Skill Composition of Migration and Welfare State Generosity: Comparing Free and Policy-Controlled Migration Regimes

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Abstract

We present a parsimonious model which predicts that the generosity of the welfare state serves as a magnet to unskilled migrants, but as a deterrent to skilled migrants. Almost the opposite is however true when migration is controlled by national policies, which reflect voter preferences.

We develop a parsimonius general-equilibrium model whose predictions are tested against cross-sectional data from 14 EU countries and other 12 OECD countries in the year 2000. The identification strategy is a decomposition of the sample into source-host pairs into two groups: a "free-migration" group (source-host pairs within the

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EU, plus Norway and Switzerland) and a "policy-controlled" group (source-host pairs, where the host countries are the EU group, and the source countries are from the remaining (non EU) countries. We provide strong support for (a) sthe "magnet" theory under the free migration regime; and (b) the significant differential effect of the generosity of the welfare state on the skill composition of migrants across the free and policy-controlled regimes.

1 Introduction

Free migration has been one of the important qualities of the integration of Europe into the European Union. 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. In contrast, labor mobility into the EU members states from non EU states, is still restricted by national policies. This difference in policy regimes across EU and non EU states provides an opportunity to test theory predictions about key differences between free and policy-controlled migration.

Differences in migration policies are tightly linked to the generosity of the welfare state and the fiscal burden of migration For example, an impetus for relaxing migration restrictions by EU member states, towards non-EU countries, is that birth rates dwindle and life expectancy goes on rising. 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 robustness 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]

The paper addresses the effect of the generosity of the welfare state on the skill composition of immigrants. This effect depends crucially on the policy regime, namely whether migration is free or restricted. We first develop a parsimonious model to analytically study how different is the effect of the generosity of the welfare state on the skill composition of the immigrants across these policy regimes. In a free-migration regime, a typical welfare state with relatively abundant capital and high total factor productivity (implying relatively high wages for all skill levels) attracts unskilled and skilled migrants. Furthermore, the *generosity* of the welfare state attracts unskilled (poor) migrants, as they expect to gain more from the benefits of the welfare state than what they expect to pay in taxes for these benefits; that is, they are net beneficiaries of the generous welfare state. In contrast,

[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).

potential skilled (rich) migrants are deterred by the generosity of the welfare state. Thus, the latter tilts the skill composition of the migrants towards the unskilled. In the restricted migration regime, these same considerations lead voters to open the door wide to skilled migration and slam the door shut on unskilled migration. Voters are motivated by two considerations: how migration affects their wages, and how it bears on the finances of the welfare state. Typically, unskilled migration depresses the unskilled wage and boosts up the skilled wage. The opposite occurs with skilled migration. The effect of migration on the finances of the welfare state is common to all voters of all skills, because skilled migrants are net contributors to the welfare state, whereas unskilled migrants are net beneficiaries. From a public finance point of view, native-born voters of all skills would therefore opt for the formers to come in and for the latter to stay out.

We claim that core EU countries can serve as a useful laboratory for studying empirically the policy-regime differential effect of the generosity of the welfare sate on the skill composition of migration. 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. In contrast, labor mobility into the EU-15 member states, from non-EU-15 states, is still restricted to various degrees by national policies. [2]

[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

The paper utilizes this difference in policy regimes across EU-15 and non-EU-15 states in order to test the predictions of the model about key differences between free and policy-restricted migration, in conjunction to the effect of the welfare state on the skill composition of immigrants.

We employ cross-sectional data from 14 EU countries and other 12 OECD countries in the year 2000.[3] We form source-host pairs of countries where only the EU countries (plus Norway and Switzerland) serve as host countries, whereas all the 26 countries in the sample serve as source countries. The identification strategy is a decomposition of the source-host pairs into two groups: a "free-migration" group (source-host pairs within the EU, plus Norway and Switzerland) and a "policy-controlled" group of countries (source-host pairs where the host countries are the same as in the former group, and the source countries are from the remaining (non EU) countries). We assume, plausibly, that this free-restricted migration decomposition, which has its origin in the integration process in Europe that started in the 1950s, could not have as one of its determinants, the eventual stock of the migrants in the EU states, some 50 years later.

