Int Econ Econ Policy (2013) 10:491–519
DOI 10.1007/s10368-012-0219-2

ORIGINAL PAPER

Are immigrants really attracted to the welfare state? Evidence from OECD countries

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Published online: 12 August 2012

Abstract This paper examines the impact of fiscal policies on both the size and educational levels of immigrants in destination countries. We find that whether or not a country's policies are attracting highly educated immigrants goes beyond the issue of the "welfare state". Immigrants are making important distinctions between the different benefits provided by a receiving country's government. Health and education spending are found to have a positive impact on the education levels of immigrants while the reverse is true for unemployment and retirement benefits. Welfare programs are found to be insignificant once other government programs/taxes and other factors are taken into account. These results imply that countries should be less concerned about whether they are a "big government" with regards to attracting immigrants, and more concerned with what types of benefits they offer.

Keywords Migration · European union · Fiscal · Welfare

JEL codes J1 · J6 · F2

1 Introduction and background

Immigration is a major economic and political issue for developed countries around the world. Globally, the number of international migrants has been increasing for decades, more than doubling over the period of 1980–2010 (World Bank 2011). This is a crucial issue for the governments of developed countries, as they are the

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destinations for approximately 60 % of international migrants (World Bank 2011). The expansion of the European Union, high unemployment and the lifting of East–west restrictions on labor movements have made migration a priority for European Union policy makers, and a strong concern among affected voters.

Worries from individuals about the impact of increased migration stem primarily from labor market effects and the strain on government budgets. Individuals are concerned with the negative impacts that increased migration may have on wages and employment prospects of native workers in particular labor market segments. However, the issue of government budgets impacts all citizens. In particular, there is concern that if a country attracts a large percentage of lower educated immigrants, they will consume a disproportionate percentage of government services thereby increasing the tax burden on domestic workers. Thus, policy issues relate not only to the number of immigrants but also to their educational level.

The relationship between immigrants and governments budgets may be bidirectional since immigrants may both impact *and be impacted by* government budgets. Tiebout (1956) proposed that individuals consider governmental tax and social spending policies when they make migration decisions. Thus, one would expect individuals to choose to locate in areas where government policies match their preferences. Of course, these fiscal factors must be considered alongside other migration variables such as wage and unemployment differences, distance, and network effects.[1]

A significant body of research has been conducted which examines the impact of fiscal factors on domestic migration within the United States and Canada. Since a full review of this literature is beyond the scope of this paper, readers are directed to Dowding and John (1994), Fischel (2006), and Howell-Moroney (2008) for surveys of the literature on the Tiebout hypothesis.[2] This literature focuses on the impact of aggregate government spending variables (such as total education spending) and their impact on the number of immigrants which a country attracts. More recent evidence that fiscal factors affect international migration include Liebig and Sousa-Poza (2006), who examine the Tiebout hypothesis using data from Switzerland. They find that immigrants' decisions on which communities to locate in are impacted by local tax rates. International applications of the Tiebout hypothesis rely on macro-level data and as such do not control for local factors such as property tax rates.[3] Twomey (1987) and Cuthbertson et al. (1982) test the Tiebout hypothesis with data from different boroughs in the United Kingdom, and find that government spending has a significant impact on location decisions. Recent papers by Peridy (2006) and Karidis and Quinn (2006) examine the impact of fiscal factors on the number of immigrants in European Union countries. Peridy (2006) focuses on health and education

[1] Massey et al. (1994) and Taylor and Yunez-Naude (1999) provide a good review of different migration theories.

[2] Some examples of the empirical Tiebout research includes papers such as Banzhaf and Walsh (2008), Buchanan and Goetz (1972), Cebula (2009), Cebula and Kafoglis (1986), Cushing (1993), Day (1992), Day and Winer (2001), Flatters et al. (1974), Koven and Shelley (1989), Mazzaferro and Zanardi (2008), Ott and Shadbegian (1993), Shaw (1986) and Starrett (1980).

[3] Given the nature of international data, local property tax rates such as those utilized by Oates (1969) cannot be studied. Housing values, while measured on a macro scale, are not available for enough destination countries to be utilized in analyses during the timeframe of our study.

spending by the government. Karidis and Quinn (2006) utilize the broader measure of social spending by governments but also include the impact of tax rates. Both papers find that fiscal factors have a significant impact on the size of migration flows.

An area of research that focuses specifically on the role of government income assistance benefits on immigration is commonly known as the "welfare magnet hypothesis". Income assistance to poor individuals and families is commonly referred to as welfare in the United States. Throughout our own analysis, we will use the term income assistance rather than welfare as we are dealing with data from many different countries. Studies in this literature examine whether individuals move to take advantage of better U.S. welfare benefits. Early work examining this idea in the context of the Tiebout hypothesis include Brehm and Saving (1964), Cebula (1974), Dye (1990) and Pack (1973). Recent research from the labor economics literature tends to focus on the movements of welfare eligible populations in the United States and Canada. The empirical results as to whether or not the welfare magnet hypothesis holds have been mixed. Research such as Borjas (1999), Dodson (2001) and Enchautegui (1997) all found evidence of the welfare magnet phenomenon occurring in the United States. However, Kaushal (2005), Levine and Zimmerman (1999), and Zavodny (1997) utilized different samples within the United States and found no evidence of the welfare magnet hypothesis. The term "welfare state", in the context of our paper, is intended to refer to a wide range of services and to the overall size of government, not strictly welfare programs (which we will denote as income assistance programs).

There is another area of migration research that focuses on the educational composition of immigrants, however much of this literature examines the flows of highly educated immigrants from less to more developed countries.[4] This research tends to focus on factors such as differential returns to education and other labor market factors as reasons for attracting higher educated immigrants.[5] Recent work such as Docquier et al. (2007) has examined the impact of a country's openness and educational inequality on "brain drain". Our paper is interested in the broader impact of government programs on the migration decisions of both high and low educated workers.

The main contribution of this paper draws from the recent internationally oriented Tiebout hypothesis literature. Unlike previous research, this paper will examine both government spending priorities and specific programs (such as income assistance programs, unemployment and retirement benefits) on international migration. Research has shown that higher educated immigrants have shorter migration durations than lower educated immigrants (Dustmann and Weiss 2007). Since different government benefits have different eligibility timeframes, higher educated immigrants should then place more value on government spending that has short term benefits. By testing this hypothesis, our paper furthers the literature by examining the impact of government spending programs on the educational composition of international migration. This paper also contributes to the literature by explicitly accounting for the endogeneity which is inherent in the two-way relationship between fiscal factors and migration. The analysis also includes the impact of factors commonly cited in the literature such as wage and unemployment differences, distance, network effects and

[4] For examples see Docquier et al. (2008); Fan and Stark (2007); Lien and Wang (2005); or Yabuuchi and Chaudhuri (2007).

[5] See Borjas et al. (1992); Chiswick (1999); Chiquiar and Hanson (2002); or Hunt and Mueller (2004).

previous colonial relationships. This comprehensive approach provides a more detailed examination of determinants which affect both the size and composition of migrant stocks and thereby allows governments to better construct policies to meet their economic, political, and social objectives.

The next section lays out the theoretical model, providing a basis for the empirical specification. Section III gives an overview of the data and variables employed, and discusses some a priori expectations of the specifications. Sections IV and V discuss the empirical methodology and estimation results. Concluding remarks then follow.

2 Theoretical model

Consistent with the Tiebout and welfare magnet hypotheses, we model migrants making a decision to immigrate or not based on the expected wages in the host country versus home country, as well as any differences in public goods provision or social safety nets. Agents work, consume, and save in the first period. In the second period, agents draw off any retirement benefits and public goods provided by the host country, as well as savings accumulated in the first period.

For immigrant i, the decision to migrate or not depends on whether the utility of staying in the home country is greater than that of immigrating. At the beginning of the first period, potential immigrants evaluate expected lifetime utility and make the choice to stay in the source country, or immigrate to the destination country. Lifetime expected utility for agent i is given by

$$V_{i,t} = u_{i,t}\left(Y_{i,t}\right) + \rho u_{i,t+1}\left(Y_{i,t+1}\right) \tag{1}$$

where Y is aggregate goods consumption by each potential migrant, and $u(.)$ is an increasing concave function of Y. We assume for simplicity that migrants provide a fixed amount of labor services.

