winters (2010) and the OECD (2010) also find a more pronounced response of migrants' employment and unemployment levels to economic fluctuations. Although part of the difference in the response between migrants and natives can be explained by occupational choice and the industries migrants are employed in, migrants are also hit harder by economic fluctuations because of a higher proportion of temporary work contracts, shorter tenure on the

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job or because of selective layoffs (OECD, 2010). As predicted by the "welfare magnet" hypothesis (Borjas, 1999a), migrants can therefore be expected to—ceteris paribus—prefer countries with more generous welfare provisions to insure themselves against labor market risks.

This paper analyses the role of the welfare and tax systems in the locational choice of approximately 9 million migrants who migrated to the EU-15 in the 1998-2007 period to test for the welfare magnet hypothesis in the European Union. The empirical analysis is based on an extensive dataset from the 2007 European Labour Force Survey at the NUTS-2 level. The empirical analysis builds upon the work by Geis et al. (2008), who analyzed the role of institutional factors in determining migrants' country choice.

This paper, however, extends the previous literature in several important aspects. First of all, almost all EU-15 countries are considered in the analysis instead of only a selection of countries (Geis et al., 2008, for example, consider only the choice between France, Germany, the UK and the U.S.). Secondly, the location decision is analyzed at the regional (NUTS-2), not the national level. As regions even within countries are often very heterogeneous with respect to income and labor market opportunities, this allows a better identification of the effect of labor market and income variables. Finally, in contrast to previous studies the paper employs the more flexible random parameters logit (RPL) model which does not exhibit the independence of irrelevant alternatives (IIA) property which is often violated in empirical applications of conditional or multinomial logit models.

The remainder of this paper is organized as follows: section 2 provides an overview of the empirical and theoretical literature on the location choice of migrants. Section 3 describes the data used and develops the empirical method applied in section 4. Section 5 concludes.

2 Overview of the literature on locational choice

At the most basic level, differences in economic opportunities can be assumed to influence locational choice: individuals will move to countries or regions where they expect to earn a higher income (given differences in costs of living) and/or where they expect a higher proba-

bility of finding employment. Given these factors, individuals will furthermore—ceteris paribus—prefer regions closer to their home country if costs of migration increase with distance.

2.1 Welfare magnets

The location decision of migrants can also be explained by differences in welfare provision. As the so-called "welfare magnet" hypothesis predicts, generous welfare systems attract immigrants. This effect may not be limited to those with the highest labor market risks (such as low-skilled migrants, Borjas, 1999a), but also highly skilled migrants may prefer to live in a country with a more generous welfare system because migrants are generally among the groups most vulnerable to economic fluctuations and have a higher probability to lose their jobs in economic downturns, irrespective of their skill level (see, for example, Arai and Vilehelmsson, 2004, or Dustmann et al., 2010). Generous welfare systems might even attract migrants who would not have migrated otherwise or can keep migrants already living in generous welfare states from returning to their home countries (see Borjas, 1999a). Income-maximizing migrants should thus be clustered in countries with more generous welfare systems. Countries or regions with more generous welfare systems might thus face a higher burden in terms of social security expenditures. Furthermore, as shown by Lazear (1999), government transfers can reduce the incentives to assimilate, thus counteracting integration efforts.

Most of the empirical literature on the welfare magnet hypothesis focuses on migration to or within the U.S., while there are only few studies for the EU or single European countries. Borjas (1999a) concludes that welfare-receiving immigrants in the U.S. show a higher degree of clustering. Levine and Zimmerman (1999), on the other hand, find no support for the welfare magnet hypothesis in their analysis of moves within the U.S. In their analysis of migration flows to 22 OECD countries, Pedersen et al. (2008) find only weak results for their welfare generosity proxy (public social expenditure as a percentage of GDP) which are even negative in some regressions. On the other hand, results by Åslund (2005) or Damm (2009) point to welfare seeking behavior by immigrants to Sweden and Denmark, respectively. However, because the generosity of the welfare system hardly varies within European countries, effects

are hard to identify in single-country studies because of low variation in the explanatory variables.

Geis et al. (2008) find mixed effects for their proxies for welfare generosity in their study covering France, Germany, the UK and the U.S. The authors estimate a negative effect of pension replacement rates on country choice, which can—according to the authors—be attributed to a higher "implicit tax" associated with more generous pension systems. On the other hand, they find positive effects on migrants' choice of a host country for the quality of health care and educational systems as well as the unemployment replacement rate.

