The Skill Composition of Immigrants and the Generosity of the Welfare State: Free vs. Policy-Controlled Migration

Alon Cohen* and Assaf Razin†

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Abstract

The paper analyzes the effect of welfare state generosity on the skill composition of immigrants. Using a theoretical parsimonious model, we argue that such effect can be divided into two: the supply- and the demand-side effect. The supply-side captures the effect of welfare generosity on the considerations of potential migrants. The demand-side captures the effect of welfare generosity on the immigration policy of the host country. Plausibly, both effects contradict each other: welfare generosity deters high-skilled immigrants and attract low-skilled immigrants; on the other hand, it induces the host country to prefer high-skilled over low-skilled in their immigration policy. Separating

*Tel-Aviv University

†Tel aviv University, Cornell University, CEPR, NBER.

the welfare migration effect into both its components, therefore, may account for some incoherency in the literature in that regard. We further argue that the supply-side effect is dominant if migration is free, whereas the demand-side is dominant if migration is policy-controlled. We examine our hypothesis using immigration data in the EU, separated by their origin (EU and non-EU), which conforms to free and policy-controlled migration regimes, respectively. Using the legal origin of the host countries as instrumental variable for welfare benefits, and the exogeneity of the separation into EU and non-EU countries, we find support for our main argument.

1 Introduction

The idea that immigrants are attracted to the welfare state because of its benefits, in the form of social security, education, family aid etc., is well known. A generous welfare program serves as a magnet to foreigners ("welfare migration"). Empirical works addressing international migration normally support that notion, but not always. Furthermore, the question of whether welfare migration effect is coherent across skill level, is much less examined. The few works relating to that question are somewhat inconsistent with each other. This work argues that such inconsistency may be the result of opposite effects that are embedded within the welfare migration effect. Specifically, welfare-state benefits affect both the considerations of potential immigrants (the supply-side) but also the considerations of the politicians of the host country, regarding the immigration policy (which we refer to as the "policy-demand"-side). These effects may set off each other to some degree, which

can explain this relative inconsistency.

We present a parsimonious model that explains both effects:

Consider first the supply-side effect, which accounts for the motivations of potential migrants in source countries. Generous benefits of the welfare state may increase the volume of migrants. However, while low-skilled individuals indeed are attracted to a generous welfare state, high-skilled individuals are deterred thereby. A low skilled immigrant opts for the country with generous benefits, as he is a net beneficiary of the tax-benefits scheme. Other things being equal, a high skilled immigrant opts for the country with moderate benefits, as he is a net contributor to the tax-benefits scheme.

This argument is the conventional one. It is also supported by Borjas (****) self-selection theory. Countries with generous welfare system are more egalitarian than countries with moderate welfare system. Namely, the post-tax returns to skills are more disperse within countries with moderate welfare systems, thus its immigrants are expected to be positively selected. On the other hand, countries with generous welfare system, and thus, less dispersed returns to skills are expected to attract negative selection of immigrants. Hence, the skill composition of immigrants, in equilibrium, should be adversely affected by the welfare generosity of host countries.

Consider now the determination of immigration policy in the host country (the so called "policy demand-side"). In a generous welfare state high taxes are required. It inflicts a fiscal burden upon the high-skilled workers of the host country. Therefore, the domestic voters (especially the high-skilled) support the admission of additional immigrants on skill-selection basis. Skill-selection immigration policy mitigates the fiscal burden.

For example, an impetus for relaxing migration restrictions by European Union member states, towards other countries, is that birth rates dwindle and life expectancy goes on rising in Europe. Consequently, EU native born population is both declining and ageing. A declining productive workforce needed to finance the increased economic burden of the costly welfare-state institutions, puts a downward pressure on output growth. One alternative is to adopt more liberal migration policies, especially towards skilled migrants, solidifying the financial soundness of the welfare state. Unskilled migrants, in contrast, which are usually heavy users of the benefits of the welfare state, may put further strains on the welfare state. Therefore, voters in an ageing welfare state may opt for a migration policy which will be more liberal and also upgrade the skill composition of migration.[1] Therefore, the skill composition of immigrants, in equilibrium, is (weakly) positively affected by the welfare generosity of host countries.

Clearly, this simple intuition suggests that the policy demand- and supply-side effects of welfare generosity on the skill composition of immigrants, are opposite. We further argue that different migration regimes are each dom-

[1]The Financial Times puts it sucsinctly: "Over the next 10 years Germany faces a demographic disaster and immigrantion could be part of the solution. As the birth rate dwindles and life expectancy goes on rising, the country's population is both declining and ageing. Unless this double-whammy is confronted head-on, the economy will collapse under the weight of an expensive welfare state that lacks the productive workforce to finance it. Something has to be done – and fast – as Germany's leaders and parts of its economic elite are finally realising. And now they have come up with a last-ditch plan to avert meltdown: a plan designed to harness the untapped resources of its migrant community, whose youth, ambition and skills Germany needs to keep its economic engine running." (FT June 27, 2008). See also Brucker et al (2001).

inated by a different effect of the two. Consider the "free migration" and "policy-controlled migration" regimes:

Free migration means that all individuals can freely move into the host country, reside, work and retire there. The European Union is an example of such regime (especially with respect to the original EU-15 countries). EU members, in general, are obligated by international treaties to enable free entrance to any individual originated in other EU country. Freedom of movement, and the ability to reside and work anywhere within the EU, are one of the fundamental rights to which member states of the EU are obligated towards each other.[2]

Policy-controlled migration is exercised between any pair of countries that are not obligated to free migration. Immigration quota is one sort of such policy. Another sort, which becomes increasingly popular, is quality-selection migration policy. The host country screens out less desirable immigrants. Immigrants with high skills and education are preferred over immigrants with low skills and education. Quality-selection immigration policy is well established in Australia, New Zealand and Canada. The U.S. has also adopted such rules in 1990, as well as in a growing number of EU countries, including

[2]Despite the legal provision for the free movement of labor among EU-15 (the old member countries), the level of cross-border labor mobility is low. Reasons cited for this include the existence of legal and administrative barriers, the lack of familiarity with other European languages, moving costs, inefficient housing markets, the limited portability of pension rights, problems with the international recognition of professional qualifications and the lack of transparency of job openings. The expansion of the EU to 25 member states in May 2004, was accompanied by concerns over the possibility of a wave of migration – particularly of the low-skilled – from the then ten new member states to the EU-15.

France, Ireland and the UK (Docquier and Marfouk (2006)).

Why such a distinction is of crucial importance to the analysis of welfare migration? The "free migration" regime enables each person free entrance to the host country. Therefore, the political considerations of the host country are less relevant. Thus one can expect the considerations of the potential immigrants, namely, the supply-side effect, to dominate. The "policy-controlled" migration regime can be construed as determining simple quotas for differently skilled immigrants. Therefore the considerations of the immigrants are less relevant. Thus one can expect the considerations of the host country, namely, the "policy demand-side", to dominate.

Consequently, welfare state policy should have a negative effect on the skill composition of immigrants under the free migration regime. On the other hand, welfare state policy should have a (weak) positive effect on the skill composition of immigrants under the policy-controlled regime. Pooling together both effects distorts the estimation of the welfare state generosity effect on the skill composition of immigrants. Separating between both migration-regimes, however, enables a more accurate understanding of that effect.

We confront the predictions of this theoratical argument with a cross section data of source-host developed country pairs[3]. We use the international immigration dataset introduced by Docquier and Marfouk (2006). It contains stocks of immigrants by the year 2000, based on census and register data. Immigrants are at working age (25+), defined as foreign born,

[3]We restrict attention to OECD countries in order to get a relatively homogeneous classification of skill levels.

subdivided into three classes of education level: low (0-8 schooling years), medium (9-12 schooling years) and high (13+ schooling years). The data is decomposed into two groups. Group A contains only source-host pairs of countries which enable free mobility of labor between them. Any kind of discrimination between native born and immigrants, regarding labor market accessibility and welfare-state benefits eligibility, is prohibited. These are 16 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, U.K., Norway and Switzerland. Group B includes only source-host pairs of countries within which the source country residents cannot freely move, work and get benefits in either of the host countries. The host countries are the same 16 countries as in group A. The source countries are 10 developed countries: U.S., Canada, Japan, Australia, New Zealand, Israel, Taiwan, Hong Kong, Korea and Singapore.