It is assumed that private consumption goods and public goods are perfect substitutes, such that the two are additive as an argument of u, i.e. $Y_{i,t} = C_{i,t} + G_{i,t}$ where C is real consumption of private goods and G is real public goods consumed (we later decompose public goods into an income assistance spending variable, P, and spending on combined health and education, H). The assumption of substitutability of private and public goods is motivated by the observation that spending on health care or education, for example, if not provided by the government, would presumably be paid for in private, and therefore indirectly reduce consumption of private goods by the same amount.[6]

[6] We thank an anonymous referee for pointing out that in countries where health care is not provided by the government, it is possible that some immigrants may choose to not participate in private health care coverage, and therefore allow for a higher level of private consumption. However, even in countries such as the United States that do not have nationalized health care systems, there is still de facto government spending on health care for those who cannot afford it, including immigrants, implying that government spending on health care will still indirectly increase. In addition, given the cross-section of countries that are considered destination countries, the vast majority have some form of government supported (or fully nationalized) health care, making the number of countries with strict private health insurance the only option relatively small. While disaggregating the different types of health care coverage among countries is an interesting question, it goes beyond the scope of this paper.

In period two, agents consume private goods from savings accumulated while working in period 1, as well as public goods consumption and any retirement benefits provided by the state. The parameter ρ represents a time discount factor.

Thus, the decision to migrate is a standard intertemporal utility maximization problem in which agents base their decision to move across the differences in benefits received now, as well as those expected to be received in the future. Expected income of each migrant for the first period is given by

$$I_{i,t} = \gamma_w(1 - \tau(w))w_{i,t} + \gamma_B B_{i,t} \tag{2}$$

where γ_w is the probability of earning wage w and $\tau(w)$ is the income tax rate, which is a function of wages. The γ_w term can be roughly interpreted as the inverse of the unemployment rate. In the event that the person does not find a job, $\gamma_B B_{i,t}$ represents the amount of expected unemployment compensation that can be drawn from the government, where γ_B is the probability of an immigrant receiving benefits B. The variable B also is meant to capture any informal income opportunities that migrants may have in lieu of or in addition to formal compensation.[7] Consumption, income, and savings are related by the identity $C_{i,t} + S_{i,t} = I_{i,t}$, or

$$C_{i,t} + S_{i,t} = \gamma_w(1 - \tau(w))w_{i,t} + \gamma_B B_{i,t} \tag{3}$$

where $S_{i,t}$ is the amount of savings in period t. Expected consumption in period $t+1$ is then given by:

$$C_{i,t+1} = S_{i,t} + \gamma_R R_{i,t+1}. \tag{4}$$

That is, expected consumption in $t+1$ depends on accumulated savings from the working years, as well as any expected (retirement) benefits provided either by the state or private employers. Again γ_R is the probability that migrants will be able to draw retirement benefits.

Rearranging and substituting (3) and (4), lifetime utility in (1) is then given by:

$$\begin{aligned} V_{i,t} = {} & u_{i,t}\{\gamma_w(1 - \tau(w))w_{i,t} + \gamma_B B_{i,t} - S_{i,t} + \gamma_G G_{i,t}\} \\ & + \rho u_{i,t+1}(S_{i,t} + \gamma_R R_{i,t+1} + \gamma_G G_{i,t+1}). \end{aligned} \tag{5}$$

As opposed to a linear function, we assume a quadratic utility form to capture the realistic assumption of diminishing marginal returns to consumption in both private and public goods. Period t utility for migrant i is assumed to be an increasing, concave quadratic function of aggregate goods consumption, taking the following form:

$$u_{i,t} = \delta Y_{i,t} - (\kappa/2)(Y_{i,t})^2 \tag{6}$$

where δ and κ are parameters governing the marginal utility of consumption (i.e. dictating the concavity of $u(.)$).

Thus, agents choose $S_{i,t}$ (and hence implicitly C) to maximize (5), as all other variables are taken as given. Substituting (6) into (5) and solving for the utility

[7] We assume that there is no correlation between the likelihood of an immigrant finding employment in a destination country and the generosity of that country's immigrant-eligible benefits (that γ_w and γ_B behave independent of one another).

maximizing amount of savings $S^*_{i,t}$ yields:

$$S^*_{i,t} = \left[\gamma_w(1-\tau(w))w_{i,t} + \gamma_B B_{i,t} + \gamma_G G_{i,t} + (\delta/\kappa)(\rho-1) - \rho\left(\gamma_R R_{i,t+1} + \gamma_G G_{i,t+1}\right)\right]/(1+\rho). \quad (7)$$

From (7) it can be shown that aggregate consumption of goods in time t and $t+1$ is given by

$$Y^*_{i,t} = \rho\prod/(1+\rho) + \delta(1-\rho)/(\kappa(1+\rho)), \quad (8)$$

and

$$Y^*_{i,t+1} = \prod/(1+\rho) - \delta(1-\rho)/(\kappa(1+\rho)), \quad (9)$$

where $\Pi \equiv \gamma_w(1-\tau(w))w_{i,t} + \gamma_B B_{i,t} + \gamma_R R_{i,t+1} + \gamma_G\left(G_{i,t} + G_{i,t+1}\right)$. Thus, each agent's lifetime expected maximized utility is given as

$$V^*_i = \delta^2(1-\rho)^2/(2\kappa(1+\rho)) + 2\rho\delta\prod/(1+\rho) - \kappa\rho\prod{}^2/(2(1+\rho)). \quad (10)$$

Note that $u(.)'>0$ as long as $Y<\delta/\kappa$, and $u(.)''$ is negative for all values of Y. This implies that for utility to be increasing in Y, the parameter κ must be sufficiently small relative to δ, which necessarily implies a relatively modest curvature of the utility function. Since we must assume κ is small in a relative sense to ensure diminishing marginal returns to consumption, this also implies that the term $\kappa\rho\Pi^2/(2(1+\rho))$ is of second order importance and thus, from the standpoint of comparing utility derived from this term across source and destination country, will be inconsequential to the migration decision. Similarly, assuming the preference parameters are constant for each individual, the first term $\delta^2(1-\rho)^2/(2\kappa(1+\rho))$ will not affect the decision to migrate, and therefore can also be dropped.

Each agent's lifetime expected maximizing utility can then be expressed as

$$Q_i = \gamma_w(1-\tau(w))w_{i,t} + \gamma_B B_{i,t} + \gamma_R R_{i,t+1} + \gamma_G\left(G_{i,t} + G_{i,t+1}\right) \quad (11)$$

where $Q_i \equiv (1+\rho)/(2\rho\delta)V^*_i$.

Letting superscript s denote the source country and superscript d denote the destination country of the potential migrant, agents then will choose to migrate whenever $Q^d_i > Q^s_i + X_i$ where X_i is a vector of variables representing both the direct costs of migrating (such as the distance from source to destination country), and indirect costs of migrating (such as former colony status, or current stocks of migrants in the destination from the source country).

Thus, taking into account factors such as expected income, benefits, and other public good provisions, if the expected lifetime utility of the destination country is greater than that of the home country (net of migration costs), the agent will migrate. This condition can similarly be expressed as

$$\begin{aligned}\left(\gamma_B B^d_{i,t} - B^s_{i,t}\right) + \left\{\gamma_G\left(G^d_{i,t} + G^d_{i,t+1}\right) - \left(G^s_{i,t} + G^s_{i,t+1}\right)\right\} + \left(\gamma_R R^d_{i,t} - R^s_{i,t}\right) \\ + \left(\gamma_w w^d_{i,t} - w^s_{i,t}\right) - \left[\gamma_w \tau^d_{i,t}(w) w^d_{i,t} - \tau^s_{i,t}(w) w^s_{i,t}\right] - X_i > 0\end{aligned} \quad (12)$$

This condition tells us that the decision to migrate hinges on the differences in the origin and destination countries between expected wages, taxes paid, unemployment

benefits and secondary income, public goods provision while working, and retirement benefits and other public goods provision while not working.[8] In addition to the typical factors explaining the immigration decision, Eq. (12) provides the basis for estimating the effects of various government spending programs on the size and educational composition of immigrants to the destination countries.