Noting that the empirical analysis may be plagued with an endogeneity problem associated with reverse causality: the skill composition of migration itself influences the voters' attitude towards the generosity of the welfare state. The reverse causality mechanism is studied from the question of how the skill composition of migration shapes voters decision concerning the gen-

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.

[3]Because a proper measure of skill is key to our analysis, we restrict attention to OECD countries. In this way we get a relatively homogeneous classification of skill levels.

erosity of the welfare state. Recalling that skilled migrants are typically net contributors for the welfare state, whereas unskilled migrants are net beneficiaries, voters in the host country are likely to boost its welfare system when absorbing high-skill migration, and curtail it when absorbing low-skill migration. This prediction is also confronted with evidence from European union countries.

The paper is organized as follows. Section 2 develops a parsimonious model of the welfare state and migration, divided into two alternative migration-regimes. In the first regime, political-economy equilibrium of migration is determined by host country, capturing the interests of the skilled and unskilled workers, as voters; in the second migration regime migration is determined by the choice of potential migrants in the source country. Section 3 discusses empirical evidence from the literature , focusing on the interaction between international migration and the welfare state. In section 4 we confront the parsimonious model's predictions with international cross section data. Section 5 investigates the possibility of reverse causality. Section 6 presents robustness tests, and Section 6 concludes.

2 Empirical Evidence on Welfare Migration

The existing literature on how the welfare-state generosity works as a magnet to migrants — the "welfare migration" phenomenon .is large; Brueckner (2000) provides a review of recent empirical studies regarding welfare migration. Khoudouz-Castezas (2004) studies emigration from the 19th century Europe. He finds that the social insurance legislation, adopted by Bismarck

in the 1880s, reduced the incentives of risk averse Germans to emigrate. He estimates that in the absence of social insurance, German emigration rate from 1886 to 1913 would have been more then doubled their actual level. Southwick (1981) shows with U.S. data 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 will have more welfare-recipient 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. Similarly, Enchautegui (1997) finds a positive effect of welfare benefits over the migration decision of women with young children. Meyer (2000) employs a conditional logit model, as well as a comparison-group method, to analyze the 1980 and 1990 U.S. Census data and 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 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). Walker (1994) uses the 1990 U.S. Census data and finds strong evidence in support of welfare-induced migration. Levine and Zimmerman (1999) estimate a probit model using a dataset for the period 1979-1992 and find, on the contrary, that welfare benefits have little effect on the probability of female-headed households

(the recipients of the benefits) to relocate. Peridy (2006) studies migration rates in 18 OECD host countries from 67 source countries and finds that the host-source ratio of welfare-state benefits (as measured by total public spending) has a significant positive effect on migration. De Giorgi and Pellizzari (2006) conduct an empirical investigation of migration from outside the EU-15. Using a 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 to immigrate; whereas probabilities of the secondary and tertiary education groups are not significantly affected. Docquier at el. (2006) study the determinants of migration stocks in the OECD countries in the year 2000, with migrants from 184 countries, classified according to three education levels. They find that the social welfare programs encourage the migration of both skilled and unskilled workers. However, the unskilled are motivated by social expenditure much more than the skilled migrants. Thus they conclude that the skill composition of migrants is adversely affected by the welfare-state benefits, that is, welfare benefits encourage migration biased towards the unskilled.

As we demonstrate in the next section, the parsimonious model predicts a differential effect on migration and its skill composition, depending on whether migration is free or policy-controlled. Therefore, in order to obtain unbiased estimates of the generosity of the welfare state on migration (and on its skill composition), one must control for the migration regime (free versus controlled). 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 a biased results. Other studies that employ samples confined to the policy-controlled migration regime, but at the same time employ a model of the migrants' choice, whether to migrate and to which country, are evidently inconsistent. In this case, the estimates convey little information on the migrants' choices (and hence on the welfare state as a magnet to unskilled migrants), but rather on the migration policy choices of the host country. Those 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 countries, and on the individual migrant's migration choices in the source countries.

3 Parsimonious General-Equilibrium Model

Assume a Cobb-Douglas production function, with two labor inputs, skilled and unskilled[4]:

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

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

The competitive wages of skilled and unskilled labor are, respectively

$$w_s = \alpha Y / L_s \tag{2}$$
$$w_u = (1-\alpha)\, Y / L_u.$$

[4]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).