This decomposition is vital to identifying the effect of (pre-determined) welfare-state benefits, on the skill composition of immigrants:

1. Immigration within group A is free, which isolates the effect of welfare on the considerations of the potential immigrants (the "supply-side effect").

2. Immigration within group B is controlled by policies of the host countries. This assumption isolates the effect of welfare on the considerations of the host country (the "policy demand-side effect").

3. The decomposition into groups A and B is exogenous to the skill composition of immigrants. This assumption relies on the fact that this categorizing reflects the history of the EU establishment, since the post-WWII treaties. It is safe to assume that these agreements were not signed

with regard to the skill composition of their future immigrants. Hence, the difference between the estimated parameter within group A and group B can also be identified.

Our findings match the predictions of the theory. We observe a negative and significant impact of the welfare-state benefits over the skill composition of immigrants, when estimation is restricted to group A. We also observe that the effect of welfare is significantly higher in group B, but not significantly different than zero. These results repeat in several estimations, either with high- versus low-skilled, or, with medium- versus low-skilled. It is also robust to different specifications of control variables.

In order to account for possible endogeneity of the welfare-benefits measure, we use the legal origin of the host country as an instrumental variable. Legal origin classifies our country-sample into several groups: countries whose system relies on the English common law, the continental system (French-German origin) and the Scandinavian system. Arguably, such classification is not correlated with our dependent variable, the skill composition of immigrants. Nevertheless, the legal system indicates some cultural features of the countries. Among other things, it reflects basic constitutional notion regarding the attitude towards property rights on the one hand, and social rights on the other hand. Hence, there is a strong correlation between the legal origin and the welfare benefits in these countries. The IV estimation further validates our hypothesis.

The remaining of the paper is organized as follows. Section 2 describes related literature, focusing on empirical evidence for welfare migration. Section 3 develops a parsimonious model of the welfare state and migration,

divided into two alternative migration-regimes: free and policy-controlled. Section 4 discusses empirical evidence from the literature, focusing on the interaction between international migration and the welfare state. Section 5 concludes.

2 Empirical Evidence on Welfare Migration

Empirical evidence, addressing internal U.S. migration supports the welfare migration phenomenon[4]. Southwick (1981) shows that high welfare-state benefit gap, between the origin and destination regions in the U.S., increases the share the welfare-state benefit recipients among the migrants. Gramlich and Laren (1984) analyze a sample from the 1980 U.S. Census data and find that the high benefit regions have more welfare recipients' migrants than the low-benefit regions. Using the same data, Blank (1988) employs a multinomial logit model to show that welfare benefits have a significant positive effect over the location choice of female-headed households. Walker (1994) uses the 1990 US Census data and finds strong evidence in support of welfare-induced migration. Similarly, Enchautegui (1997) finds a positive effect of welfare benefits over the migration decision of women with young children. Meyer (2000) employs conditional logit model as well as the comparison-group method to analyze the 1980 and 1990 U.S. Census data. He finds significant welfare induced migration, particularly for high school dropouts. Borjas (1999), who uses the same data set finds that low skilled migrants are much more heavily clustered in high benefit states, in comparison to other

[4]Brueckner (2000) provides a review of empirical studies regarding welfare migration.

migrants or natives. Gelbach (2000) finds strong evidence of welfare migration in 1980, but less in 1990. McKinnish (2005, 2007) also finds evidence for welfare migration, especially for those who are located close to state borders (where migration costs are lower). Levine and Zimmerman (1999) are somewhat exceptional. They employ data for the period 1979-1992, and estimate a probit model find that welfare benefits have only little effect on the probability of female-headed households (the recipients of the benefits) to relocate.

International migration studies exhibit mixed results. Pedersen at el. (2004) find that the tax revenue - GDP ratio (which is a proxy for welfare benefits generosity) is negatively correlated with immigration flows from 129 countries of origin into 27 OECD countries. To the contrary, Peridy (2006) studies migration rates in 18 OECD host countries from 67 source countries. He finds that the host-source ratio of total public spending has a significant positive effect on migration. Leblang et al. (2007) also show that government spending has a positive effect on immigrants into 26 OECD countries from 128 countries of origin, during 1985-2004. Restricting migration analysis only to the EU-15 countries, however, indicates negative but insignificant effect of government expenditure over migration. Warin and Svaton (2008) explores migration flow into 14 EU countries, from 76 countries of origin, clustered by groups. They find that migrants from the EU-15, Central and Eastern European countries and the deveoping countries are all attracted to welfare benefits, as measured by total social protection expenditure per capita. Disaggregating social expenditure yields significant result only for the intra-EU migration: old age benefits attracts migrants but family aid

benefits deters migrants.

De Giorgi and Pellizzari (2006) conduct an empirical investigation of migrants from outside the EU-15 into them. Using the conditional logit approach, they find that welfare-state benefits attract migrants. When interacted with the education level, welfare benefits show also a positive effect on the probability of the lowest group of education; whereas probabilities of the secondary and tertiary education groups are not significantly affected.[5] Docquier at el. (2006) study the determinants of migration stocks in the OECD countries in the year 2000, where the migrants from 184 countries are classified according to three education levels.[6] They find that the social welfare programs encourage the migration of both skilled and unskilled migrants. However, the unskilled are motivated by social expenditure much more than the skilled. Thus they claim that the skill composition of migrants is adversely effected by the welfare-state benefits.

These mixed results can be a result of several identification problems. An obvious one would be reverse causality between welfare-state benefits and immigration flows. Razin et al. (1998) find that the fiscal leakage effect caused by immigrants, may result in lowering the scope of welfare generosity. Another identification problem may be the result of the opposite effects of the

[5] Welfare-benefits, for that matter, are defined as monthly benefit received by a typical 40 years old person who has continuously worked and paid contributions since the age of 18, averaged over 60 months of non-employment, two earning levels relatively to the average production worker and three types of family status. The results are robust to replacing the welfare benefits measure with public expenditure on unemployment related benefits.

[6] The data used in Section 4 is extracted from the same database which is used in Docquier et al. (2006).. The database is presented in Docquier and Marfouk (2006).

demand and supply side. As described in the introduction, such effects can be separated within different types of migration policies: "free migration" and "policy-controlled migration". This means that the studies of migration between states within the U.S. (such as Borjas (1999), for example), which are evidently confined to a single migration regime (namely, free migration), can produce unbiased results - but only for the supply-side effect of the welfare migration effect. Other studies, that refer to both migration regimes, without controlling for them, are not easily interpretable because they convey a mixture of information on migration policies in the host country, and on the individual migrant's migration choices in the source country.

3 Parsimonious Model of Migration

Assume a Cobb-Douglas production function, with two labor inputs, skilled and unskilled[7]:

$$Y = AL_s^{\alpha} L_u^{1-\alpha},\ 0 < \alpha < 1 \tag{1}$$

where Y is the GDP, A denotes a Hicks-neutral productivity parameter, and L_i denotes the input of skilled and unskilled labor i, where $i = (s, u)$.

The competitive wages of skilled and unskilled labor are, respectively

$$\begin{aligned} w_s &= \alpha Y / L_s \\ w_u &= (1-\alpha)\, Y / L_u \end{aligned} \tag{2}$$

Aggregate labor supply, for skilled and unskilled workers, respectively, is

[7] The parsimonious model is developed with the cross-section data is mind. The migration variable is the stock of migrants; not flows (as relevant for dynamic analysis).

given by:

$$L_s = (s + \sigma\mu)\, l_s \tag{3}$$
$$L_u = (1 - s + (1 - \sigma)\, \mu)\, l_u$$

There is a continuum of workers, where the number of native born is normalized to 1; s denotes the share of native born skilled in the total native born labor supply; σ denotes the share of skilled migrants in the total number of migrants; μ denotes the total number of migrants; and l_i is the labor supply of an individual with skill-type i.

Total population (native born and immigrants) is:

$$N = 1 + \mu \tag{4}$$

We specify a simple welfare-state system which levies a proportional labor income tax of the rate τ, with the revenues redistributed equally to all residents (native born and migrants alike), as a demogrant, b, per capita. The demogrant captures not only a cash transfer but also outlays on public services such as education, health, etc., that are distributed to all workers, regardless of their contribution to the tax revenues.

The government budget constraint is:

$$Nb = \tau Y \tag{5}$$

The utility function for skill-type i is:

$$u_i = c_i - \frac{\varepsilon}{1 + \varepsilon} l_i^{\frac{1+\varepsilon}{\varepsilon}} \tag{6}$$

where c_i denotes consumption of an individual with skill-type i, and $\varepsilon > 0$.