2.2 Other factors affecting location choice

Another factor which can significantly influence the locational choice of migrants is ethnic networks. Since a seminal study on migrant concentration in the U.S. by Bartel (1989), several hypotheses have been developed to explain the phenomenon that migrants tend to settle where other migrants from the same country of origin migrated before. One of the most frequently cited theories is that migrant networks produce externalities for members of the same ethnic group so that the costs of migration decreases with the number of previous migrants (Massy et al., 1993, Carrington et al., 1996). Above reducing migration costs, networks can also provide help with the settlement process, decrease the perceived alienation in the host country (Bauer et al., 2000) or provide financial assistance (Munshi, 2003). Furthermore, networks can provide their members with ethnic goods or marriage markets (Chiswick and Miller, 2005) or increase the labor market prospects of new arrivals (Gross and Schmitt, 2003, Edin et al., 2001, Munshi, 2003). If employers with migration background prefer to employ other migrants of similar ethnic origin instead of natives (Andersson and Wadensjö, 2007), a separate migrant labor market can emerge which can even sustain a higher wage than the larger "general" labor market (Gross and Schmitt, 2003).

A variety of empirical results support the network migration hypothesis. Pedersen et al. (2008) and find a robust and sizeable effect of ethnic networks on the volume of migration flows to 22 OECD countries. In a single-country study focusing on Denmark, Damm (2009) showed that the relocation hazard of refugees randomly assigned to a municipality is lower for those assigned to a municipality with a higher percentage of co-nationals. Åslund (2005)

found similar effects for immigrants to Sweden subject to the "Whole of Sweden Strategy". Geis et al. (2008) also found networks to have a positive (but decreasing) effect on locational choice.

Besides economic conditions, social security systems and ethnic networks, other factors can affect the location choice of migrants. Local characteristics, such as cultural institutions or climatic conditions—also called local "amenities" which affect the individual's quality of life—constitute another factor determining the choice of target location. The explanatory power of amenities however depends on whether their value is capitalized in local wages and housing prices. But other interpretations are possible, as Krupka (2009) hypothesized in a recent paper that individuals "invest" in appreciating the amenities of the region they were born in, and thus prefer target locations with amenities similar to those of their region of birth. The author found broad support for his hypothesis in an empirical analysis using U.S. data.

Another important aspect for international migration is income taxation, as it affects the net income available in the target country. Geis et al. (2008) find a negative effect of the income tax wedge on country choice. Country size also affects the distribution of migrants across countries and regions and it can be expected that larger regions are, all else equal, chosen more often. Furthermore, Egger and Radulescu (2008) bring forward the argument that migration flows closely follow bilateral FDI flows, which favor large countries.[2]

The probability of a migrant choosing a particular country can also be expected to be higher if the prospective host and home countries share the same language, which reduces the costs of staying in the host country considerably (Pedersen et al., 2008). Furthermore, knowledge of the host country's language can also raise the returns-to-skill in the host country (Grogger and Hanson, 2008). (Former) colonial ties between two countries can also affect the locational choice of migrants because of cultural similarities if the colonial power exported part of its culture (or legal code etc.) to the (former) colonies.

Concerning the relative importance of the factors summarized in this section there is some evidence that the presence of other migrants from the same country is the primary factor driv-

[2] See Bergstrand et al. (2008) for a theoretical approach to linking FDI and migration flows.

ing the choice of a migrant's target location, while economic conditions are of lesser importance, as are welfare benefits (see, Zavodny, 1999, Pedersen et al., 2008). The relatively low importance of economic conditions can partly be explained by the fact that most migratory steps are not "speculative", but "contracted", i.e., individuals migrate only if they have a job offer abroad (Molho, 1986, Westerlund, 1997). Thus, it is likely more important to have fellow countrymen abroad which can provide information about job offers and help with finding a job before moving abroad than focusing on the general economic conditions. Nevertheless, the state of the economy does play a role because it influences the availability of job offers in general.

The relatively low importance of welfare benefits found in the literature (compared to network effects) can be attributed to the fact that in most countries migrants are not eligible for social security benefits right away and will have to spend some time in the receiving country's labor market before receiving the same welfare entitlements as natives. Nevertheless, the generosity of the welfare system can play a role because a move to a region or country with a better social security system can be seen as an investment into future social security protection.

3 Estimating locational choice

3.1 Migration data

The empirical analysis uses 2007 data from the European Labour Force Survey (EU-LFS). The EU-LFS is a regular questionnaire surveyed among a representative sample of households in all countries of the EU-27. Among other things, the data contain information on the region of residence (at the NUTS-2 level), the nationality and the country of birth for individuals living in the EU. The country of birth is used to identify migrants and all individuals who were not born in the member state they reside in are considered "migrants". Because the data essentially constitute stock data, i.e., only those migrants are observed who have been living in the EU-15 in 2007, there is no information on repeat and return migration in the data. However, the data allow us to differentiate between those who moved during the last 10 years and those who have been living in this region for more than 10 years. Because the EU-LFS

data do not contain information on the country of birth for Germany and Ireland, only 158 NUTS-2 regions in 13 countries[3] of the EU-15 can be considered in the empirical application. It is assumed that these 158 regions constitute the migrants' exhaustive and mutually exclusive choice set.[4] All in all, this paper models the location decision of 8,988,710 migrants from 166 different source countries who migrated to one of the 13 EU countries considered during the 1998-2007 period.