Equation (12) also makes clear that it isn't just the *size* of the benefits that matter for immigrants, but also the *feasibility* of immigrants to draw those benefits, as captured by γ_B, γ_G, γ_R, and γ_w which influences the migrant's decision. [9] Even if wages are high in a given destination country, if γ_w is low (as represented by a high unemployment rate), this should discourage migration. Similarly, if a destination country provides generous state benefits, but those benefits are difficult to qualify for (i.e., a low γ_B, γ_G, and/or γ_R), this should likewise discourage immigration to that country.

More specifically, the theoretical model from Eq. (12) leads to several hypotheses we test against the data:

(H1) The total number of immigrants should be negatively related to the cost of migration. This includes variables such as distance, colonial relationship and migrant stocks.

(H2) The total number of immigrants should be positively related to expected income gains. This incorporates the unemployment and wage difference variables.

(H3) The total number of immigrants should be positively related to the differential in government provided benefits (income maintenance, health, education, unemployment insurance and retirement benefits).

(H4) Total migration stocks should be negatively related to tax differentials.

(H5) The educational level of immigrants should be positively related to government benefits with the highest probability of receiving benefits (γ) for highly educated immigrants. Assuming highly educated immigrants have shorter migration durations and/or better information about benefits eligibility, then benefits with the most immediate eligibility such as health and education should be positively related to educational level of the migrant stocks. Benefits with longer times to eligibility such as unemployment and retirement benefits may be less positive or even negatively related to educational level. As highly educated workers are both less likely to collect and be less impacted by unemployment and retirement programs, the expectation is that such benefits will be negatively related to the educational level of the migrant stocks.

(H6) The educational level of immigrants and hence the outstanding stock of migrants should be negatively related to differentials in the progressivity of the tax system.

[8] The γ term is only necessary for the destination countries in Eq. (12), as we assume that immigrants have full knowledge regarding employment prospects, government benefits and eligibility in their source country. Additionally, this simplification is made due to developing country data limitations.

[9] The idea of using expected wage differentials in migration models is well-established in economics, beginning with the work of Harris and Todaro (1970). One can consider the notion of expected benefits to be an extension of that concept.

(H7) The educational level of immigrants should be positively related to the cost of migration. This is assuming that immigrants with higher educational levels will have more resources to pay the costs of migration (X_i).

3 Data and variables

The data set is cross-sectional in nature, using observations from the year 2000. There are 19 immigrant receiving (destination) countries and 91 sending (source) countries resulting in 1,619 observations, so we fulfill the large sample conditions.[10] The data set contains only immigrants above the age of 25. Restricting the sample to those aged above 25 should mitigate any potential biases associated with whether the immigrant received their education in the source or destination country.[11]

There are two main dependent variables of interest in the analysis: the total stock of the source country migrants in the destination country for each country pair, and the average educational level of those immigrants. Both of these variables are taken from the Docquier and Marfouk (2006) World Bank data set. The size of the migrant stock from source country (s) in destination country (d) is denoted as M_{sd}, and is in log form.[12] The average educational level of the stock is denoted as E_{sd} and is measured as the average number of years of schooling of source migrants in the destination country. This data set is a rare opportunity to have a large cross-section of educational data on immigrant stocks. Stock data on immigration is preferred to flow data as it has been shown to be more statistically reliable (Brucker and Siliverstovs 2005; Docquier and Schiff 2008).

Due to data constraints, fiscal factors are only available for destination countries.[13] This is unavoidable and is common in the literature (see Marfouk 2008 and Peridy 2006 for examples). The government spending variables (denoted as G in the theoretical model) consist of two variables: low income assistance spending (P_d) and combined health and education spending (H_d). Total low income assistance spending is defined as a percentage of GDP and comes from the OECD's *Stat Extracts* (OECD 2010). It includes such programs as housing, day care, training, social assistance, income maintenance, survivor assistance, etc. The combined health and education spending is defined as a percentage of GDP and is taken from World Development Indictors (World Bank 2011).

In addition to these spending variables, there are three other fiscal factor variables that impact individuals. The percentage of an unemployed individual's income replaced by the government (denoted as B_d) is from Standing (2000) and is based

[10] The destination countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, and United States.

[11] Beine et al. (2007) were able to source the education for a subset of immigrants with tertiary education and results were found not to change as compared to the original data.

[12] We converted to log form to scale the variable.

[13] Note that the theoretical model has fiscal variables entering as differences between destination and source countries. However, these fiscal variables are unavailable for many developing countries, making the use of source country fiscal variables infeasible. This is unavoidable and is common in the literature (see Marfouk 2008 and Peridy 2006 for examples). Difference variables are available and included for many of the non-fiscal variables.

on calculations from the *OECD Benefits and Work Incentives Database*. The percentage of an individual's income that is replaced by government retirement/pension benefits is taken from the *OECD Pensions at a Glance*, and is denoted as R_d (OECD, 2005b). Income tax rates (τ_d) are from World Development Indicators and are defined as the highest marginal tax rates on individuals measured as percentages.

For the analysis of the total number of immigrants from the source country in the destination country (M_{sd}), a variable was defined to capture the interaction between unemployment benefits and the average educational level of the immigrants. Heitmueller (2005) suggests that individuals with higher educational levels may be more risk averse and therefore prefer systems with more generous unemployment benefits (as a form of insurance). This interaction term is included as a test of his hypothesis.

There are several other control variables in the analysis, included in vector X_{sd}.[14] Wages across countries are from Freeman and Oostendorp (2000), and are based on data from the International Labour Organization surveys. Wages are defined as average monthly wages for male workers across multiple occupations and are adjusted for purchasing power parity differences. Since the wage data was compiled from occupational surveys, it is considered to be a more reliable indicator of individuals' expected wages than a broad GDP per capita variable might be. This variable is constructed as the difference between the migration destination and source countries.[15]

Variables for income inequality (Gini coefficient), population aged 0–14 in 1985, life expectancy, population (source country) and unemployment rates are all taken from World Development Indicators. Unemployment rates, life expectancies and lagged population aged 0–14 are constructed as differences between destination and source countries. The population aged 0–14 in 1985 reflects the domestic population aged 15–29 in year 2000 as a percentage of the total population. This is intended as a measure of the youth population which can be a significant "push" factor in migration (Clark et al. 2002; Hatton and Williamson 2002). The Gini coefficient is available only for destination countries. The stock of source country migrants in the destination country (converted to log form for scaling) is taken from the *OECD International Migration Outlook* (OECD 2007), and is for use in the educational level analysis only.

A dummy variable is constructed to equal 1 if there is a former or current colonial relationship, and is obtained from the CIA World Factbook (CIA 2011). The usage of the colonial relationship variable precludes the inclusion of a common language variable as there is too much overlap between the two variables. We chose the colonial relationship variable as this relationship impacts both common language and visa policies. Distance between countries is from the CEPII database and is measured in kilometers converted to logs (CEPII 2011). A dummy variable is included to represent the Schengen agreement, consistent with the work of Grogger and Hanson (2008). This variable is equal to 1 if the source and destination countries were both one of the thirteen full members (in 1990) of the Schengen agreement on

[14] Although wages are separated from the direct and indirect costs which defined the vector X_{sd} in the theory section, to simplify the presentation of our estimated model we will lump the wage variable into the vector X_{sd}.

[15] To convert the wage difference data to logs, we had to first normalize it since some differences were negative.

borderless travel. This is intended to measure the openness of immigration and travel within this group of countries. The asylum variable is a measure of how open a destination country is to asylum seekers. This is defined as the percentage of asylum applications that were accepted over the time period 1991–1999.[16] There is also a dummy variable for whether or not the country places a heavy weight on skills in granting entry visas (as opposed to family reunification). This is equal to 1 for Australia, Canada and New Zealand and equal to zero otherwise. The index of economic freedom in the destination country variable is compiled by the Heritage Foundation (Heritage 2011).