The individual budget constraint is:

$$c_i = b + (1-\tau)\, l_i w_i \tag{7}$$

Individual utility maximization yields the labor supply equation:

$$l_i = \left(w_i\,(1-\tau)\right)^{\varepsilon} \tag{8}$$

It is then straightforward to calculate the equilibrium wages:

$$w_s = A\left(\alpha\widehat{\alpha}^{\varepsilon}\theta^{1-\alpha}\right)^{\frac{1}{1+\varepsilon}} \tag{9}$$

$$w_u = A\left((1-\alpha)\,\widehat{\alpha}^{\varepsilon}\theta^{-\alpha}\right)^{\frac{1}{1+\varepsilon}}$$

$$\text{where: } \widehat{\alpha} \equiv \alpha^{\alpha}\,(1-\alpha)^{1-\alpha}\,;\ \theta \equiv \frac{1-s+(1-\sigma)\,\mu}{s+\sigma\mu}$$

To guarantee that $w_s > w_u$, we assume:

$$\frac{\alpha(1-s)}{(1-\alpha)(s+\mu)} > 1 \tag{10}$$

3.1 Policy-Controlled Migration

Assume that the host country faces a perfectly elastic supply of migrants of each one of the two skill types, so that host-country migration policy is the sole determinant of migration flows. The policy is determined by the majority of the voters in the host country .We assume that the policy decisions on the tax rate, τ, and the total volume of migration, μ, are exogenous. We do this in order to focus the analysis on a single endogenous policy variable, the skill composition of immigrants, σ. Note that once the policy variables σ, μ, τ are determined, then the demogrant, b, is given by the budget constraint; we thus denote the demogrant b as $b(\sigma;\tau)$; where the exogenous variable μ is suppressed.

The indirect utility of an individual with skill level i is given by:

$$V_i(\sigma;\tau) = \tag{11}$$
$$= b(\sigma;\tau) + (1-\tau)\, l_i(\sigma;\tau)\, w_i(\sigma;\tau) - \frac{\varepsilon}{1+\varepsilon} l_i(\sigma;\tau)^{\frac{1+\varepsilon}{\varepsilon}}$$
$$= b(\sigma;\tau) + \frac{1}{1+\varepsilon} l_i(\sigma;\tau)^{\frac{1+\varepsilon}{\varepsilon}}$$

Differentiating Equation (10) with respect to σ, and employing the envelope theorem, yields[8]:

$$\frac{dV_i(\sigma;\tau)}{d\sigma} = \frac{db(\sigma;\tau)}{d\sigma} + (1-\tau)\, l_i(w_i(\sigma;\tau)) \frac{dw_i(\sigma;\tau)}{d\sigma} \tag{12}$$

Thus, a change in the share of skilled migrants in the total number of migrants, σ, affects the utility level through two channels. First, an increase in σ raises average labor productivity and thereby tax revenues. This, in turn, raises the demogrant, b. Second, an increase in σ, which raises the supply of skilled labor relative to the supply of unskilled labor depresses the skilled premium in the labor market, w_s/w_u.

We assume that only the native born is eligible to vote about migration policy. If the decisive voter is unskilled, both of the above effects are positive. Thus, an unskilled voter would like to set the skill-composition of migrants at a corner solution, $\sigma = 1$. If the decisive voter is skilled, however, the two effects are conflicting: an increase in σ raises b but lowers w_s. Thus the derivative in equation (12) is equated to zero by the skilled worker at a level of σ below one. This means that the share of skilled migrants preferred by a skilled voter must be lower than the share of skilled immigrants preferred by an unskilled voter. Defining σ^i as the share of skilled immigrants most

[8] We assume that second order condition for maximization holds.

preferred by a skill-type i individual, where $i = s, u$,we get:

$$\sigma^s < \sigma^u = 1$$

Our goal is to find the effect of the change in the generosity of the welfare state on the migration policy concerning σ. The generosity of the welfare state, captured by the demogrant, b, depends on the tax rate, τ (as the economy is assumed to be on the "right side" of the Laffer curve). We can readily show that:[9]

$$\frac{d\sigma^u}{d\tau} = 0; \frac{d\sigma^s}{d\tau} > 0 \tag{13}$$

This means that an exogenous increase in the tax rate, τ, would leave the skilled-only migration policy unchanged, if the decisive voter is an unskilled worker. It is simply because the unskilled median voter prefers only skilled immigrants regardless of the level of τ. If, however, the decisive voter is a skilled worker, an exogenous increase in the tax rate, τ, must change the policy concerning the skill-composition of migrants in the direction toward a larger share of skilled immigrants. The reason is that when the tax rates rise, the redistribution burden upon a skilled decisive voter increases, and allowing an additional skilled migrant can ease this fiscal burden.

3.2 Free Migration

Assume now that no restrictions are placed on migration by the policy makers in the host country. In choosing whether to migrate or not, a potential migrant of skill i compares his prospect utility, V_i, in the migration destination, to the reservation utility, denoted by u^i, in the source country.

[9]Fo detailed derivations, see Appendix A.

There is a continuum of potential migrants, different with respect to the reservation utility level in the source country. This heterogeneity of reservation utilities in the source country stems for different traits of the potential migrants (e.g., family size, age, moving costs, forms of portable pensions, housing, cultural ties, etc.). Thus the host country faces an upward sloping supply curve, $u_i(m_i)$, where m_i denotes the number of immigrants of skill-type i (thus $\sigma = \frac{m_s}{m_s+m_u}$).

In equilibrium, the immigration stocks for both skill-types, (m_s, m_u), are determined by:

$$V_i(m_s, m_u; \tau) = u_i(m_i), \; i = s, u \tag{14}$$

We now turn to find the effect of the generosity of the welfare state on the skill mixture of the immigrants. We show in the appendix that under simple conditions, skilled immigrants are deterred by higher taxation, whereas unskilled immigrants are attracted thereby. The intuition is simple: the main effect is the direct effect of taxes on their returns. High-skilled are net contributors to the tax-welfare scheme. Hence marginal increase of taxation reduces their returns. The opposite holds for the unskilled. Given this notion, clearly:

$$\frac{d\sigma}{d\tau} < 0 \tag{15}$$

In sum, an exogenous increase of the tax rate, τ, deters skilled immigrants and attracts unskilled immigrants. The supply-side effect of welfare generosity, therefore, over the skill composition of immigrants, is on the negative.

3.3 Testable Hypotheses

The main prediction of the parsimonious model relates to the differet effects of welfare benefits on the skill composition of immigrants. The policy demand-side reflects a negative effect and the supply-side bears a non-negative effect. In reality, naturally, it may be that both the policy demand- and supply-side effects exist. That is, a positive shock to the welfare generosity may induce that country to "demand" more skilled immigrants to alleviate its increased fiscal burden; however, on the other side, it may deter high-skilled immigrants (and attract low-skilled immigrants) for the very same reason. These conflicting effects may account for the mixed results in the empirical welfare migration literature.

When migration is completely free, the ability of host countries to control immigration flows, as well as their skill composition, is limited. Namely, immigration rates and skill composition are determined by the considerations of the immigrants themselves. Therefore, we argue that given such regime the supply-side effect dominates. However, when migration is controlled by policy, for instance, using qoutas or quality selection policies, the considerations of the immigrants themselves are suppressed. Specifically, we assume that the migration policy is effective, in the sense that in either skill level, less immigrants are entering the host country than under the free migration regime alternative. Hence immigration equilibrium rates are determined by the host country. Any change in the immigration rates, or skill composition, is due to the policy of the host country. Therefore, we argue that given such regime the policy demand-side effect dominates.

Denote by σ^F and σ^R, respectively, the skill composition of migrants in free

migration regime and the policy-controlled regime. Formally, $\frac{d\sigma^F}{d\tau} < 0$, $\frac{d\sigma^R}{d\tau} > 0$ thus the differential effect must be positive, $\frac{d\sigma^R - \sigma^F}{d\tau} > 0$. The importance of that hypothesis extends beyond merely accounting for a possible reason for the mixed results in the empirical literature. If indeed this argument is true, it may suggest that countries who control the skill composition of their immigrants are able to sustain a more generous welfare state than countries who do not.