3.2 Estimation strategy

Consider the locational choice of individual k who intends to migrate to the EU-15. The individual faces R alternative regions, each with choice-specific attributes X_{kr} (including the costs of migration). Using this information, she can compare her utility at different regions. The representative utility function is assumed to be linear in the characteristics of the regions. Individual k's utility of living in region s depends on a vector of choice-specific characteristics of this region, X_{ks}, as well as a utility component ε_{ks} which is unknown and treated as random:

$$u_{ks} = \beta' X_{ks} + \varepsilon_{ks} \tag{1}$$

We can, however, not observe the utility of the different regions directly. Instead, we observe the information $I_k = s$ if the individual chose to migrate to region s, and we can assume that this region provides the individual with the highest utility ($u_{ks} > u_{kr}\ \forall\, r \in R \neq s$). The final outcome can thus only be predicted in terms of probability.

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[3] Austria, Belgium, Denmark, Finland, France, Greece, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. Overseas territories, the exclaves Ceuta and Melilla and the relatively remote Canary Islands and the Azores and Madeira island regions are not considered. Åland (Finland) as well as the Highlands and Islands and North Eastern Scotland regions in the U.K. must be excluded because of data restrictions. Because of data limitations Denmark is treated as a single NUTS-2 region and Serbia, Montenegro and the Kosovo must be considered a single source country.

[4] The choice of migrating vs. staying in the home country will not be modeled. Modeling this choice would imply including all source countries into the choice set as well as not only modeling the choice of all "stayers" but also the choices of all migrants from these source countries to all other countries outside the EU-15. Since this is practically infeasible, it is assumed that the individuals have already decided to migrate to the EU-15. Migration between the EU-15 countries is also not considered. Technically, for migrants within the EU-15 the regions of their home country would be included in their choice set, while they are actually not allowed to choose one of these regions (because only migrants are included in the empirical analysis). While it would in principle be possible to model the location decision of all EU nationals (including "stayers") with the data at hand, this is left to future research.

The probability of individual k moving to region s can be defined as $\Pr(I_k = s) = \Pr(u_{ks} = \max[u_{k1}, u_{k2}, \dots, u_{kR}])$. Under the assumptions that the errors ε_{ks} are i.i.d. extreme value, the probability $\Pr(I_k = s)$ can then be estimated by the well-known conditional logit model (McFadden, 1974):[5]

$$\Pr(I_k = s|X_k) = \frac{\exp(\beta' X_{ks})}{\sum_{r=1}^{R} \exp(\beta' X_{kr})} \tag{2}$$

However, in the conditional logit model the relative odds of choosing one region over another should depend only on the characteristics of these two regions, while the relative odds should be independent of the availability or the characteristics of alternative regions, a property known as "independence from irrelevant alternatives" (IIA). While IIA has some advantages if satisfied (for example it allows the consistent estimation of parameters on a subset of R) its validity in empirical applications can often be questioned.

Whether IIA holds can be tested by a Hausman test (Hausman and McFadden, 1984). This test is based on comparing the parameters of the unrestricted model (including all alternatives) to the parameters of a restricted model estimated on a subset of R. A significant test statistic provides evidence against IIA. Because the test does not offer guidelines for choosing the subset to exclude from R and because of the vast number of alternative subsets to be excluded with 158 choice alternatives it is likely to find at least one restricted model where the parameters are significantly different from the unrestricted model.

This calls for a model which does not exhibit the IIA property. Probably the most flexible model is the random parameters logit (RPL, also called mixed or random coefficients logit, see McFadden and Train, 2000, Hensher and Greene, 2003, Train, 2009, and the references contained therein for an overview).[6] Although the random parameters logit framework goes

[5] See also Bartel (1989), Bauer et al. (2000, 2002, 2005), Gottlieb and Joseph (2006), Jaeger (2007), Geis et al., 2008, or Christiadi and Cushing (2008) for related applications of the conditional logit model.

[6] A probably more common alternative model which relaxes the IIA assumption is the nested logit model. However, while nested logit does not impose IIA between nests, alternatives within nests are still assumed to exhibit independence of irrelevant alternatives. The model is thus less flexible than the RPL which can approximate any random utility model (McFadden and Train, 2000) and is therefore not considered here.

back to the early 1980's (among the first applications are Boyd and Mellman, 1980, and Cardell and Dunbar, 1980) and recent advances in simulation techniques (foremost, the use of Halton draws, see below) and computing power have made its estimation more practicable, applications of the random parameters logit model are still scarce in migration research (one notable exception is the paper by Gottlieb and Joseph, 2006).