Aggregate labor supply, for skilled and unskilled workers, respectively, is 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 level $i \in \{s, u\}$

Total population (native born and migrants) is as follows

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

We specify a simple welfare-state system which levies a proportional labor income tax at 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, and other provisions, that benefit all workers, regardless of their contribution to the finances of the system.

The government budget constraint is therefore

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

The utility function for skill-type $i \in \{s, u\}$ 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 level i, and $\varepsilon > 0$.

The budget constraint of an individual with skill level i is

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

Individual utility-maximization yields the following the labor supply equation

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

It is then straightforward to calculate the equilibrium wages for the skilled and unskilled workers, which are given respectively by

$$\begin{aligned} w_s &= A\left(\alpha\delta^{\varepsilon}\theta^{1-\alpha}\right)^{\frac{1}{1+\varepsilon}} \\ w_u &= A\left((1-\alpha)\,\delta^{\varepsilon}\theta^{-\alpha}\right)^{\frac{1}{1+\varepsilon}} \end{aligned} \tag{9}$$

where $\delta \equiv \alpha^{\alpha}\left(1-\alpha\right)^{1-\alpha}$ and $\theta \equiv \frac{1-S+(1-\sigma)\mu}{S+\sigma\mu}$

In order to ensure that the skilled wage always exceeds the unskilled wage, $w_s > w_u$, we assume that

$$\frac{\alpha(1-S+(1-\sigma)\mu)}{(1-\alpha)(S+\sigma\mu)} > 1. \tag{10}$$

.We now use this model to to analyze the policy-controlled regime.

4 Policy-controlled Migration Regime

Assume that the host country can receive as many migrants as it wishes of each one of the two skill types, so that the host-country migration policy is the sole determinant of migration flows[5]. The policy is determined by the

[5]In the next subsection and henceforth we describe an upward sloping supply of type of would-be migrants. Our assumption in this section amounts to supposing that the host country can provide a utility level which is above the highest reservation utilities of the would-be migrants.

median voter 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, which is the skill composition of migrants, σ. Note that once σ, μ, τ are determined, then the per capita benefit variable, b, is given by the government budget constraint; we thus denote the per capita benefit b as $b(\sigma;\tau)$; where the exogenous variable μ is suppressed here and elsewhere.

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

$$V_i(\sigma;\tau) = b(\sigma;\tau) + \frac{1}{1+\varepsilon}\left[(1-\tau)w_i(\sigma;\tau)\right]^{1+\varepsilon}. \tag{11}$$

Differentiating Equation (11) with respect to σ, employing the envelope theorem, yields

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

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 per capita benefit, b. Second, an increase in σ , which raises the supply of skilled labor relative to the supply of unskilled labor, depresses the skill-premium in the labor market.

We plausibly assume that only the native-born population is eligible to vote on the migration policy, as the would-be migrants are not yet a part of the host country. If the decisive voter is unskilled, both of the above effects increase her utility. Thus, an unskilled voter would like to set the skill-composition of migrants at the maximal limit, $\sigma = 1$. This means that

the share of skilled migrants preferred by the decisive skilled voter is typically lower than that preferred by the decisive unskilled voter. We plausibly assume therefore that the decisive skilled voter would like to set σ below 1 (which is equivalent to assuming that the first-order condition is met before σ reaches 1).

Defining σ^i as the share of skilled immigrants most preferred by an individual with skill level $i = s, u$ in the host country, 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 magnitude of the per capita benefit, b, depends positively on the tax rate, τ (we assume that economy is on the "correct side" of the Laffer curve). We thus look for the effect of τ on the change in the skill composition of the migrants, σ. We show in the appendix 2A.1 that

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

This means that, if the decisive voter is an unskilled worker, an exogenous increase in the tax rate, τ, would leave the skill migration policy unchanged, because it is always set at the maximum possible limit. If, however, the decisive voter is a skilled worker, an exogenous increase in the tax rate, τ, will change the policy concerning the skill-composition of migrants in the direction towards a larger share of skilled migrants. The reason is that when the tax rate is higher, the redistribution burden upon a skilled decisive voter increases. Allowing an additional skilled migrants can ease this rise in the

fiscal burden, dominating the adverse effect on the skilled wage[6].