There are seven instrumental variables used in estimations discussed in the methodology section. Five are taken from the International Social Survey and Eurobarometer Surveys (ISSP 1996; Eurobarometer 1993, 2008) and are created by combining equivalent questions across the two surveys. The five survey variables capture respondents' views on the government's responsibility to provide health care for all citizens, care and support for the elderly, adequate housing, unemployment compensation and free education for all its citizens. Appendix A provides an expanded discussion of these survey questions. The sixth instrument is the dependency ratio, which is the percentage of the population aged 0–14 and over 65 divided by the total population. The dependency ratio variable is from World Development Indicators. The seventh instrument is the unemployment rate of those with primary education and is constructed from World Bank (2011), OECD (2010), and Docquier and Marfouk (2006). A VIF test run on all of the exogenous variables yielded an average result under three, suggesting that multicollinearity is not a significant problem.

Descriptive statistics for the variables of interest are provided in Table 1 below.

3.1 Variable predictions for the number of immigrants analysis (M_{sd})

Most of the control variables have predictions which are well established in the literature. Transportation costs are proxied by a distance variable which is measured as the distance between the capitals of the migration source and destination countries and should be negatively related to total number of immigrants.

According to neoclassical expected wage theory, real wage differences between destination and source countries should be positively related to migration. Unemployment differences between destination and source countries should be negatively related. An unemployment rate perceived to be higher in the destination country than in the source country should discourage migration. Greater life expectancy and economic freedom should both be positively related to migration, as these are draw factors from an individual's perspective. The source country population variable should be positive, as countries with larger populations will send out more immigrants (in absolute terms). Countries with large youth populations experience demographic pressure which results in increased migration outflows, thus the lagged population aged 0–14 difference variable should be negative (Hatton and Williamson 2002; Clark, Hatton and Williamson 2002). The sign on the Gini coefficient is expected to be negative, as income inequality may be viewed negatively by prospective immigrants.

[16] Countries in the sample with a high percentage of asylum applications accepted also tend to receive a high number of applications. The correlation in the sample between # of asylum applications and percentage accepted is 0.83. This data is from the United Nations High Commissioner for Refugees (1999).

Table 1 Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Migration stock (log)	5.06	3.64	0.00	15.67
Average education level (years)	11.83	1.72	6.64	15.79
Dest health/Educ spending (%)	0.12	0.02	0.08	0.15
Dest. income assistance spending (%)	0.21	0.04	0.02	0.28
Dest. retirement compensation (%)	0.75	0.15	0.47	1.16
Dest. unemployment compensation (%)	0.32	0.11	0.13	0.66
Dest. income tax (%)	0.46	0.07	0.29	0.59
Migrant stock (log)	6.35	3.01	0.00	16.05
Distance (log km)	8.54	0.85	4.05	9.84
Colonial relationship dummy	0.03	0.17	0	1
Dest. freedom	69.68	6.28	57.40	80.90
Wage difference (log)	8.48	0.34	0.00	8.94
Youth population difference (%)	−0.15	0.10	−0.33	0.13
Unemployment rate difference	−6.12	12.00	−82.70	13.10
Dest. Gini	32.06	4.41	24.70	40.81
Source population (log)	15.65	1.91	10.70	20.96
Asylum applications accepted (%)	0.11	0.10	0.01	0.48
Skill-specific visa program dummy	0.14	0.34	0 1	
Schengen dummy	0.04	0.20	0 1	
Instruments				
Dependency ratio	0.50	0.03	0.46	0.55
Education survey	0.42	0.25	0.00	0.86
Elderly survey	0.49	0.31	0.00	1.00
Health survey	0.32	0.30	0.00	1.00
Unemployed survey	0.47	0.31	0.00	1.00
Housing survey	0.47	0.30	0.00	1.00
Primary unemployment rate	8.74	3.65	3.00	15.30

Fiscal variables are expected to have differential impacts tied to differences in the timing of migrant eligibility for the programs. For most destination countries, migrants can draw benefits almost immediately from government health and education programs. This is also true in some European countries of income assistance benefits. After a longer period of time immigrants may qualify for unemployment benefits, as eligibility usually requires a documented record of working in the country. The benefit with the longest eligibility time is obviously retirement benefits. An immigrant would have to stay in a destination country for many years to qualify for retirement benefits. During this time, they would be subject to payroll taxes to fund retirement programs. Depending on the time horizon of immigrants, income assistance, unemployment, and retirement benefits should have differential impacts and hence different signs. The most positive signs should go to benefits with the shortest eligibility waits. This implies that the variables from most positive to most negative should be: health/education spending, income assistance benefits, unemployment benefits and then retirement benefits,

respectively. At the far end of the eligibility timeframe, retirement benefits are expected to have a negative sign, as it will represent nothing more than another form of taxation for most immigrants. It is clear that income tax rates will have an expected negative impact on the size of the migrant stocks.[17]

The three policy-related "openness" variables, the Schengen dummy, the percentage of asylum applications accepted, and the presence of a skill-specific visa program, should all encourage migration. Hence we would expect to find positive and significant signs on all three. There is an interesting potential relationship regarding Schengen and asylum. With the abolition of border checks, an asylum seeker/refugee which is granted entry into one Schengen area country is de facto granted entrance into all countries in the area. This would make the Schengen countries more appealing for asylum seekers/refugees. However, the coordination of asylum policies means that a rejected application to one Schengen country could make an individual ineligible to apply to other member countries. These individuals would then be applying to non-Schengen countries resulting in an increase in applications in those countries. Statistics on the percentage of immigrants across the destination countries that were either asylum seekers or refugees is presented in Table 2 below. Refugees and asylum seekers did comprise a significant percentage of immigrants in several Schengen area countries, suggesting that controlling for the generosity of a country's asylum policies is potentially important. As a robustness check, the analyses were also run without the asylum variable and results did not significantly change.[18]

3.2 Variable predictions for the educational level analysis (E_{sd})

The welfare magnet hypothesis predicts that income assistance benefits will be negatively related to education level as lower educated immigrants would be more likely to collect these benefits. Heitmueller (2005) indicates that the appeal of high unemployment benefit systems should be positively related to educational level, due to risk aversion rising with level of education. In terms of health and education spending, it could be argued that higher educated immigrants will place more value on high quality health and educational systems for their families. However, a counter-argument could be made that higher educated immigrants have more ability (than lower educated immigrants) to finance private health and education services.

According to our hypothesis, the time horizon of immigrants will vary based on educational level. This is also consistent with the previous research discussed in the literature review which has found that higher educated immigrants have shorter migration stays (than immigrants with less education). Therefore, the impact of government programs on education levels of immigrants should be strongest for programs that have the most immediate eligibility and benefits. According to this hypothesis, health and education spending should have the most positive impact on the education level of immigrants. In terms of eligibility timeframes, the next strongest positive impact should come from

[17] The United States is one of very few countries which seek to tax its citizens income earned while working abroad. However, this is mitigated by tax treaties (to avoid double-taxation) which the United States has with all of the destination countries in our sample. The amount of foreign earned income automatically exempted is high enough that even without a tax treaty, less than 10 % of U.S. citizens would have any tax liability from income earned abroad.

[18] Results available on request.

income assistance benefits. In many European countries, immigrants can gain almost immediate access to income assistance benefits. The countervailing influence on this prediction is the welfare magnet hypothesis idea that higher educated immigrants believe they are less likely to ever need income assistance benefits. Unemployment benefits usually require a substantial period of work in the destination country before collecting, and may have accompanying taxes to support such benefits. As higher educated immigrants are more likely to have better information regarding these issues, we expect the sign on unemployment benefits to be negative. Retirement benefits should have a negative impact on the educational level as relatively few highly educated immigrants will stay long enough in the destination to collect benefits; however they will have to pay the corresponding payroll taxes upfront. Likewise, income tax rates should be negatively related to the educational level of the immigrants, as higher educated immigrants earn more and will therefore be paying higher tax rates.

It is predicted that the cost of migration will be positively related to education levels of migrants. Individuals with more resources and earnings capacities can afford to undertake more difficult/expensive migrations. Therefore, distance is expected to be positive and both colony and migrant stocks are expected to be negative. The economic freedom variable is expected to be positive as migrants with higher educational levels have the most to gain from a more openly capitalistic system. In a similar manner, inequality is expected to be positive, as higher educated immigrants have more to gain from an unequal system than would lower educated immigrants. There are no a priori expectations for the other control variables.