The random parameters model can be derived from utility-maximizing behavior by assuming that the parameters of the characteristics X_{ks} in the representative utility function are allowed to vary over individuals:

$$U_{ks} = \beta_k^{'} X_{ks} + \varepsilon_{ks} \tag{3}$$

In this utility function, β_k is a vector of coefficients for individual k representing k's preferences. The utility function is thus heterogeneous across individuals, and the coefficients' sign and size can differ between individuals according to a density function $f(\beta|\theta)$, where θ are the parameters describing the density of β. As in the conditional logit model, ε_{kr} is assumed to be i.i.d. and follow an extreme value distribution. If the β_k's were known, the probability of choosing a specific region s would, analogous to equation (2), be given by:

$$L_{ks}(\beta_k) = \frac{\exp(\beta_k^{'} X_{ks})}{\sum_{r=1}^{R} \exp(\beta_k^{'} X_{kr})} \tag{4}$$

However, because the β_k's are unobserved the probability of choosing a region s is the integral of $L_{ks}(\beta_k)$ over all possible values of β_k (Train, 2009, p.138):

$$P_{ks} = \int \left(\frac{\exp(\beta_k^{'} X_{ks})}{\sum_{r=1}^{R} \exp(\beta_k^{'} X_{kr})} \right) f(\beta|\theta) d\beta \tag{5}$$

The probability P_{ks} is thus the weighted average of the logit formula evaluated at different values for β, with the weights given by the mixing distribution $f(\beta|\theta)$. The mixing distribu-

tion can be normal, lognormal, uniform, etc. If the parameters are assumed to be normally distributed, the estimated θ are the mean and standard deviation of a normal distribution which describe the distribution of the parameter in the population. Because the integral in (5) does not have a closed form solution, it must be approximated through simulation. The maximum simulated likelihood estimator is the value of θ that maximizes the simulated log likelihood (see Train, 2009, p. 144) and can be estimated in the STATA statistics package using the estimator by Hole (2007).

While in earlier applications of the RPL model random draws were used for simulation, recent applications have relied mostly on quasi-random Halton sequences (Halton, 1960). The main advantages of using draws from Halton sequences is that they provide a superior coverage of $f(\beta|\theta)$ than random draws, and that they imply a negative correlation between the draws of different observations, which reduces the error in the simulated log-likelihood function (Train, 2009, p. 225). This feature makes simulation based on Halton draws more effective than simulation based on random draws, as shown for example by the comparisons in Bhat (2001), Train (1999) or Hensher (2001). Train (2009, p. 230) notes that "[…] a researcher can expect to be closer to the expected values of the estimates using 100 Halton draws than 1000 random draws", so that "[…] computer time can be reduced by a factor of ten by using Halton draws instead of random draws, without reducing, and in fact increasing, accuracy".

3.3 Explanatory variables

The choice of explanatory variables for the empirical analysis follows the discussion in section 2 and other studies on the topic (see, e.g., Bartel, 1989, Davies et al., 2001, or Geis et al., 2008). In addition to region specific variables, host country specific variables as well as country-pair specific variables are included in the regression, since some important determinants of locational choice (e.g., tax levels, etc.) do not between regions of the same country. Variables specific to the source countries (such as unemployment or wage levels, or sending country fixed effects) cannot be considered in the regression logit model, since variables with

the same value for all R choices cancel out in the logit formula (4). The same holds true for individual characteristics like age, gender or educational attainment.[7]

3.3.1 Region specific variables

Among the region specific X_k attributes assumed to influence the probability of moving to a region is the area (measured in 1,000 km²): even if there is a completely uniform distribution of migrants across all regions, larger regions are likely to attract larger inflows of migrants. In addition, the population (in 100,000) enters the regression. To control for differences in economic opportunities, the unemployment rate (in %) as well as the average annual income per employed person (in € 1,000) are included in the regression. Data for population and unemployment (in 2006) as well as average annual income per employee (in 2004) are taken from Eurostat. To proxy for the costs of migration (or the costs of visiting relatives at home), the distance (in 1,000 km, measured as the crow flies) between the capital of the migrants' home country and the largest city in the region of residence and its squared value are also included as is a dummy variable for those regions which comprise national capitals, since these can be expected to receive a ceteris paribus higher share of migrants because of being the cultural, political and administrative centers of the respective countries. A negative effect of the unemployment rate and a positive effect of average annual income on the probability of choosing a specific region can be expected. For distance, a negative (but possibly decreasing) effect can be expected.

Another important region specific variable is the local ethnic network (see section 2.2). To measure the influence of ethnic networks on the probability of migrating to a specific region the proportion of migrants born in the same country of origin who have been living in this region for at least 10 years in 2007 is included. For a migrant in ethnic group j, the network size in region s is defined as:

$$\text{Network} = \frac{m_{js}^{10+}}{\sum_{r=1}^{R} m_{jr}^{10+}}$$

[7] It would, in principle, be possible to consider the effect of individual characteristics by including interactions of all model variables with individual level variables. However, because of technical and practical limitations on the number of random parameters which can be estimated in the RPL model, the scope for including individual variables is rather limited and will be left to future research.

where m_{jr}^{10+} is the number of migrants of ethnic group j who have been living in region r for more than 10 years.[8] Because the positive effect of the ethnic network can be expected to decrease with network size (see Heitmueller, 2006, Portnov, 1999, and Bauer et al., 2002), the squared network size will also enter the regression. Summary statistics for the explanatory variables are shown in table 1.