4.1 Free Migration Regime

We now assume that no restrictions are placed on migration by the policy-makers in the host country. The level of migration depends entirely on the choice of potential migrants. In choosing whether to migrate or not, a potential migrant of skill i compares his prospective utility, V_i, in the migration destination, to the reservation utility, denoted by $\overline{u}^i$ in the source country. For each skill level i, we assume that there is a continuum of would-be migrants, differing with respect to the reservation utility level in the source country. This heterogeneity of reservation utilities in the source country could stem from 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, $S^i(V_i)$, of potential migrants from the source country for each skill level i.

Let m_s be the number of skilled migrants, and m_u the number of unskilled migrants. The proportion of skilled migrants, σ , is defined by

$$\sigma = \frac{\frac{m_s}{m_u}}{1 + \frac{m_s}{m_u}}. \tag{14}$$

The indirect utility function in the host country no longer depends on the policy variable σ, but rather given by

$$V_i(\tau) = b(\tau) + \frac{1}{1+\varepsilon}\left((1-\tau)\, w_i\right)^{1+\varepsilon}. \tag{15}$$

The following equation determines, for each τ, the cut-off levels of the

[6]For a related study, see Krieger (2003)

reservation utilities ($\overline{u}^s(\tau)$ and $\overline{u}^u(\tau)$, for a would-be migrant of skill $i = s, u$

$$V_i(\tau) = \overline{u}^i(\tau). \tag{16}$$

We can use this to find the supply curve of the potential migrants and hence the number of migrants for each skill level. By definition, the number of migrants of each skill level, $i = s, u$, is determined by the supply of migrants, that is

$$m_i(\tau) \equiv Q_i(\overline{u}^i(\tau)), \tag{17}$$

for $i = s, u$.

We now attempt to find the effect of an exogenous change in the generosity of the welfare state on the skill mixture of the migrants. We show in the appendix that:

$$\frac{d\sigma}{d\tau} < 0. \tag{18}$$

That is, the generosity of the welfare state attracts unskilled migrants and discourages skilled migrants.

The rationale for this result is as follows. An increase in τ raises the per capita benefit , b, but lowers the net wage, $(1-\tau)w_i$. For skilled migrants, the fall in net wage outweighs the increase in the per capita benefit Thus, an increase in τ reduces the well-being of skilled workers. Consequently, an increase in τ reduces the cut-off reservation utility of skilled migrants, $\overline{u}^s(\tau)$. As a result, those skilled migrants with reservation utilities between the old one the new cutoff levels will choose not to migrate. The opposite holds true for unskilled migrants. Thus, an increase in the generosity of the welfare state under free migration deters skilled migrants and attracts unskilled ones, thereby tilting the skill composition of migration towards unskilled migrants.

5 Empirical Analysis

There are two main predictions of our parsimonious model, which we would like to test. First, if migration is not restricted, the generosity of the welfare state has an adverse effect on the skill composition of migrants. A typical skilled migrant is more likely to move to a less generous welfare state with a lower tax rate rather than to a more generous country with a higher tax rate, other things being equal. Second, in the case that the skill composition of migration is policy-controlled, then the more generous is the welfare state, the more the skill composition of migrants is biased towards skilled migrants.

As explained before, both results hinge on the redistributive aspects of the welfare state. Under free migration, equilibrium migration reflects (among others) the choice of the migrants. Thus, a generous welfare state generating a fiscal burden on skilled migrants is a deterrent for skilled migration. In the policy-controlled migration regime, however, the interests of the native-born in the host country, as is reflected in the voting equilibrium, are at play. Fiscal burden associated with the generosity of the welfare state, which falls on the skilled native-born, induces this interest group to endorse higher rates of skilled migration. The unskilled native-born is in favor of maximum level of skilled migration, both for redistributive reasons and for labor complementarity reasons.