4 Empirical Analysis

4.1 Identification Strategy

We confront the prediction of the theory with a cross section data of source-host developed country pairs. We decompose the data into two groups. Group A contains only source-host pairs of countries which enable free mobility of labor between them. Any kind of discrimination between native born and immigrants, regarding labor market accessibility and welfare-state benefits eligibility, is prohibited. These are 16 European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, U.K., Norway and Switzerland.

Group B includes only source-host pairs of countries within which the source country residents cannot freely move, work and get benefits in either of the host countries. The host countries are the same 16 countries as in group A. The source countries are 10 developed countries: U.S., Canada, Japan, Australia, New Zealand, Israel, Taiwan, Hong Kong, Korea and Singapore.

First, in order to identify the welfare benefits effect on the skill com-

position of immigrants, to both its componenet, we must assume that the decomposition of the sample is exogenous to our dependent varaible. We indeed argue that this is the case. The European integration is the result of long term developments of multilateral treaties, whose content extends far beyond the issue of immigrants and their skill composition. The historical development of the "free migration" group goes far back. The Treaty of Paris (1951) established the European Coal and Steel Community (ECSC) and was signed by France, West Germany, Italy, Belgium, Luxembourg and the Netherlands. The underlying idea was based on supra-nationalism, aiming to help the economy of Europe and prevent future war by integrating its members together. This treaty, among other things, enabled the right to free movement for workers in these industries. Following that, the Treaty of Rome (1957) established the European Economic Community (EEC), signed by the same countries. The main goal of the EEC was to "preserve peace and liberty and to lay the foundations of an ever closer union among the peoples of Europe". This treaty also provided for the free movement of all workers within the EEC.

The first enlargement was in 1973, with the accession of Denmark, Ireland and the United Kingdom. In 1981 Greece has joined, and Spain and Portugal became members in 1986. Transitional periods of 6 years, postponing free labor mobility were introduced for these three countries. In 1990, after the fall of the Iron Curtain, the former East Germany became part of the EEC as part of a newly reunited Germany. The Maastricht Treaty came into force on 1 November 1993, introducing the European Union (EU), which absorbed the EEC as one of its three pillars, to be called as the European Community

(EC). The agreements reiterated the free movement of persons (article 39). That is, citizens can move freely between member states to live, work, study or retire in another country. Such freedom of movement also entails the abolition of any discrimination based on nationality between workers of the member states as regards employment, remuneration and other conditions of work and employment. Austria, Sweden and Finland joined in 1995. These countries together form the EU-15 (or, the "old members states").[10]

The European Economic Area (EEA) came into being on January 1, 1994. The contracting parties to the EEA agreement are Iceland, Liechtenstein and Norway - and the EU Member States along with the European Community. Switzerland is not part of the EEA. However, Switzerland is linked to the

[10]The accession treaties normally allow for the introduction of 'transitional measures'. For instance, transitional periods of 6 years, postponing free labor mobility were introduced with respect to Greece, Spain and Portugal. The transitional measures obliges the member states to declare whether they will open up their labor markets for workers from the newly accessed countries, or keep restrictions in place for several (limited) years. In the eastern accession of the EU-8 (Poland, Lithuania, Latvia, Estonia, the Czech Republic, Slovakia, Hungary and Slovenia) in 2004, the restrictions will definitely end on 30 April 2011. A similar scheme (known as '2+3+2' on account of the possible periods of restrictions) is in place with respect to workers from Romania and Bulgaria, which joined the EU on 1 January 2007. Most EU-15 Member States (with the exception of the United Kingdom, Ireland and Sweden) took the decision after the 2004 EU enlargement to maintain restrictions on the cross-border mobility of labour from the EU-8 (Malta and Cyprus were excluded from these restrictions), which delayed the migrant flow between the EU-8 and EU-15 Member States for up to seven years. Portugal, Finland, Spain and from July 2006 also Italy decided to lift restrictions, while Belgium, Denmark, France, the Netherlands and Luxembourg decided to alleviate them. The restrictions remain unchanged in Austria and Germany.

European Union by bilateral agreements. The EEA as well as the Switzerland bilateral agreements with the EU are based on the same "four freedoms" as the European Community, which includes the free mobility of labor and equal treatment clauses.[11]

This historical description demonstrates that free migration is allowed among all the 16 countries of group A. Furthermore, it shows that the inclusion of those countries (and the exclusion of others) under the "free migration" treaties is the result of historical reasons, which extends far beyond the skill composition of immigrants. Hence, we believe that this decomposition is exogenous to our dependent variable.

Secondly, we must also assume that our variable of interest, welfare benefits, is also exogenous to our dependent variable. Hence, we first take the lagged avarge of welfare benefits (1974-1990), where the dependent variable is the skill composition of immigration stock in 2000. Since such stock may be the result of immigration prior to 1990, we also include past migration stock, in 1990, as a control variable. This also neutralizes any time-invariant effect. Additionally, we define the skill composition as the difference between migration rates. Therefore, any skill invariant effects (whether the variable itself is skill dependent or not) is also controlled for. Furthermore, we control for source-host returns to skills, using the domestic stocks of labor force for each skill level. We confront our results with several robustness tests, including different measures for welfare benefits, different time average thereof and also specifying different kinds of benefits. We also consider several specifica-

[11] This historical sketch is based on the descriptions in Wikipedia of the Treaties of Rome, the E.U., the E.E.A. and the Four Freedoms.

tions for control variables. Finally, we use the legal origin of the host country as an instrumental variable. Legal origin classifies our country-sample into several groups: countries whose system relies on the English common law, the continental system (French-German origin) and the Scandinavian system. Arguably, such classification is not correlated with our dependent variable, the skill composition of immigrants. Nevertheless, the legal system indicates some cultural features of the countries. Among other things, it reflects basic constitutional notion regarding the attitude towards property rights on the one hand, and social rights on the other hand. Hence, there is a strong correlation between the legal origin and the welfare benefits in these countries.

4.2 The Econometric Model

Consider the following migration flow equations:

$$\begin{aligned} m_{s,h,t,H} &= M_{s,h,t-1,e}\alpha_H + z_{s,h,t,e}\gamma + y_{s,h,t,e}\beta_H \\ m_{s,h,t,L} &= M_{s,h,t-1,e}\alpha_L + z_{s,h,t,e}\gamma + y_{s,h,t,e}\beta_L \end{aligned} \tag{16}$$

The first equation explains the migration flow in period t, from the source country s into the host country h, of high-skilled individuals, H. The second equation explains the migration flow rate in period t, from the source country s into the host country h, of low-skilled individuals, L. Both groups of migrants are determined according to three groups of variables.

First, $M_{s,h,t-1,e}$ is the stock of immigrants in the host country h, from the source country s, at the preceding period, $t-1$. We allow the flow of migrants in either skill level, to be affected by the stock of immigrants of both skill levels, hence we denote M with the index e. We assume, thereby, some

networking effect of prior migration over the flow of immigrants, captured by the coefficients α_H and α_L, respectively.

Second, $z_{s,h,t,e}$, is a group of variables that have the same effect on the immigration of high and low skilled individuals, γ. For instance, it is reasonable to assume that the democracy level, or corruption level in the host country, bear the same impact on the immigration of low and high skill individuals, as captured by γ.

Third, $y_{s,h,t,e}$, is a group of variables that have a different effect across skill level, β_H and β_L, respectively. For instance, Y can include the source-host ratio of the unemployment rates of the diffenert skills (college graduates and high school dropouts). It could be that unemployment deters low-skilled more than high-skilled potential immigrants, given alternative employemt options (like the ability to change carrer into a more desirable one under market conditions).

We now differentiate between both equations in (16), yielding the skill-differences equation:

$$m_{s,h,t,H-L} = M_{s,h,t-1,e}\alpha_{H-L} + y_{s,h,t,e}\beta_{H-L} \tag{17}$$

The dependent variable, $m_{s,h,t,H-L}$, can be considered as a measure for the skill composition of the flow of immigrants. The skill-differences model estimates therefore relative effects of the regressors over $m_{s,h,t,H-L}$. The higher $m_{s,h,t,H-L}$ is, the higher is the skill composition the immigrants' flow. Hence, a positive estimation of a certain coefficient indicates a positive effect on the skill composition measure of the immigrants, and vice versa.

An important feature of the model is that it eliminates the group of variables, z. Any variable whose impact on migration is skill invariant, is

canceled out. This accounts, for instance, for either country fixed effect (source or host).