4 Empirical methodology

There are a priori reasons to suspect that income assistance spending and/or health and education spending might be endogenous since they not only impact the number of immigrants and their average educational levels of migrants, but are also impacted by these variables. That is, higher fiscal spending may attract a higher level of immigration, and higher immigration may necessitate larger spending on social programs. This is not likely to be the case with the other fiscal factors because they are policy-defined rates. In the presence of this endogeneity, an Ordinary Least Squares (OLS) approach would then be inappropriate.

The endogeneity assertions are tested using the Hausman-Wu test, which is a three-step procedure (Davidson and MacKinnon 1993).[19] Our results show the Hausman-Wu test rejects the null hypothesis of exogeneity with respect to income assistance spending and health/education spending for both the total number of immigrants and their education levels.[20] Therefore, our a priori expectations are statistically supported and an instrumental variable (2SLS) approach is required.

[19] The first step involves identifying the regressor(s) suspected to be endogenous. Next, a regression is run with the suspected endogenous variable as the dependent variable. The predicted residuals from this regression are then used as an independent variable in the original equation. If the coefficient on the residuals variable is significant, then the variable is likely endogenous.

[20] The Hausman-Wu test rejects the null of exogeneity with a p-value of 0.00 for both welfare spending and health/education spending for both dependent variables M_{sd} and E_{sd}.

Table 2 % of immigrants that were refugees/asylum seekers and Schengen membership, in 1999

	% Refugees or asylum seekers	Schengen country
Australia	2.1	No
Austria	11.6	Yes
Belgium	2.1	Yes
Canada	3.4	No
Denmark	45.3	Yes
Finland	17.8	Yes
France	3.5	Yes
Germany	26.9	Yes
Greece	6.2	Yes
Iceland	2.3	Yes
Ireland	4.7	No
Italy	2.6	Yes
Luxembourg	0.7	Yes
Netherlands	11.7	Yes
New Zealand	1.4	No
Norway	24.7	Yes
Portugal	0.2	Yes
Spain	0.8	Yes
Sweden	22.0	Yes
Switzerland	8.7	No
United Kingdom	7.9	No
United States	4.8	No

Calculation based on number of immigrants from data set and number of refugees and asylum seekers from *Refugees and Other of Concern to UNHCR: 1999 Statistical Overview*. Switzerland made an agreement with the Schengen area in 2008Ireland and the UK partially participate in the Schengen agreement but have maintained border controls

There has not been a comprehensive treatment of fiscal factor endogeneity in the literature. The *welfare magnet* literature considers income assistance benefits as endogenous, but excludes overall government health and education. The *fiscal factors* literature considers health and education spending as endogenous, but excludes income assistance benefits (see Peridy 2006). We include both as endogenous regressors in our primary regression but also present, for comparative purposes, regressions where income assistance benefits and health/education spending are treated separately as single endogenous regressors. We begin with a discussion of using two-stage least squares (2SLS) in a single endogenous regressor context.

4.1 Estimation with a single endogenous regressor (2SLS)

Two-stage least squares solves the problem of endogenous regressors by creating an instrumental variable for each endogenous regressor in the primary equation that is uncorrelated with the error term. Consider the endogenous regressor for income assistance spending (P) in the Number of Immigrants (M_{sd}) regression; the first stage regression equation

$$P_d = \beta_0 + \beta_1 X_{sd} + \beta_2 B_d + \beta_3 R_d + \beta_4 Z_d + \varepsilon \tag{13a}$$

is estimated using OLS with robust standard errors. The vector of variables X_{sd} is as defined in the previous section.[21] The variables B_d, R_d, and Z_d refer to the unemployment benefits variable, retirement benefits variable and instruments, respectively. The instrumental variables in this equation are the survey questions on the elderly, unemployed and housing. Fitted values $\left(\widehat{P}_d\right)$ are then included in the M_{sd} regression instead of P_d. The second stage equation is then

$$M_{sd} = \delta_0 + \delta_1 X_{sd} + \delta_2 \widehat{P}_d + \delta_3 B_d + \delta_4 R_d + \mu. \tag{13b}$$

Empirical tests confirm the suitability of our choice of instruments for income assistance spending. The instruments are jointly significant (as determined by an F-test, p-value=0.00) in the first stage regression with income assistance spending as the dependent variable. It is reasonable to assume that the instruments (survey results on housing, care for the elderly and unemployed) are not correlated with the number of immigrants (M_{sd}), the dependent variable; however this justification needs to be made on empirical grounds. The most widely accepted test of whether the instruments are correlated with the error term in the primary regression is the Sargan test. The Hausman statistic produced by this test fails to reject the null hypothesis of instrument validity with a p-value of 0.20. All first stage regression results are in Appendix B.

There is a similar issue with estimating the impact of health and education spending (H) on total number of immigrants from the source in the destination country (M_{sd}). For the 2SLS with health and education spending, the following equations are estimated:

$$H_d = \alpha_0 + \alpha_1 X_{sd} + \alpha_2 B_d + \alpha_3 R_d + \alpha_4 Z_d + \varepsilon' \tag{14a}$$

$$M_{sd} = \phi_0 + \phi_1 X_{sd} + \phi_2 \widehat{H}_d + \phi_3 B_d + \phi_4 R_d + \mu \tag{14b}$$

The first stage Eq. (14a) estimates health and education spending using the instruments from the education and health surveys. Both of these factors should impact a country's health and education spending but not be directly related to the number of immigrants. Empirically, these instruments are significant in a joint F-test and also pass the Sargan test.

This approach is also used when estimating regressions with educational level (E_{sd}) as the dependent variable. The equations for analyzing fiscal factors including income assistance spending (P_d) are:

$$P_d = \beta_0 + \beta_1 X_{sd} + \beta_2 B_d + \beta_3 R_d + \beta_4 Z_d + \varepsilon \tag{15a}$$

$$E_{sd} = \delta_0 + \delta_1 X_{sd} + \delta_2 B_d + \delta_3 \widehat{P}_d + \delta_4 R_d + \mu' \tag{15b}$$

The instruments in this equation are the health and education survey variables and the dependency ratio. These variables reflect a country's view on providing services

[21] Note that fiscal variables such as P and H, B, and R are available only for destination countries, hence the d subscript. This is also true of the instruments (Z). The vector X of control variables also contains some variables that are only available for destination countries. Others are differences between values in source and destination countries. Still others pertain to source countries. For convenience we subscript the X variable with *sd*.

for its citizens and should thus impact income assistance spending. However, none should theoretically directly impact the educational level of immigrants. These instruments are significant in a joint F-test and also pass the Sargan test.

The equations for analyzing fiscal factors including health and education spending (H_d) are:

$$H_d = \alpha_0 + \alpha_1 X_{sd} + \alpha_2 B_d + \alpha_3 R_d + \alpha_4 Z_d + \varepsilon' \tag{16a}$$

$$E_{sd} = \delta_0 + \delta_1 X_{sd} + \delta_2 B_d + \delta_3 \widehat{H}_d + \delta_4 R_d + \mu' \tag{16b}$$

The instruments in this case are the unemployment rate among those with only a primary education, and the education survey and health survey variables. It is obvious that these should impact a country's health and education spending, however they should not directly impact the educational composition of immigrants. These instruments are significant in a joint F-test and also pass the Sargan overidentification test.

4.2 Estimation with multiple endogenous regressors (2SLS)

The single endogenous regressor equations discussed above allow us to assess the validity of the endogeneity assumption and proper choice of instruments for income assistance spending and health/education spending separately. However a proper functional specification requires that both income assistance spending and health/education spending be treated as endogenous regressors in the primary regression equation.[22] This suggests a three-equation approach (see 17a–c below).