[Table 1 about here]

3.3.2 Country-pair specific variables

Among the country-pair specific X_k attributes is a dummy variable for linguistic closeness from CEPII which measures whether a migrant's home and host country share an official language (1, zero otherwise). According to the CEPII data, 8.3% of all country pairs share a common official language, and a positive effect of this variable can be expected. Also included is a neighborship dummy assuming the value 1 if the host and home countries share a common border, and zero otherwise. Again, a positive effect can be expected, e.g., because a common border facilitates not only legal, but also illegal immigration and can thus lead to ceteris paribus higher migrant stocks. As mentioned in section 2.2, colonial ties can also affect the locational choice of migrants. A dummy variable capturing whether two countries were in a colonial relationship after 1945 is included from the CEPII data (=1, zero otherwise). According to the data, a colonial relationship after 1945 can be found for 3.7% of all country pairs.

3.3.3 Host country specific variables

The host country specific X_k variables are intended to capture the effects of the social security system on locational choice of migrants in order to test the welfare magnet hypothesis. The

[8] Although, as shown by Nowotny (2010), the effect of ethnic networks is not limited to a region's boundaries, the spatially lagged ethnic network is not included in this regression.

choice of variables used to proxy for the generosity of the social security system in this paper follows Geis et al. (2008). The first variable to be included is the net replacement rate during the initial phase of unemployment (following any waiting period) at the average wage for 2007 from the OECD Benefits and Wages Statistics.[9] Although many migrants are not eligible for unemployment benefits right after arriving in the host country, a positive effect of the net replacement rate can be expected if migrants expect to become (temporarily) unemployed at some point in the future. The same holds true for the pension net replacement rate (for men, at average wage) published in OECD (2007). The unemployment and pension replacement rates differ widely across the EU countries considered, with levels ranging from 36% to 87% (unemployment benefits) and 41.1% to 110.1% (pensions), respectively.

The sickness/health care expenditures per capita in Euro (2005 Eurostat data, ESSPROS domain) are included to proxy for the quality of the health care system. According to the data, the average sickness/health care expenditures are about € 2,100 per capita and year for the countries considered. As in Geis et al. (2008), the 2006 PISA science scores (OECD 2007a) are also included to control for the quality of the educational system.

Because welfare provisions must be financed by taxes and social security contributions, variables capturing the effects of the taxation system will be considered to control for the costs of living in a more generous welfare system. The average personal income tax and employee social security contribution rate (SSC) as a percentage of gross wage earnings measured at the average income is included from the OECD Tax Database (2007 figures). As it directly affects the net income, a negative effect on location choice can be expected. Furthermore, the net income ratio will enter the regression as an explanatory variable to measure the progressivity of the income tax system. Defining $t(\cdot)$ as the function of the combined tax and SSC rates and $\bar{y}$ as average income, the net income ratio at 133% and 100% of the average wage can be defined as (see Schratzenstaller and Wagener, 2009):

[9] The value used in the regression is the replacement rate for single individuals without kids.

$$\text{NIR}(1,1.33) = \frac{1 - t(1.33\bar{y})}{1 - t(\bar{y})} * 100$$

where values NIR < 100 indicate a progressive income tax system, and progression is higher the lower the net income ratio. The progressivity of the income tax system can have either a negative or a positive effect on individual location decisions depending on whether the migrant expects to earn a low income (in which case she can profit from the lower tax rate implied by a higher progression) or whether the migrant expects to earn a high income.[10] As table 1 shows, the average combined tax and SSC rates evaluated at the average income range from 20.5% (Spain) to 46.9% (Luxemburg) in the 13 EU countries considered according to the OECD data, with an average rate of 31.6%. As the summary statistics for the net income ratios shows, almost all countries apply progressive income tax schedules (at least in the 100% to 133% average income range). According to the net income ratio criterion, the countries with the lowest progressivity are Luxembourg, whose income tax code is not progressive between 100% and 133% of income (NIR = 100.0), and the U.K. (NIR = 98.5), while Denmark (NIR = 91.2) and Sweden (NIR = 91.7) are the most progressive when comparing the net income rates at 100% and 133% of the average income.

Finally, data from the British Council's Migrant Integration Policy Index project (MIPEX), which provides indices for the strictness of integration policies, also enters the regression. The included index measures the strictness of the laws governing labor market access and ranges from 0 to 100, with 0 representing "critically unfavorable" circumstances and 100 representing "best practice" (see Niessen et al., 2007).[11] The country with the highest value (and the only country to achieve a "best practice" rating of 100) is Sweden, the countries with the lowest ratings are Denmark and Greece (40 points), followed by Austria and Luxembourg

[10] The progressivity can also affect the selection of migrants, because it alters the relative returns to skill between home and host countries: for given average tax rates and given returns to skill in the source country, countries with higher progression can rather expect negatively selected migrants, while countries with a low level of progression can expect positively selected migrants.