We now sum equation (17) over all preceding periods:

$$\begin{aligned} M_{s,h,t,H-L} &= \overline{M}_{s,h,t-1,e}\alpha_{H-L} + \overline{y}_{s,h,t,e}\beta_{H-L} \\ \text{where } \overline{M}_{s,h,t-1,e} &= \sum_{i=1}^{t} M_{s,h,t-i,e};\ \overline{y}_{s,h,t-1,e} = \sum_{i=0}^{t-1} y_{s,h,t-i,e} \end{aligned} \tag{18}$$

We now lag equation (18):

$$M_{s,h,t-1,H-L} = \overline{M}_{s,h,t-2,e}\alpha_{H-L} + \overline{y}_{s,h,t-1,e}\beta_{H-L} \tag{19}$$

and rewrite equation (18):

$$M_{s,h,t,H-L} = M_{s,h,t-1,e}\alpha_{H-L} + \overline{M}_{s,h,t-2,e}\alpha_{H-L} + \overline{y}_{s,h,t-1,e}\beta_{H-L} + y_{s,h,t,e}\beta_{H-L} \tag{20}$$

Using equation (19) into equation (20) we get:

$$\begin{aligned} M_{s,h,t,H-L} &= M_{s,h,t-1,e}\widehat{\alpha}_{H-L} + y_{s,h,t,e}\beta_{H-L} \\ \text{where } \widehat{\alpha}_{H-L} &= \alpha_{H-L} + 1 \end{aligned} \tag{21}$$

We now specify $y_{s,h,t,e} = (x_{s,h,t-1}, u_{s,h,t,e})$, into observable variables (that are not skill dependent), $x_{s,h,t-1}$, and unobservable varibles (that may be skill dependent), $u_{s,h,t,e}$. Note that we lag our observable variables, to reduce the possibility of correlation with the unobservable variables. Hence:

$$M_{s,h,t,H-L} = M_{s,h,t-1,e}\widehat{\alpha}_{H-L} + x_{s,h,t-1}\beta_{H-L} + u_{s,h,t,e} \tag{22}$$

We now turn to express our decomposition of the data into two groups: group A (of (s,h) pairs within which free migration is allowed) and group B

(of (s,h) pairs where the source country originated individuals cannot freely migrate into the host countries):

$$M_{j,t,H-L} = M_{j,t-1,e}\widehat{\alpha}_{H-L} + D_j M_{j,t-1,e}\widehat{\alpha}^0_{H-L} + x_{j,t}\beta_{H-L} + D_j x_{j,t-1}\beta^0_{H-L} + u_{j,t,e} \tag{23}$$

$$\text{where } D_j = \begin{cases} 0, & \text{if } j \in A \\ 1, & \text{if } j \in B \end{cases}$$

We argue that the dummy variable, which decomposes our sample into groups A and B (free migration and policy-controlled migration

**********R is a dummy variable, which is equal to 0 if the source-host pair exercise free migration between them, and 1 otherwise; B_h denotes the average benefits per capita in the host country h, in the years 1974-1990. The remaining controls are denoted by $X_{s,h}$: the ratio of the stock of skilled migrants, from source country s in host country h to the stock of all native skilled migrants in the source country s, in the year 1990; a similar ratio for unskilled migrants; the log of skilled native-born workers in the host country h in year 1990; and a similar proportion for the unskilled. We also interact all variables with the decomposition dummy variable. The coefficients are depicted by the vectors, α and β. The error term is denoted by $u^e_{s,h}$, which can be divided into two components: a skill independent effect, $\theta_{s,h}$, and a skill-dependent effect $\epsilon^e_{s,h}$.

This simple model estimates the effects of the benefits per capita (and the other control variables) on the emigration share, m, for each skill level. Note that $\theta_{s,h}$ reflects some omitted variables which are skill independent. In order to avoid the skill-independent- omitted-variable bias, we define a skill-differences model (a version of difference-in-difference model), by subtracting

the two equations in (16):

$$\Delta m_{s,h} = \Delta\beta_0 + \Delta\beta_1 R_{s,h} + \Delta\beta_2 B_h + \Delta\beta_3 R_{s,h} B_h + X_{s,h}\Delta\alpha_1 + X_{s,h} R_{s,h}\Delta\alpha_2 + \Delta\epsilon_{s,h} \tag{24}$$

where Δ is the skill-differences operator.

The dependent variable, Δm, can be considered as a measure for the skill composition of immigrants. The skill-differences model, (24), estimates therefore relative effects of the regressors over Δm. The higher Δm is, the more upgraded is the skill composition the immigrants. Hence, a positive estimation of a certain coefficient indicates a positive effect on the skill composition measure of the immigrants, and vice versa.[12]

An important statistical feature of the model is that it eliminates part of the error term, $\theta_{s,h}$. Any variable whose impact on migration is skill invariant, is canceled out. Additionally, by the inclusion of past migration stocks in $X_{s,h}$ we are able to account for key time invariant effects.

Note that the effect of τ on σ^F is captured in the above equation by the coefficient $\Delta\beta_2$. Therefore, the null hypothesis describing the effect of τ on σ^F becomes $\Delta\beta_2 < 0$.Also, the effect of τ on σ^R is captured by the coefficient $\Delta\beta_2 + \Delta\beta_3$. Therefore the null hypothesis describing the the effect of τ on $\sigma^R - \sigma^F$ becomes $\Delta\beta_3 > 0$.

A potential endogeneity problem, between the level of benefits in the host

[12]Naturally the estimation of $\Delta\beta$ can be obtained directly from (16), by estimating each skill-dependent equation separately. As all skill-dependent equations in (16) have the same determinants, the coefficients $\Delta\beta$ are simply the respective difference of the separated estimation, β^h and β^l. However, extracting the estimation for $\Delta\beta$ from the DD model, (24), enables us to directly test the significance of the coefficients which are related to the differences in the levels of the explanatory variables.

country, B_h , and the skill composition of the migrants, $\Delta m_{s,h}$, may arise, because skill immigrants can influence the political economic equilibrium level of benefits.[13] One way go around this problem is to take the average level of benefits over a long, pre-2000, period (1974-1990), as we indeed do. Recall that we also control for past migration stock rate (in 1990). Thus only migration between 1990-2000 is to be explained by the lagged benefit variable, a predetermined variable. Importantly, in addition, we also run IV estimation, using the legal origin in the host country (English, Scandinavian, or French-German) as instrument. The legal origin, a century old construct, was put in place without having the 2000 migration in mind. The legal origin is however, closely linked to national attitudes towards the generosity of the welfare state, and its institutional setups. It is therefore likely to be strongly correlated with B_h.

We also provide several robustness estimations, including additional variables like distance, common language and others.

4.3 Data

Migration data is taken from Docquier and Marfouk (2006). The data set contains bilateral stock of migrants, based on census and register data, for the years 1990 and 2000. Stock variables are more attractive for analysis than flows because our model describes a long-run equilibrium of migration and voting decisions. Also, as indicated by Docquier and Marfouk (2006), data on migration flows are less reliable than stock data, because flow data disregard

[13] For a political-economy model and evidence on the effect of migrants on the generosity of the welfare state, see Razin, Sadka and Swagell (2002).

return migration movements, which may distort the estimation. Immigrants are at working age (25+), defined as foreign born, subdivided into three classes of education level: low-skilled (0-8 schooling years), medium-skilled (9-12 schooling years) and high-skilled (13+ schooling years).

Data for welfare-state benefits per capita is based on OECD's Analytical Database (average for 1974-1990). Social expenditure encompass all kinds of social public expenditures, in cash or in kind, including, for instance, old age transfers, incapacity related benefits, health care, unemployment compensations and other social expenditures. The data is PPP-converted to 1990 U.S. dollars.

4.4 Main Findings

Table 1 presents the main estimation results. Columns 1 and 2 report OLS regressions results; columns 3 and 4 report IV regression results, using the legal origin of the host countries as the instrumental variable. The difference between columns 1 and 3, on one hand, and columns 2 and 4, on the other hand, is in the variables of the vector $X_{s,h}$. Columns 1 and 3 contain only the migration stock shares, skilled and unskilled, in the year 1990. Columns 2 and 4 include also the log-values of the skilled-unskilled native labor stocks ratio, in the host country, in the year 1990.