If there is reason to believe that the error terms are correlated across the three equations, efficiency gains are possible by taking the cross correlations into account in the estimation method (3SLS). If they are not, or if the system of equations is exactly identified as is the case here, then 3SLS is equivalent to an equation-by-equation endogenous application of 2SLS. Hence we use 2SLS to generate predicted values in (17a) and (17b) below and then use the predicted values $\widehat{P}_d$ and $\widehat{H}_d$ in the number of immigrants Eq. (17c).

$$P_d = \beta_0 + \beta_1 X_{sd} + \beta_2 B_d + \beta_3 R_d + \beta_4 Z_d + \varepsilon \tag{17a}$$

$$H_d = \alpha_0 + \alpha_1 X_{sd} + \alpha_2 B_d + \alpha_3 R_d + \alpha_4 Z_d + \varepsilon' \tag{17b}$$

$$M_{sd} = \delta_0 + \delta_1 X_{sd} + \delta_2 \widehat{P}_d + \delta_3 \widehat{H}_d + \delta_4 R_d + \delta_5 B_d + \mu' \tag{17c}$$

A similar three equation system is run with educational levels of immigrants (E_{sd}) as the dependent variable of interest. The system of equations is:

$$P_d = \beta_0 + \beta_1 X_{sd} + \beta_2 B_d + \beta_3 R_d + \beta_4 Z_d + \varepsilon \tag{18a}$$

$$H_d = \alpha_0 + \alpha_1 X_{sd} + \alpha_2 B_d + \alpha_3 R_d + \alpha_4 Z_d + \varepsilon' \tag{18b}$$

$$E_{sd} = \delta_0 + \delta_1 X_{sd} + \delta_2 \widehat{P}_d + \delta_3 \widehat{H}_d + \delta_4 R_d + \delta_5 B_d + \mu' \tag{18c}$$

[22] This is accomplished through using Stata's reg3 command with the 2sls option specified.

5 Results

Discussion of the results will focus on the three-equation systems, as this is the specification which properly accounts for issues of endogeneity. The two-equation systems are included for the purposes of showing how some results can change significantly if one does not utilize the comprehensive three equation model. We first discuss results for the number of immigrants (M_{sd}) analyses from Table 3, and then analyze results of the educational level of those immigrants (E_{sd}) from Table 4.

5.1 Results for analyses of the number of immigrants (M_{sd})

As shown in Table 3, results indicate a number of fiscal factors have a significant impact on the number of source country migrants in the destination countries (M_{sd}), but in some cases the signs run counter to expectations. Income tax effects are negative and significant as expected. The income assistance benefits variable is positive and highly significant, as expected. However, the health/education spending variable is not significantly different from zero, which is unexpected. These results suggest that income assistance spending in the destination country has a larger impact on the migration decision than health and education spending and seems at odds with our hypothesis about eligibility timing. However, if migrants are young, working age people without children, they might not care as much about health or education benefits because of short planning horizons.

The negative sign on retirement benefits may seem counterintuitive, but is in line with our expectations, since most immigrants will not be in a destination country long enough to collect these benefits. Thus, the retirement benefits variable essentially represents a form of taxation, which should discourage migration. It is quite possible that this effect has become less dominant after the 2003 EU Pensions Directive, which aggregated retirement benefits across countries giving EU citizens credit toward their pension eligibility for time lived in other signatory countries (European Parliament 2003). However, this paper's data are from 2000 (prior to the directive), so the effect noted above is not surprising.

The unemployment benefits variable impacts the number of immigrants both directly and indirectly via an interaction term with the educational level. The direct effect is positive and significant as one might expect. However, as educational levels rise, the impact of unemployment compensation on the migration decision diminishes (the interaction variable is negative and significant). This runs contrary to the view expressed in Heitmueller (2005). This is consistent, however, with the view that higher educated immigrants are more likely to secure long-term employment and therefore be less dependent on these benefits. It is also consistent with the hypothesis that higher educated immigrants have better information regarding benefits eligibility than do lower educated immigrants and/or shorter migration timeframes (as unemployment benefits would require a longer timeframe to collect than would health/education spending).

Results for the control variables are mixed. The economic freedom, colonial relationship and source population variables are all positive and significant as expected. Unemployment differences and distance are negative and significant, also as predicted. The larger the real wage differential between destination and source

Table 3 2SLS estimates for number of immigrants (M)

Variables	3 Equation system	Income assist. 2SLS	Health/Educ 2SLS
Dest. income assistance spending (P)	0.3810	−0.4662	–
	(.0533)[c]	(.1106)[c]	–
Dest. health/Educ spending (H)	−0.0072	–	0.4030
	(.0988)	–	(.0801)[c]
Dest. income tax (T)	−0.0396	0.1878	0.0271
	(0.0129)[c]	(.0309)[c]	(.0099)[c]
Dest. unemployment compensation (B)	5.5200	−2.0682	5.2826
	(1.077)[c]	(1.4567)	(1.0811)[c]
Interaction (B[a]EducLevel)	−0.6453	−0.8013	−0.8954
	(.0897)[c]	(.0886)[c]	(.0800)[c]
Dest. retirement compensation (R)	−0.0721	−0.0227	−0.0594
	(.0047)[c]	(.0080)[c]	(.0043)[c]
Colonial relationship	2.7001	4.1270	3.1564
	(.2053)[c]	(.2927)[c]	(0.1908)[c]
Distance	−0.4760	−0.4928	−0.4978
	(.0479)[c]	(.0557)[c]	(.0463)[c]
Dest. freedom	0.1624	−0.1820	0.0068
	(.0237)[c]	(.0462)[c]	(.0090)
Unemployment rate difference	−0.0165	−0.0142	−0.1143
	(.0037)[c]	(.0042)[c]	(.0035)[c]
Wage difference	0.4708	1.6214	0.4651
	(.1510)[c]	(.2039)[c]	(.1533)[c]
Dest. Gini	0.1900	−0.1074	0.1588
	(.0226)[c]	(.0418)[c]	(.0237)[c]
Source population	0.7236	0.7412	0.7158
	(.0220)[c]	(.0255)[c]	(.0213)[c]
Life expectance difference	−0.0582	−0.0727	−0.0555
	(.0048)[c]	(.0056)[c]	(.0048)[c]
Youth population difference	0.0401	0.0357	0.0386
	(.0057)[c]	(.0066)[c]	(.0055)[c]
Schengen	0.0579	0.3817	0.0306
	(0.1514)	(.1777)[b]	(.1473)
Asylum applications accepted (%)	6.8743	12.2514	6.9590
	(0.6749)[c]	(.9357)[c]	(.6858)[c]
Skill-specific visa program	0.7081	0.2305	0.6457
	(0.1720)[c]	(.2076)	(.1671)[c]
Number of observations	1629	1629	1629
F-Statistic	200.35	153.15	221.90
Prob>F	0.00	0.00	0.00

R2 are not reported as they are invalid in 2sls (see Wooldridge 2006). Coefficients shown with standard errors in parentheses. [a], [b] and [c] refers to significance at 10,5 and 1 % level

Table 4 2SLS estimates for average educational level (E)

Variables	3 Equation system	Income assist. 2SLS	Health/Educ 2SLSS
Dest. income assistance spending (P)	0.0079	0.5737	–
	(.0449)	(.0591)[c]	–
Dest. health/Educ spending (H)	0.6200	–	0.4839
	(.0626)[c]	–	(.0785)[c]
Dest. income tax (T)	−0.0149	−0.1072	−0.0009
	(.0123)	(.0175)[c]	(.0099)
Dest. unemployment compensation (B)	−1.5702	2.6721	−2.0221
	(.6188)[c]	(.8240)[c]	(0.4991)[c]
Dest. retirement compensation (R)	−0.0229	−0.0413	−0.0183
	(.0050)[c]	(.0063)[c]	(.0048)[c]
Colonial relationship	−0.0397	−0.7166	−0.0171
	(.2132)	(.2523)[c]	(.1997)
Distance	0.1732	0.2335	0.1927
	(.0504)[c]	(.0582)[c]	(.0495)[c]
Migrant stock	−0.1584	−0.1631	−0.1426
	(.0217)[c]	(.0253)[c]	(.0219)[c]
Dest. freedom	0.1173	0.3621	0.1172
	(.0211)[c]	(.0263)[c]	(.0089)[c]
Unemployment rate difference	0.0108	0.0044	0.0098
	(.0036)[c]	(.0042)	(.0035)[c]
Wage difference	−1.0900	−1.1277	−0.9259
	(.1348)[c]	(.1585)[c]	(.1453)[c]
Dest. Gini	0.1302	0.1624	0.0891
	(.0211)[c]	(.0264)[c]	(.0254)[c]
Source population	0.1112	0.1301	0.1072
	(.0256)[c]	(.0299)[c]	(.0247)[c]
Life expectance difference	0.0213	0.0188	0.0194
	(.0048)[c]	(.0055)[c]	(.0047)[c]
Youth population difference	0.0459	0.0541	0.0464
	(.0057)[c]	(.0066)[c]	(.0054)[c]
Schengen	−0.7200	−0.7726	−0.6718
	(.1500)[c]	(.1757)[c]	(.1464)[c]
Asylum applications accepted	1.5679	2.0000	2.3505
	(.6237)[c]	(.7111)[c]	(.6830)[c]
Skill-specific visa program	0.1180	0.2284	0.0586
	(.1736)	(.2038)	(.1693)
Number of observations	1619	1619	1619
F-Statistic	49.29	37.88	49.15
Prob > F	0.00	0.00	0.00