[11] The index covers the following dimensions: eligibility ("Are migrants excluded from taking some jobs?"), labor market integration measures ("What is the state doing to help migrants adjust to the demands of the labor market?"), security of employment ("Can migrants easily lose their work permit?") and rights associated ("What rights do migrants have as workers?"). However, the index only represents the legal framework, not the actual situation in the host country.

(45 points). It can be hypothesized that a larger value of this index increases the attractiveness of a country as target location, so that a positive coefficient can be expected.

4 Empirical analysis

The estimation of the RPL model follows Gottlieb and Joseph (2006) in specifying both fixed as well as normally distributed parameters. A fixed parameter is essentially a coefficient whose standard deviation is zero (Hensher, 2003) and for which only a mean will be estimated. The only fixed coefficient to enter the model is the coefficient of area (in 1,000 km²): if migrants were evenly distributed across space, larger regions would have a—ceteris paribus—higher probability of being chosen by a single migrant, a probability which is independent of individual tastes. All other coefficients are unrestricted and assumed to be normally distributed. The estimated parameters θ for these coefficients are thus the mean and standard deviation of a normal distribution. This also allows the calculation of the area of the density function $f(\beta|\theta)$ which is below and above zero. If part of the area of $f(\beta|\theta)$ is below zero, a variable constitutes an attractor for some, and a repellent for other individuals. Although sign restrictions could be imposed by specifying some of the coefficients as being log-normally distributed the random parameters are specified as normally distributed to make the model as flexible as possible. 500 Halton draws are used for simulation in the random parameters logit.[12]

Table 2 shows the results of the random parameters logit estimation. For unrestricted variables the table shows the estimated mean and standard deviation of the random parameters (which define the normal distribution of these coefficient in the population). The fourth column gives the proportion of the estimated parameter's density which above zero (i.e., the percentage of the population for which the parameter is positive). The fifth column shows the

[12] Halton sequences are usually defined in terms of a prime number. For the simulation of an integral of dimension ι (where the dimension is equal to the number of random parameters), the first ι prime numbers are conventionally used to generate ι Halton sequences (Cappellari and Jenkins, 2006). Because the initial elements of the sequences can be highly correlated across dimensions, Train (2009, p. 227) recommends to discard at least the first κ elements, where κ should be as least as large as the prime number used in the ι'th dimension. Because the model has 18 random parameters (dimensions), the first 61 elements are dropped.

exponentiated mean parameter of the random parameters logit, which can be interpreted as the odds ratio of an individual at the mean parameter.

[Table 2 about here]

The results show that individuals prefer larger regions, both in terms of population as well as in terms of the area, although the latter coefficient is rather small. They also indicate that, as expected, a higher unemployment rate decreases while a higher income increases the probability of moving to a region. Interestingly, the effects are not positive for all individuals. Although the parameter of the unemployment rate is negative for the majority of migrants and the vast majority of migrants ceteris paribus prefers regions with a higher average income, the parameter of the former is positive for about 16.4% while the parameter of the latter is negative for about 5.3% of all migrants. This does, however, not necessarily indicate that these individuals actually prefer regions with higher unemployment rates and/or lower income, but it probably rather shows that the aggregate income and unemployment figures are not relevant for a segment of migrants to the EU-15.[13] A higher score of the MIPEX Labour Market Access Index increases the probability of moving to a region: countries with more liberal rules governing migrant's access to the labor market as well as to active labor market policies thus attract a—ceteris paribus—higher share of migrants.

Ethnic networks increase the attractiveness of a region as target location for all migrants. At the mean estimated parameter, an increase in the ethnic network size of one percentage point almost doubles the odds of choosing a region. The effect of ethnic networks is, however, decreasing as indicated by the coefficient of the squared network variable. This suggests that ethnic networks can reach an optimal size beyond which the attractiveness of a region actually decreases (for example because of rising housing prices or a decrease in wages). The attractiveness of a region decreases with the distance to the source country which indicates that mobility costs do play a role in the location decision. The negative effect of distance is, how-

[13] This especially applies to refugees. Unfortunately, the data does not allow distinguishing between migrants and refugees.

ever, decreasing as the distance between the capital of the source country and the largest city in the NUTS-2 region of residence rises.

Unexpectedly, capital regions are a repellent for the majority of individuals and the parameter of the dummy variable is positive for only 25.4% of migrants. The common border dummy variable is positive for only 69.0% and only 28.4% prefer regions in countries of a former colonizer. The effect of a common official language is, however, unequivocally positive and large for all individuals. The odds ratio of the common language dummy is 6.2 at the mean parameter, which indicates that the odds of moving to a region are more than six times higher if this region is in a country which shares an official language with the migrant's home country.