The first null hypothesis, is that $\Delta\beta_2 < 0$. It captures the migrant choices in the free migration regime. Indeed, the coefficient is negative and significant in all four regressions. That is, the generosity of the welfare state adversely affects the skill composition of migrants in the free migration regime. The magnitude of the coefficient is even higher in the IV regressions than the

Dependent Variable: High-Low Difference in Migration Stock Shares at 2000				
	OLS	**OLS**	**IV**	**IV**
benefits per capita (host country)	-0.139	-0.111	-0.199	-0.205
	(0.049)***	(0.054)**	(0.079)**	(0.086)**
benefits per capita (host country) X R	0.135	0.133	0.195	0.226
	(0.054)**	(0.061)**	(0.079)**	(0.088)**
migration stock share in 1990 - low skilled	-0.755	-0.757	-0.750	-0.750
	(0.097)***	(0.095)***	(0.098)***	(0.097)***
migration stock share in 1990 - low skilled X R	1.673	1.694	1.669	1.687
	(0.185)***	(0.180)***	(0.185)***	(0.181)***
migration stock share in 1990 - high skilled	1.076	1.082	1.071	1.071
	(0.131)***	(0.127)***	(0.132)***	(0.130)***
migration stock share in 1990 - high skilled X R	-0.729	-0.734	-0.723	-0.723
	(0.134)***	(0.130)***	(0.135)***	(0.133)***
high-low labor ratio in 1990 (host country)		-0.459		-0.459
		(0.165)***		(0.165)***
high-low labor ratio in 1990 (host country) X F		-0.088		0.221
		(0.558)		(0.542)
Observations	400	400	400	400
R-squared	0.857	0.858	0.856	0.856
Migration into 16 European countries, from 26 developed countries (inclusive of the 16 host countries, among which free migration is allowed);				
F (R) is a dummy variable for the 16 (10) source countries whose migration into the 16 host countries is (not) fre				
IV: legal origin of the host country (English, Scandivavian, German-French)				
Robust standard errors in parentheses				
* significant at 10%; ** significant at 5%; *** significant at 1%				

Table 1: Welfare Migration: The High-Low Skilled differential Effect between Free and Policy-Controlled Migration Regimes

OLS regressions. Whether we include the full set of the variables in$X_{s,h}$ in the regressions (columns 2 and 4) or not (columns 1 and 3) does not seem to have much of an effect on on the magnitude of the coefficient.

The second null hypothesis is that $\Delta\beta_3 > 0$. It indicates the considerations of the host country's voters in policy controlled migration regimes. Indeed, the coefficient is positive and significant in all four regressions. That is, the effect of the generosity of the welfare state on the skill composition of migrants is more pronounced in the policy-controlled migration regime. The magnitude of the coefficient is even higher in the IV regressions than the OLS regressions. Again, whether we include the full set of the variables

in $X_{s,h}$ in the regressions (columns 2 and 4) or not (columns 1 and 3) does not seem to have much of an effect on the magnitude of the coefficient.

Turning to the other control variables, $X_{s,h}$, the effect of low (high) skilled migration stock rate in 1990 on the skill-composition of migration in 2000 is negative (positive) and significant, in the free migration regime. An interpretation of this result is that in the free-migration regime there is an inertia over time for each skilled group of migrants. More unskilled migrants bring about further waves of unskilled migrants; and similarly, more skilled migrants bring about further waves of skilled migrants.

In the policy controlled migration regime, past migration of the unskilled increases the skill composition of immigrants in 2000 (past skilled migration increases the skill composition of immigrants in 2000, but less than in the free migration regime). The interpretation of this result, consistent with our model, is that having initially (i.e., in 1990) a large stock of unskilled migrants, which poses a fiscal burden on the welfare state, induces its voters to opt for more skilled migrants in order to ease the burden. This explanation is supported in columns 2 and 4, where we account for the quantity of high-low skilled voters ratio, in the host countries. One can see that as this ratio is higher, the skill composition of immigrants is lower. Clearly, this outcome is in line with our model, wherein $\sigma^s < \sigma^u$.

4.5 Robustness Tests

First we replicate Table 1 with respect to the medium-skilled versus the low-skilled.

As can be seen, the coefficient of welfare benefits, for free migration

Table 2: Welfare Migration: The Medium-Low Skilled differential Effect between Free and Policy-Controlled Migration Regimes

regimes, is negative and significant (in the second column, however, it is significant only at 13%). The coefficient of welfare benefits in policy controlled regimes is significantly higher (again, with the exception of the second column).

We now extend the main specification so as to account for standard variables used in international immigration examinations. We include a dummy variable, accounting for common language between any source-host pairs, the log value of the great circle distance, in miles, between all source-host pairs, and the GDP per capita average in 1974-1990, in real terms converted into PPP US$, for both the source and host countries:[14]

Again, the results are very similar to the ones presented in Table 1, where the IV estimations pronounce our theory predictions even more.

5 Conclusion

Migration is often viewed as an economic force, which can mitigate the fiscal burden induced by the process of aging. The reason is that an inflow of young working age immigrants may slow down population aging and help paying for social security. However, on the other hand, because immigrants often have low education and high fertility rates, their net fiscal impact may be

[14]The GDP per capita data is taken from Heston, Alan, Robert Summers and Bettina Aten, Penn World Table Version 6.2, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, September 2006.

Dependent Variable: High-Low Difference in Migration Stock Shares at 2000				
	OLS	**OLS**	**IV**	**IV**
benefits per capita (host country)	-0.138	-0.147	-0.279	-0.320
	(0.068)**	(0.070)**	(0.122)**	(0.133)**
benefits per capita (host country) X R	0.159	0.167	0.301	0.340
	(0.072)**	(0.074)**	(0.123)**	(0.134)**
migration stock share in 1990 - low skilled	-0.750	-0.751	-0.742	-0.741
	(0.096)***	(0.095)***	(0.098)***	(0.097)***
migration stock share in 1990 - low skilled X R	1.710	1.711	1.702	1.701
	(0.166)***	(0.165)***	(0.167)***	(0.166)***
migration stock share in 1990 - high skilled	1.076	1.081	1.063	1.065
	(0.128)***	(0.123)***	(0.130)***	(0.127)***
migration stock share in 1990 - high skilled X R	-0.731	-0.736	-0.718	-0.720
	(0.130)***	(0.126)***	(0.133)***	(0.129)***
high-low labor ratio in 1990 (host country)		-0.342		-0.342
		(0.199)*		(0.199)*
high-low labor ratio in 1990 (host country) X F		-0.852		-0.962
		(0.874)		(0.896)
common language	-0.061	-0.076	-0.039	-0.051
	(0.048)	(0.054)	(0.049)	(0.052)
common language X R	0.027	0.049	0.005	0.024
	(0.059)	(0.064)	(0.058)	(0.061)
log distance	0.044	0.035	0.055	0.048
	(0.034)	(0.031)	(0.036)	(0.033)
log distance X R	0.014	0.023	0.003	0.010
	(0.039)	(0.037)	(0.041)	(0.039)
GDP per capita (host country)	0.029	0.188	0.178	0.385
	(0.074)	(0.129)	(0.128)	(0.205)*
GDP per capita (host country) X R	-0.097	-0.208	-0.247	-0.405
	(0.080)	(0.136)	(0.130)*	(0.207)*
GDP per capita (source country)	-0.062	-0.070	-0.051	-0.057
	(0.084)	(0.085)	(0.082)	(0.084)
GDP per capita (source country) X R	0.031	0.038	0.020	0.026
	(0.084)	(0.086)	(0.083)	(0.085)
Observations	400	400	400	400
R-squared	0.863	0.865	0.860	0.861

Migration into 16 European countries, from 26 developed countries (inclusive of the 16 host countries, among which free migration is allowed);
F (R) is a dummy variable for the 16 (10) source countries whose migration into the 16 host countries is (not) fre
IV: legal origin of the host country (English, Scandivavian, German-French)
Robust standard errors in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3: Welfare Migration: The High-Low Skilled differential Effect between Free and Policy-Controlled Migration Regimes under Different Specification

costly rather than beneficial. Storesletten (2000) and Lee and Miller (2000) calibrate a general equilibrium overlapping generations model to investigates whether a reform of immigration policies could resolve the fiscal problems associated with aging. Storesletten finds that selective immigration policies, involving increased inflow of working-age high and medium-skilled immigrants, can remove the need for a future fiscal reform. Lee and Miller, on the other hand, base their conclusion on that immigrants have lower education and higher fertility rates than that of the native born population. Thus if more immigrants are admitted into the economy, they will ease temporarily the projected fiscal burden associated with the retirement of the baby boomers. But the overall fiscal consequences are relatively small.