R2 are not reported as they are invalid in 2sls (see Wooldridge 2006). Coefficients shown with standard errors in parentheses. [a], [b] and [c] refers to significance at 10,5 and 1% level

countries the greater the migration incentive and hence the larger the migrant stock, as predicted. On the other hand, the positive and significant sign on destination inequality variable and the negative and significant sign on the life expectancy differential are both unexpected.[23] In the latter case, this may reflect the idea that individuals in countries with very low life expectancies lack the resources for international migration to developed countries. Likewise, the youth population difference (positive and significant) is also a surprise. It suggests that the younger the population in the destination country (relative to the source country) the greater the migration incentive and hence the outstanding migrant stock. This runs contrary to the view that a larger youth population in the source country is a "push" factor.

The signs on the three policy related variables measuring openness largely conform to expectations. If the source and destination are signatories of the Schengen agreement the outstanding stock of source country migrants in the destination country is larger (although it is insignificant). The larger the percentage of asylum applications accepted, the larger the migrant stock in the destination country. Finally, the presence of a skill-specific visa program provides an incentive to migrate, although one would expect the more interesting impact to be on the educational level of the migrants.

5.2 Results for analyses of the educational level of immigrants (E_{sd})

Table 4 shows that fiscal factors have a significant impact on the educational level of immigrants. The results also appear to support the hypothesis that higher educated immigrants may possess better information regarding the timeframe of receiving benefits and/or a shorter planned migration duration. Results from the three-equation analysis show the health/education spending benefits variable is positive and significant. The income assistance variable is positive but only significant in the two-equation approach. This is inconsistent with the welfare magnet hypothesis. However, it is consistent with the hypothesis that higher educated workers have better information on benefits eligibility and thus realize that in many EU countries income assistance benefits are accessible soon after entry. Unemployment benefits, however, take longer to collect in most countries as they normally require a work history in the destination country for eligibility. Consistent with this hypothesis, the coefficient on the unemployment benefits variable is negative and significant. The retirement benefits variable is also negative and significant, suggesting that highly educated immigrants are not placing high value on retirement benefits (likely because of their long-timeframe to eligibility) and/or viewing the accompanying payroll taxes negatively.[24] For the most part, these results are consistent with the view that benefits have differential impacts on the migration decision depending on the eligibility time

[23] An alternative specification (results on request) included inequality squared to test if this would change the unexpected sign, as suggested by Borjas (1987) and Peridy (2006), but it did not.

[24] Note the caveat mentioned earlier about the European Parliament directive (2003) aggregating pensions after 2003. Our data is, however, prior to that directive.

and hence the perceived probability that the migrant receives them. The income tax variable is negative, as expected, but only significant in the two equation approach. Taken together, this set of results indicates a more sophisticated view of the welfare magnet hypothesis. Rather than expecting government benefits to have a negative impact on the educational levels of immigrants, the impact is shown to vary based on the types of benefits being considered.

The results also suggest that the educational level of immigrants rises with the cost of migration. Migrant stocks are negative and significant. The more familiar the destination environment is, the lower the cost of migrating and the lower is the educational level of migrants on average. Consistent with this reasoning, the colony variable is also negative. However, it is only significant in the two-equation approach. The distance variable is positive and significant, as expected. Immigrants with higher educational levels can expect a higher financial return (in absolute terms) from migration and will have more resources (pre-migration) which allow them to pay a higher cost of migration. The lower cost of the Schengen agreement also appears to lower education levels of immigrants, as this variable is consistently negative and significant. The destination economic freedom variable is positive and significant, as expected. Higher educated immigrants expect a higher return from a more market-based system. There are no predictions regarding the other control variables.

Overall, the results suggest a strongly significant impact of government tax and spending policies on both the number and composition of immigrants. Interestingly, policies such as generous unemployment benefits increase the overall size of immigration stocks and lower their educational level. Health and education spending, however, increases the educational level of the migration stocks but has no significant impact on its size. For countries interested in attracting substantial numbers of highly educated immigrants, it appears that health and education spending may be part of a successful strategy. Inconsistent with the welfare magnet hypothesis, income assistance spending is not found to have a negative impact on the educational level of immigrants, after other government programs are taken into account.

6 Conclusions

The impact of government spending programs on immigration has become a topic of increased research and policy interest. The results of this paper can shed additional light upon this issue. The analysis shows the issue to be more complex than either a welfare magnet or fiscal factors approach. We find that certain government programs, such as income assistance and unemployment compensation have strong, positive impacts on the number of immigrants; while other programs such as retirement compensation and income taxes have a negative impact.

Concerning the average education level of immigrants, we find that certain government programs such as health and education spending actually have a positive impact on educational levels. However, other government programs such as unemployment and retirement benefits negatively impact educational levels. While the

subject of much study, income assistance spending may be insignificant with regards to the educational level, once these other government programs are taken into account. These results suggest that immigrants are discriminating among government benefits. Obviously, these results are subject to the timeframe being studied and the data available. However, these results do suggest it may be more than the size of a country's government (or whether it is a "welfare state") that matters in attracting immigrants of a desired educational level; the structure of benefits also matters. In particular, these results indicate that countries may not be able to independently target both the number of immigrants and domestic social policy goals.

These results are particularly important for countries in Western Europe as new entrants into the EU experience delayed, but eventually free, labor mobility. Future EU entrants (after Croatia) may receive more permanent limits on labor mobility. As the European Union expands, it continues to let in poorer countries. The 10 Eastern European countries that joined the EU in 2004 were poorer than the current 15 Western European members; Romania and Bulgaria joined in 2007 and were poorer than those who joined in 2004. Prospective member Turkey would be the most populous EU member, and its poorest. As new, poorer countries join the EU and immigration restrictions are phased out, the impact of government programs on immigration will become an essential policy issue for governments in the European Union. Results of studies such as the one here can be helpful to governments trying to manage their budgets in the face of increasing immigration, while at the same time providing essential services to their citizens.

Appendix A–Instrument survey questions

Five of the instruments are based on survey questions. ISSP survey questions as a predictor of attitudes on public expenditure programs has precedence in the work of Mazzaferro and Zanardi (2008). These questions are on the topics of education, care for the elderly, health, housing and unemployment compensation. These survey instruments were chosen because they would be directly related to the income assistance and health/education spending variables but not to the number or composition of immigrants. These are cross-country survey questions, administered in a yes/no format. The variable values are the percentage of "yes" answers to each question. The text of the questions are:

a.) Is it the responsibility of the government to provide free education to all people?
b.) Is it the responsibility of the government to provide care and support for the elderly?
c.) Is it the responsibility of the government to provide health care for all people?
d.) Is it the responsibility of the government to ensure adequate housing for all people?
e.) Is it the responsibility of the government to provide a decent standard of living for the unemployed?