Finally, turning to the variables capturing aspects of the tax and social security system the regression shows that the attractiveness of a region decreases with the average combined tax and SSC rates as hypothesized. All else equal, a 1 percentage point increase in the average combined tax and social security contribution rates (at average income) decreases the mean odds of moving to a region by about 6.8%. Furthermore, the less progressive the income tax code, the more attractive a region, as shown by the positive coefficient for the net income ratio. While the progressiveness of the income tax system is a repellent for almost all individuals, a higher average tax and SSC rate enters the utility function of 22.8% of the migrants with a positive sign. One explanation for this finding is that some individuals actually prefer countries with higher tax rates, if higher taxes also imply a higher level of public services. Furthermore, the variable used here is the average tax and social security rate at the average income. If the income tax system is progressive, individuals expecting to earn less than the average income will face a lower tax burden while they expect those with higher income to contribute more to financing public services.

Some results of the welfare system variables used to test the welfare magnet hypothesis are rather unexpected. For example, the mean estimated parameter for the unemployment replacement rate is negative. In addition, the estimated standard deviation of the parameter in the population is rather small so that 100% of the parameter's distribution is below zero. This indicates that the unemployment replacement rate actually has a negative effect on the proba-

bility of moving to a region. The same holds true for the parameter of sickness/healthcare expenditures per capita which was intended to measure the quality of the health care system.

Finding negative effects for variables used to proxy for the provision of welfare services on locational choice is, however, not unprecedented in the literature (see Pedersen et al., 2008, or Geis et al., 2008). This might indicate that the variables used do not really reflect the generosity of the welfare system, but other characteristics of the target country. For example, higher health care expenditures might indicate an ageing society, poor environmental conditions or a rather inefficient health care system. Another explanation is that (even after controlling for the average income tax and SSC rates) the general tax level (including indirect taxes) may be higher in more generous welfare states with higher expenditures and replacement rates, so that individuals can expect to bear a higher overall tax burden in these countries. If the individual's willingness to pay for an increase in welfare provision (the implicit increase in taxation they are willing to bear for an increase in the unemployment replacement rate or in healthcare expenditures) is below the implicit tax price, the attractiveness of a region or country will be lower although it provides superior welfare (see also Geis et al., 2008). Furthermore, if migrants are not eligible for social security benefits right away, the negative effect of the implicit tax rates will be amplified in a more generous welfare system, because newcomers will have to pay higher taxes for welfare benefits they are not entitled to. These effects seem to dominate any positive effect based on expectations about future welfare benefits.

The pension replacement rate on the other hand affects locational choice positively for all individuals. The same holds true for the PISA science scores, which are included in the regression to capture the quality of the educational system. Although the effects of these variables appear rather small (a one percentage point increase in the pension replacement rate increases the mean odds of moving to a region by only 0.5%, a one point increase in the PISA science score increases the odds by only 0.3%), the effects are quite sizable when considering the range of these variables (see table 1). The difference in the odds between regions in the country with the lowest science scores (Greece) and a region in the country with the highest science score (Finland) is more than 30%. For the pension replacement rate, this difference is more than 40%. As the estimated standard deviation of the parameter of the PISA science

scores is not statistically different from zero, the coefficient can be seen as a fixed parameter which does not vary in the population.

5 Conclusions

This paper analyzed the role of the welfare magnet hypothesis for the locational choice of approximately 9 million migrants who migrated to 13 of the EU-15 countries in the 1998-2007 period. The paper followed Geis et al. (2008) in the choice of variables capturing the generosity of the welfare system. The empirical analysis based on a random parameters logit (RPL) model shows that the location decisions of migrants are mostly governed by better income opportunities, more favorable labor market conditions (lower unemployment), easier access to the labor market, higher ethnic networks, a lower distance to the home country as well as a common official language, while past colonial relationships actually decrease the probability of moving to a region for most migrants.

The regression, however, does not find strong evidence for the welfare magnet hypothesis—the hypothesis that migrants are attracted to countries or regions with more generous welfare benefits. For example, the unemployment replacement rate (at average income) and the sickness/healthcare expenditures (which are used to proxy for the quality of the health care system) affect location choice negatively, contrary to the welfare magnet hypothesis. But the RPL model also shows results consistent with the welfare magnet hypothesis: the pension replacement rate (at average income) and the PISA science scores (to capture the quality of the educational system, cf. Geis et al., 2008) both enter the regression with positive coefficients. Generally, however, the regression provides no consistent evidence for the welfare magnet hypothesis, and the location decisions of migrants in the 13 EU countries considered are rather governed by other factors.

But the RPL shows that the design of the tax system significantly affects location decisions: migrants tend to settle in regions of countries with lower combined income tax and social security contribution (SSC) rates as well as a lower progressivity of the income tax system. However, as parameters are allowed to have different signs for different individuals in the RPL model, the average tax and SSC rates enter the utility functions of some migrants with a

positive sign, and some individuals actually prefer regions in countries with a more progressive income tax code. One explanation for this is that higher income tax and SSC rates also imply a higher level (or better quality) of public services. Nevertheless, the design of the (income) tax system appears to have a larger and more consistent effect on locational choice than the design of the welfare system.