Providing evidence on whether immigrants pay their way in the welfare-state is addressed in a series of influential paper by Borjas (1991, 1994, 1996). Razin and Sadka (2000, 2004) address the issue of the fiscal burden associated with immigrants in a pay-as-you-go fiscal system. They show that the additional fiscal burden could be shifted forward indefinitely, and all cohorts of the native born in the present and in the future could gain from the initial influx of unskilled migrants.[15]

We conclude by noting the potential for a reversed possible effects that run from the skill composition of migrants to the generosity of the welfare state; and interactions between the skill composition of migrants and the generosity of the welfare state. The effect of immigration on the generosity

[15] An empirical investigation of the effect of the proportion of elderly people in the population on the size of social security benefit per retiree turn out not to be significant (Mulligan and Sala-i-Martin (1999) and Breyer and Craig (1997) and also negative (Razin, Sadka and Swagel (2002).

of the welfare-state is addressed by Razin, Sadka and Swagel (2002). They use data for 11 European countries during 1974-1992, and find that the coefficient of the share of immigrants in the host country population is negative in the labor tax, and welfare-state benefits regressions. They also find some evidence that the medium and high educated group among the immigrants have a positive coefficient in the tax rate regression. They interpreted the result in terms of "fiscal leakage" from the median voter toward unskilled migrants, and "fiscal gift" from skilled migrants to the median voter. Facchini, Razin and Willmann (2004) treat the welfare-state benefits and immigration as being jointly determined. Some of their regressions show that the fiscal -leakage effect dominates the shift-in-the median voter effect , but some other show the opposite. Facchini, Razin and Willmann (2004) provide an empirical study attempting to capture the interaction between tax-welfare and immigration, both as endogenous variables, so as to analyze welfare-state magnet for international data. The analysis supports the welfare-state magnet argument, when labor tax rates proxy the welfare-state program. However, if tax rates are replaced by welfare-state transfers (per capita), the results become statistically insignificant.

References

[1] Blank, Rebecca M. (1988), "The Effect of Welfare and Wage Levels on the Location Decisions of Female-Headed Households", *Journal of Urban Economics*, 24, 186.

[2] Bohn, Henning (2005), "Aging? An Update", in: Robin Brooks and

Assaf Razin (eds.), The Politics and Finance of Social Security Reform, Cambridge University Press, 44-72.

[3] Borjas, George J. (1991).

[4] Borjas, George J. (1994).

[5] Borjas, George J. (1999). Heaven's door: immigration policy and the American economy. Princeton University Press, Princeton, N.J.

[6] Breyer and Craig (1997)

[7] Brucker, Herbert, Gil Epstein, Barry McCormick, Gilles Saint-Paul, Alessandra Venturini, and Klaus Zimmermann (2001), "Managing Migration in the European Welfare State," mimeo, IZA, Bonn, Germany.

[8] Brueckner, Jan K. (2000), "Welfare Reform and the Race to the Bottom: Theory and Evidence", *Southern Economic Journal*, 66(3), 505.

[9] De Giorgi, Giacomo and Michele Pellizzari (2006), "Welfare Migration in Europe and the Cost of a Harmonized Social Assistance", IZA Discussion Paper No. 2094.

[10] Docquier, Frederic and Abdeslam Marfouk (2006), "International Migration by Educational Attainment (1990-2000)", in Ozden, Caglar and Maurice Schiff (eds.), *International Migration, Remittances and the Brain Drain*, McMillan and Parlgrave: New York.

[11] Docquier, Frederic, Oliver Lohest and Abdeslam Marfouk (2006), "What Determines Migrants' Destination Choice?", working paper.

[12] Dolmas, J., Huffman G.W., 2004. On the political economy of immigration and income redistribution. International Economic Review 45, 1129-1168.

[13] Enchautegui, Maria E. (1997), "Welfare Payments and Other Determinants of Female Migration", *Journal of Labor Economics*, 15, 529.

[14] Facchini, Giovanni, Assaf Razin and Gerald Willmann (2004), "Welfare Leakage and Immigration Policy", *CESifo Economic Studies*, 50(4), 627.

[15] Gelbach, Jonah B. (2000), "The Life cycle Welfare Migration Hypothesis: Evidence from the 1980 and 1990 Censuses", working paper.

[16] Gramlich, Edward M. and Deborah S. Laren (1984), "Migration and Income Redistribution Responsibilities", *Journal of Human Resources*, 19(4), 489.

[17] Hassler, J., Rodriguez Mora, J. V., Storesletten, K., Zilliboti, F., 2003. The survival of the welfare state, American Economic Review 93,. 87-112, 2003.

[18] Leblang, David, Jennifer Fitzgerald, and Jessica Teets. 2007. "Defying the Law of Gravity: The Political Economy of International Migration." Department of Political Science, University of Colorado at Boulder.

[19] Lee, R., Miller, T., 2000. Immigration, social security, and broader fiscal impacts. The American Economic Review 90, 350-354.

[20] Levine, Phillip B. and David J. Zimmerman (1999), "An Empirical Analysis of the Welfare Magnet Debate Using the NLSY", *Journal of Population Economics*, 12(3), 391.

[21] McKinnish, Terra (2005), "Importing the Poor: Welfare Magnetism and Cross-Border Welfare Migration" *Journal of Human Resources*, 40(1), 57.

[22] McKinnish, Terra (2007), "Welfare-Induced Migration at State Borders: New Evidence from Micro-Data" *Journal of Public Economics*, 91, 437.

[23] Meyer, Bruce D. (2000), "Do the Poor Move to Receive Higher Welfare Benefits?", unpublished paper.

[24] Ortega, F., 2005. Immigration quotas and skill upgrading. Journal of Public Economics 89, 1841-1863.

[25] Pedersen, Peder J., Mariola Pytlikova, and Nina Smith (2004), "Selection or Networks Effects? Migration Flows into 27 OECD Countries, 1990-2000." IZA Discussion Paper No. 1104.

[26] Peridy, Nicolas (2006), "The European Union and Its New Neighbors: An Estimation of Migration Potentials", *Economic Bulletin*, 6(2), 1.

[27] Razin, Assaf and Efraim Sadka (2000). Unskilled migration: a burden or a boon for the welfare state. Scandinavian Journal of Economics 102, 463–479.

[28] Razin, Assaf and Efraim Sadka (2004).

[29] Razin, Assaf, Efraim Sadka and Phillip Swagel (2002), "Tax Burden and Migration: A Political Theory and Evidence", *Journal of Public Economics*, 85, 167.

[30] Sala-i-Martin (1999)

[31] Southwick, Lawrence Jr. (1981), "Public Welfare Programs and Recipient Migration", *Growth and Change*, 12(4), 22.

[32] Storesletten, K., 2000. Sustaining fiscal policy through immigration. The Journal of Political Economy 108, 300-24.

[33] Walker, James. 1994. "Migration Among Low-income Households: Helping the Witch Doctors Reach Consensus." Unpublished Paper.

[34] Warin, Thierry and Pavel Svaton (2008), "European Migration: Welfare Migration or Economic Migration?", *Global Economy Journal* 8(3) article 3.

A Proof

We first show that $\frac{\partial b(\sigma;\tau)}{\partial \sigma} > 0$:

$$\frac{\partial b(\sigma;\tau)}{\partial \sigma} = \frac{A\mu\tau\left(1-\tau\right)^{\varepsilon}}{1+\mu}\left\{\alpha w_s^{\varepsilon}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{1-\alpha}{1+\varepsilon}}\left[1-\frac{\varepsilon\left(1-\alpha\right)\left(1+\mu\right)}{\left(1+\varepsilon\right)\left(1-s+\left(1-\sigma\right)\mu\right)}\right]\right. \tag{25}$$

$$\left.-\left(1-\alpha\right)w_u^{\varepsilon}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{-\alpha}{1+\varepsilon}}\left[1-\frac{\varepsilon\alpha\left(1+\mu\right)}{\left(1+\varepsilon\right)\left(s+\sigma\mu\right)}\right]\right\} > 0$$