Appendix B–First stage results

Table 5 First stage regression results

Endogenous regressor. Variables	Educational level (E)		Migration stock (M)	
	2SLS Income assist	2SLS Health/Educ	2SLS Income assist	2SLS Health/Educ
Dest. health assistance spending (P)	–	–	–	–
	–	–	–	–
Dest. health/Educ spending (H)	–	–	–	–
	–	–	–	–
Dest. income tax (T)	0.2364	0.0381	0.2819	0.0479
	(.0073)[c]	(.0081)[c]	(.0092)[c]	(.0060)[c]
Dest. unemployment compensation (B)	−7.1783	−1.6163	−11.1199	−5.8761
	(.4449)[c]	(.3556)[c]	(1.0761)[c]	(.7041)[c]
Interaction term (B[a]educflow)	–	–	0.0657	0.3681
	–	–	(.0843)	(.0564)[c]
Dest. retirement compensation (R)	0.0521	0.0387	0.0504	0.0368
	(.0041)[c]	(.0036)[c]	(.0050)[c]	(0032)[c]
Colonial relationship	0.8190	0.2238	1.5662	0.5432
	(.1873)[c]	(.1549)	(.1969)[c]	(.1463)[c]
Distance	−0.0234	0.1085	−0.0181	0.0113
	(.0451)	(.0373)[c]	(.0482)	(.0361)
Migrant stock	0.1085	0.1062	–	–
	(.0188)[c]	(.0159)[c]	–	–
Dest. freedom	−0.3460	0.0418	−0.3846	0.0189
	(.0102)[c]	(.0086)[c]	(.0100)[c]	(.0088)[c]
Unemployment rate difference	0.0031	−0.0075	0.0031	−0.0098
	(.0032)	(.0027)[c]	(.0036)	(.0027)[c]
Wage difference	0.8050	0.9258	1.3484	1.0244
	(.1110)[c]	(.0909)[c]	(.1190)[c]	(.0902)[c]
Dest. Gini	−04418	−0.3737	−0.3893	−0.3092
	(.0162)[c]	(.0180)[c]	(.0170)[c]	(.0132)[c]
Source population	−0.0555	−0.0246	0.0111	0.0402
	(.0229)[c]	(.0191)	(.0220)	(.0164)[c]
Life expectance difference	−0.0129	−0.0123	−0.1960	−0.0204
	(.0043)[c]	(.0036)[c]	(.0046)[c]	(.0034)[c]
Youth population difference	−0.0274	0.0021	−0.0111	−0.0011
	(.0051)[c]	(.0042)	(.0058)[a]	(.0042)

Table 5 (continued)

Endogenous regressor. Variables	Educational level (E)		Migration stock (M)	
	2SLS Income assist	2SLS Health/Educ	2SLS Income assist	2SLS Health/Educ
Schengen	0.6124	0.3222	0.3544	0.3808
	(.1341)[c]	(.1112)[c]	(1497)[c]	(.1120)[c]
Asylum applications accepted	4.5848	2.9969	7.1162	3.4051
	(5360)[c]	(.4612)[c]	(.6662)[c]	(.4379)[c]
Skill-specific visa program	−0.1305	−0.4967	−0.5157	−0.5655
	(.1584)	(.1368)[c]	(.1755)[c]	(.1286)[c]
Housing ratio (Instrument)	–	–	−1.8770	–
	–	–	(.2123)[c]	–
Health survey (Instrument)	1.4222	2.0576	–	1.9221
	(.1460)[c]	(.1259)[c]	–	(.122o)[c]
Elderly survey (Instrument)	–	–	0.9467	–
	–	–	(.1641)[c]	–
Unemployed survey(Instrument)	–	–	−0.3375	–
	–	–	(.2849)	–
Dependency ratio (Instrument)	22.7479	–	–	–
	(1.2703)[c]	–	–	–
Primary unemployment rate (Instrument)	–	−0.3722	–	–
	–	(.0185)[c]	–	–
Education survey (Instrument)	−3.5147	−1.0109	–	−0.1741
	(.3108)[c]	(.3304)[c]	–	(.2560)

R2 are not reported as they are invalid in 2sls (see Wooldridge 2006). Coefficients shown with standard errors in parentheses. [a], [b] and [c] refers to significance at 10,5 and 1% level

Appendix C–Results with additional variables

By adding three additional variables, we attempted to gain further insight into fiscal effects. The first two variables were property and sales taxes in the destination country as a percentage of GDP. These are measured using tax revenues from all levels of government. The property and sales tax variables are taken from the *OECD Tax Revenue Statistics* and *OECD Consumption Tax Trends*, respectively (OECD 2005a, 2012). The motivation behind these variables is that immigrants may respond differently to varying types of taxes. Taxes can be collected and services provided at different levels of government. Some countries use a federal (versus unitary) system of government that allows for more tax and spending decisions to be made at sub-national levels of government. Thus, we created a dummy variable equal to one for those eight destination countries in our sample that use a federal system of government. The federal system countries are Australia, Austria, Belgium, Canada, Germany, Spain, Switzerland and the United States (Forum of Federations 2012).

Results are robust to the inclusion of the new variables although there are a few changes worth noting. For the number of immigrants analysis, including the new

variables causes the coefficients on the income tax, Gini coefficient and skill-based visa program to become insignificant. The new property tax variable is insignificant in the number of immigrants regression but the sales tax is negative and significant. The federal system is also negative and significant. There are no significant changes in the impact of government spending programs in this regression.

For the educational level analysis, the property tax and federal variables are both positive and significant and the income tax variable also becomes positive. The sales tax variable is insignificant in this case. Income assistance programs become negative and significant, which was expected by the model but not found in the paper's main results. Interestingly, both economic freedom and income inequality (Gini coefficient) change from being positive to negative. The asylum variable becomes insignificant.

These unexpected changes raised our suspicions about multicollinearity. The VIF statistics for the results in the body of the paper were quite low (1.5–2.7) but for this supplemental analysis were rather high (1.2–8.8) suggesting the presence of significant multicollinearity. Further explanatory regressions uncovered complex relationships involving these new variables. Specifically, it was found that countries with higher economic freedom scores and/or higher rates of income inequality were significantly more likely to have higher property taxes and low sales taxes. Federal systems were more likely to have both lower property and lower sales taxes. It is likely that these relationships are the source of the increased multicollinearity. Due to the multicollinearity issue, one should use caution in interpreting these results.

Table 6 Results with additional tax and federalism variables

Variables	Average educational level (E)	Number of immigrants (M)
Dest. Income assistance spending (P)	−0.5732	0.2579
	(.0798)[c]	(.0783)[c]
Dest. health/Educ spending (H)	0.7557	0.0000
	(.0763)[c]	(.1109)
Dest. sales tax	0.1613	−0.7442
	(.0952)	(.0874)[c]
Dest. property tax	1.1023	−0.0162
	(.1401)[c]	(.1455)
Dest. income tax (T)	0.1217	−0.0183
	(0.0164)[c]	(.0151)
Dest. unemployment compensation (B)	−6.6419	6.5537
	(.7732)[c]	(0.9740)[c]
Interaction (B[a]EducLevel)	–	−0.7634
	–	(.0963)[c]
Dest. retirement compensation (R)	−0.0110	−0.0404
	(.0046)[b]	(.0049)[c]
Colonial relationship	0.2944	3.1385
	(.1870)	(.1846)[c]

Table 6 (continued)

Variables	Average educational level (E)	Number of immigrants (M)
Distance	0.2058	−0.5288
	(.0448)[c]	(.0446)[c]
Dest. freedom	−0.1873	−0.0805
	(.0389)[c]	(.0377)[b]
Unemployment rate difference	0.0079	−0.0183
	(.0032)[b]	(.0034)[c]
Wage difference	−0.6412	0.1373
	(.1261)[c]	(.1364)
Dest. Gini	−0.1213	−0.0157
	(.0198)[c]	(.0212)
Source population	0.1052	0.7395
	(.0228)[c]	(.0202)[c]
Life expectance difference	0.0144	−0.0605
	(.0042)[c]	(.0044)[c]
Youth population difference	0.0438	0.0358
	(.0050)[c]	(.0053)[c]
Schengen	−0.4492	0.0685
	(.1328)[c]	(.1381)
Asylum applications accepted (%)	−1.1560	6.8771
	(0.7681)	(.9011)[c]
Skill-specific visa program	0.2710	−0.0490
	(0.1805)	(.1967)
Dest. federalism dummy	0.4982	−0.6951
	(.1898)[c]	(.1710)[c]
Migrant stocks	−0.1265	–
	(0190)[c]	–
Number of observations	1619	1629
F-Statistic	54.86	205.61
Prob>F	0.00	0.00

R2 are not reported as they are invalid in 2sls (see Wooldridge 2006). Coefficients shown with standard errors in parentheses. [a], [b] and [c] refers to significance at 10,5 and 1% level

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