Because it can be expected that some of the welfare and tax system variables have different effects on migrants with different skill levels (for example, if low-skilled migrants face higher labor market risks, welfare variables should play a larger role in determining their location choice), future extensions should focus on analyzing the skill-specific effects of these variables. A first approach to estimating education-specific effects of welfare and tax system variables can be found in Huber et al. (2010).

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Variable	Mean	S.D.	Min.	Max.
Region size (in 1,000 km²)[4]	17.345	23.686	0.161	165.296
Population (in 100,000)[4]	1.544	1.449	0.107	9.027
Unemployment rate (in %)[4]	7.290	3.743	2.286	20.186
Avg. income p.a. (in € 1,000)[4]	27.263	10.299	10.567	95.979
Network[1]	6.650	10.276	0.000	100.000
Distance (in 1,000 km)	4.697	3.641	0.055	18.981
Capital (=1)	0.082	0.275	0	1
Common border (= 1)[2]	0.045	0.207	0	1
Common official language (= 1)[2]	0.375	0.484	0	1
Colony after 1945 (= 1)[2]	0.140	0.347	0	1
Avg. tax and SSC rate (in %)[3]	31.577	7.909	20.541	46.943
Net income ratio (in %)	95.156	2.503	91.230	100.000
Unemployment replacement rate (in %)[3]	60.462	14.875	36.000	87.000
Pension replacement rate (in %)[3]	77.869	18.632	41.100	110.100
Sickness/healthcare expenditures per capita (in € 1,000)[4]	2.101	0.688	1.009	3.553
PISA science scores[3]	501.077	24.908	473.000	563.000
MIPEX Labour Market Access Index[5]	66.154	21.031	40.000	100.000

Table 1: Summary statistics for explanatory variables. Source: [1]European Labour Force Survey, [2]CEPII, [3]OECD, [4]Eurostat, [5]British Council.

Variable	Mean(β)	S.D.(β)	$\%\beta > 0$	$e^{Mean\ (\beta)}$
Region size (in 1,000 km²)	0.000 ***			1.000
	(0.000)			(0.000)
Population (in 100,000)	0.245 ***	0.012 ***	100.000	1.278
	(0.000)	(0.000)		(0.000)
Unemployment rate (in %)	-0.060 ***	0.062 ***	16.407	0.941
	(0.000)	(0.000)		(0.000)
Avg. income p.a. (in € 1,000)	0.015 ***	0.009 ***	94.701	1.015
	(0.000)	(0.000)		(0.000)
Network	0.673 ***	0.044 ***	100.000	1.959
	(0.001)	(0.000)		(0.002)
Network²	-0.047 ***	0.036 ***	9.769	0.954
	(0.000)	(0.000)		(0.000)
Distance (in 1,000 km)	-0.435 ***	0.014 ***	0.000	0.647
	(0.001)	(0.002)		(0.001)
Distance (in 1,000 km)²	0.018 ***	0.003 ***	100.000	1.018
	(0.000)	(0.000)		(0.000)
Capital (=1)	-2.885 ***	4.358 ***	25.396	0.056
	(0.009)	(0.011)		(0.001)
Common border (=1)	0.503 ***	1.015 ***	68.980	1.653
	(0.004)	(0.009)		(0.007)
Common official language (=1)	1.828 ***	0.337 ***	100.000	6.223
	(0.002)	(0.005)		(0.012)
Colony after 1945 (=1)	-0.409 ***	0.716 ***	28.383	0.664
	(0.003)	(0.008)		(0.002)
Avg. tax and SSC rate (in %)	-0.070 ***	0.094 ***	22.767	0.932
	(0.000)	(0.000)		(0.000)
Net income ratio (in %)	0.170 ***	0.089 ***	97.174	1.185
	(0.000)	(0.002)		(0.001)
Unemployment replacement rate (in %)	-0.019 ***	0.000 ***	0.000	0.981
	(0.000)	(0.000)		(0.000)
Pension replacement rate (in %)	0.005 ***	0.001 ***	100.000	1.005
	(0.000)	(0.000)		(0.000)
Sickness/healthcare expenditures (in € 1,000)	-0.363 ***	0.008 ***	0.000	0.696
	(0.002)	(0.002)		(0.002)
PISA science scores	0.003 ***	0.000	100.000	1.003
	(0.000)	(0.000)		(0.000)
MIPEX Labour Market Access Index	0.025 ***	0.002 ***	100.000	1.025
	(0.000)	(0.000)		(0.000)
Observations	8,988,710			

*Table 2: Random parameters logit regression of location choice. Germany and Ireland not included. Standard Error in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%. RPL log likelihood simulated using 500 Halton draws. Source: European Labour Force Survey 2007, Eurostat, CEPII, OECD, British Council, own calculations.*