Observe that:

$$\alpha w_s^{\varepsilon}\left[\frac{(1-\alpha)\,\theta^{\varepsilon}}{\alpha}\right]^{\frac{1-\alpha}{1+\varepsilon}} > (1-\alpha)\,w_u^{\varepsilon}\left[\frac{(1-\alpha)\,\theta^{\varepsilon}}{\alpha}\right]^{\frac{-\alpha}{1+\varepsilon}}$$

$$\Leftrightarrow \alpha w_s^{\varepsilon}\left[\frac{(1-\alpha)\,\theta^{\varepsilon}}{\alpha}\right]^{\frac{1}{1+\varepsilon}} > (1-\alpha)\,w_u^{\varepsilon}$$

$$\Leftrightarrow \frac{\alpha}{1-\alpha}\left(\frac{\alpha\theta}{1-\alpha}\right)^{\frac{\varepsilon}{1+\varepsilon}}\left[\frac{(1-\alpha)\,\theta^{\varepsilon}}{\alpha}\right]^{\frac{1}{1+\varepsilon}} > 1$$

$$\Leftrightarrow \left(\frac{\alpha\theta}{1-\alpha}\right)^{\frac{2\varepsilon}{1+\varepsilon}} > 1$$

$$\Leftrightarrow \frac{\alpha\theta}{1-\alpha} > 1$$

which is true by assumption, equation (10). Additionally, observe that:

$$1-\frac{\varepsilon\,(1-\alpha)\,(1+\mu)}{(1+\varepsilon)\,(1-s+(1-\sigma)\,\mu)} > 1-\frac{\varepsilon\alpha\,(1+\mu)}{(1+\varepsilon)\,(s+\sigma\mu)}$$

$$\Leftrightarrow \frac{\alpha}{(s+\sigma\mu)} > \frac{(1-\alpha)}{(1-s+(1-\sigma)\,\mu)}$$

$$\Leftrightarrow \frac{\alpha\theta}{1-\alpha} > 1$$

which, again, is true by assumption, equation (10). Hence, it follows that $\frac{\partial b(\sigma;\tau)}{\partial\sigma} > 0$.

Employing equation (**??**) yields:

$$\frac{\partial w_s\,(\sigma;\tau)}{\partial\sigma} = -\frac{A\alpha\widehat{\alpha}^{\varepsilon}\,(1-\alpha)\,\theta^{-\alpha}\mu\,(1+\mu)\left(\alpha\widehat{\alpha}^{\varepsilon}\theta^{1-\alpha}\right)^{\frac{1}{1+\varepsilon}-1}}{(1+\varepsilon)\,(s+\sigma\mu)^2} < 0 \qquad (26)$$

$$\frac{\partial w_u\,(\sigma;\tau)}{\partial\sigma} = \frac{A\alpha\widehat{\alpha}^{\varepsilon}\,(1-\alpha)\,\theta^{-\alpha-1}\mu\,(1+\mu)\left((1-\alpha)\,\widehat{\alpha}^{\varepsilon}\theta^{-\alpha}\right)^{\frac{1}{1+\varepsilon}-1}}{(1+\varepsilon)\,(s+\sigma\mu)^2} > 0$$

which, indicates, as expected, that wages of each skill type fall with its proportions in the labor market.

Then it follows from the equations in the text that $\frac{\partial V_u(\sigma;\tau)}{\partial\sigma} > 0$.Therefore, if the decisive voter is an unskilled individual he opts for $\sigma^u = 1$, no matter

what is τ. Thus $\frac{d\sigma^u}{d\tau} = 0$.When the decisive voter is a skilled individual, he opts for a skill composition of migrants, σ^s, which is given by the first order condition

Total differentiation of their preferences yields:

$$\frac{\partial V_s^{\shortmid}(\sigma;\tau)}{\partial \tau} + \frac{dV_s^{\shortmid}(\sigma;\tau)}{d\sigma}\frac{d\sigma^s}{d\tau} = 0 \tag{27}$$

Given the second order condition assumption:

$$sign\left(\frac{d\sigma^s}{d\tau}\right) = sign\left(\frac{\partial^2 V_s(\sigma;\tau)}{\partial\sigma\partial\tau}\right) \tag{28}$$

Define $\frac{\partial b(\sigma;\tau)}{\partial\sigma} = \gamma\tau(1-\tau)^{\varepsilon}$, using equation (25), where $\gamma > 0$ is independent of τ. Hence, it follows that

$$\begin{aligned}
&\frac{\partial^2 V_s(\sigma;\tau)}{\partial\sigma\partial\tau} = \frac{d}{d\tau}\left[\gamma\tau(1-\tau)^{\varepsilon}\right] + \frac{d}{d\tau}\left[(1-\tau)\,l_s(\sigma)\frac{dw_s(\sigma)}{d\sigma}\right] = \qquad (29)\\
&= \gamma\left((1-\tau)^{\varepsilon} - \tau\varepsilon(1-\tau)^{\varepsilon-1}\right) - \frac{dw_s(\sigma)}{d\sigma}w_s^{\varepsilon}(\sigma)(1+\varepsilon)(1-\tau)^{\varepsilon} =\\
&= \left[\gamma\tau(1-\tau)^{\varepsilon}\right]\left(\frac{1}{\tau} - \frac{\varepsilon}{1-\tau}\right) + \left[(1-\tau)\,l_s(\sigma)\frac{dw_s(\sigma)}{d\sigma}\right]\left(\frac{1+\varepsilon}{\tau-1}\right)
\end{aligned}$$

Note that we got the first order condition, weighted by $\left(\frac{1}{\tau} - \frac{\varepsilon}{1-\tau}\right)$ and $\left(\frac{1+\varepsilon}{\tau-1}\right)$. Further note that

$$\begin{aligned}
&\frac{1}{\tau} - \frac{\varepsilon}{1-\tau} > \frac{1+\varepsilon}{\tau-1}\\
\Leftrightarrow\ &\frac{1}{\tau} - \frac{\varepsilon}{1-\tau} + \frac{1+\varepsilon}{1-\tau} > 0\\
\Leftrightarrow\ &\frac{1}{\tau(1-\tau)} > 0
\end{aligned}$$

It then follows that $\frac{\partial^2 V_s(\sigma;\tau)}{\partial\sigma\partial\tau} > 0$. Hence $\frac{d\sigma^s}{d\tau} > 0$.

2. Observe from the equations in the text that:

$$\frac{\partial V_i(\sigma,\mu;\tau)}{\partial \tau} = \frac{d\overline{u}^i(m_i)}{dm_i}\frac{dm_i}{d\tau},\ i \in \{s,u\} \tag{30}$$

As $\frac{d\overline{u}^i(m_i)}{dm_i} > 0$:

$$sign\left(\frac{dm_i}{d\tau}\right) = sign\left(\frac{\partial V_i(\sigma,\mu;\tau)}{\partial \tau}\right) \tag{31}$$

Recall that

$$\frac{\partial V_i(\sigma;\tau)}{\partial \tau} = \frac{\partial b}{\partial \tau} - w_i\left(w_i(1-\tau)\right)^{\varepsilon} = \frac{Y}{N} - w_i l_i =$$
$$= \frac{w_s l_s(s+m_s) + w_u l_u(1-s+m_u) - w_i l_i(1+m_s+m_u)}{N}$$

Therefore, for the skilled migrants:

$$\frac{\partial V_s(\sigma,\mu;\tau)}{\partial \tau} = \frac{(1-s+(1-\sigma)\mu)}{N}(w_u l_u - w_s l_s) = \tag{32}$$
$$= \frac{(1-s+m_u)(1-\tau)^{\varepsilon}}{N}\left(w_u^{1+\varepsilon} - w_s^{1+\varepsilon}\right) < 0$$
$$\Leftrightarrow w_u < w_s$$

which entails that m_s decreases.

Whereas, for unskilled migrants:

$$\frac{\partial V_u(\sigma,\mu;\tau)}{\partial \tau} = \frac{(s+\sigma\mu)}{N}(w_u l_u - w_s l_s) = \tag{33}$$
$$= \frac{(s+m_s)(1-\tau)^{\varepsilon}}{N}\left(w_s^{1+\varepsilon} - w_u^{1+\varepsilon}\right) > 0$$
$$\Leftrightarrow w_u < w_s$$

which entails that m_u increases.

Recall that:

$$\sigma = \frac{m_s}{m_s + m_u}$$

Hence, it follows that

$$\frac{d\sigma}{d\tau} = \frac{\frac{dm_s}{d\tau}(m_s + m_u) - \frac{dm_s}{d\tau}m_s - \frac{dm_u}{d\tau}m_s}{(m_s + m_u)^2} = \tag{34}$$
$$= \frac{\frac{dm_s}{d\tau}m_u - \frac{dm_u}{d\tau}m_s}{(m_s + m_u)^2} < 0$$