In sum, the testable hypotheses concerning the migration-regime differential effect of the generosity of the welfare state on the skill composition of the migrants can be stated as follows. Denote by $\sigma^F$and σ^R, respectively, the skill composition of migrants in the free-migration regime and the policy-controlled regime. First, an increase in the generosity of the welfare state (re-

flected in an exogenous increase in the tax rate, τ) adversely affects the skill composition of the migrants in the free-migration regime, that is $\frac{d\sigma^F}{d\tau} < 0$. Second, an increase in the generosity of the welfare state has a more pronounced effect on the share of skilled migrants when the migration-regime is policy-controlled, that is, $\frac{d\sigma^R}{d\tau} > 0$. Consequently, we expect $\frac{d(\sigma^R - \sigma^F)}{d\tau} > 0$.

5.1 Identification Strategy

To confront the predictions of our parsimonious model with cross-section data of source-host (developed) country pairs, we decompose the sample into two groups. The first group contains source-host pairs of countries which enable free mobility of labor among themselves. They also prohibit any kind of discrimination between native-born and migrants, regarding labor market accessibility and welfare-state benefits eligibility. These are 16 European countries, 14 of them are a part of the EU (Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, and U.K.), and Norway and Switzerland. For notational brevity, we will nonetheless refer to this group as the EU group. The data for this group, therefore, consist of bilateral migration stock for any pair of these countries. The second group includes source-host pairs of countries, within which the source country residents cannot necessarily move freely into any of the host countries. That is, the host countries control migration from the source countries. The host countries are the same 16 countries from the first group, and the source countries comprise of 10 developed non-European countries (U.S., Canada, Japan, Australia, New Zealand, Israel, Taiwan, Hong Kong, Korea and Singapore).

This decomposition is key to the identification strategy. It enables us to plausibly assume that migration is free among the 16 countries of the first group, and is *effectively* policy-controlled with respect to migrants from 10 source countries belonging to the second group. It is plausible to assume that the categorizing of both groups is exogenous to our dependent variable, the skill composition of immigrants. Thus, we can identify the differential effect of the generosity of the welfare state on the skill composition of immigrants across the two groups (the "free-migration" group and the "policy-restricted migration" group) in an unbiased way.

The reason that it is safe to assume that this decomposition is exogenous to the dependent variable, the skill composition of immigrants, is that the European integration is the result of long-term developments of multilateral treaties, whose content extends far beyond the issue of migration 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 to 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 6 countries. The main aim 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 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 national origin 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").

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 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.

5.2 The Econometric Model

We specify the source-host pair migration stock by the following equation:

$$m^i_{s,h} = \beta^i_0 + \beta^i_1 R_{s,h} + \beta^i_2 B_h + \beta^i_3 R_{s,h} \cdot B_h + \beta^i_4 X_{s,h} + \beta^i_5 X_{s,h} \cdot R_{s,h} + u^i_{s,h}; \tag{19}$$

$$i \in \{s, u\}\,;\; u^i_{s,h} = \theta_{s,h} + \epsilon^i_{s,h}$$

$$R_{s,h} = \begin{cases} 0, & \text{if } s, h \text{ are in the } EU \\ 1, & \text{if } s \text{ is not in the } EU \text{ and } h \text{ is in the } EU \end{cases}$$

where $m^i_{s,h}$ denotes the ratio of the stock of migrants of skill level i, originated in source country s and residing in host country h, to the stock of all native workers of skill level i in the *source* country in the year 2000. $R_{s,h}$ is a dummy variable, which equals 0 if the source-host pair exercises free migration, and 1 otherwise. B_h denotes the average benefits per capita in the host country h, over the periods of 1974-1990. The remaining control variables are denoted by $X_{s,h}$, which include the ratio of the stock of unskilled migrants, from source country s in host country h, to the stock of all native unskilled migrants in the source country s in the year 1990; a similar ratio for skilled migrants; the proportion of unskilled native-born workers in the host country h in year 1990; and a similar proportion for the skilled.[7] We also have interaction terms of all variables with the dummy variable. The coefficients are depicted by the vectors β. The error term is denoted by $u^i_{s,h}$, which can be divided into two components: a skill-independent effect, $\theta_{s,h}$, and a skill-dependent term, $\epsilon^i_{s,h}$.

[7] As explained in the data subsection below, the last two control variables do not add up to one because we omitted workers with less than 8 year of schooling.

This simple model estimates the effects of the benefits per capita (and the other control variables) on the migration share, $m^i_{s,h}$, for each skill level $i = s, u$. Note that $\theta_{s,h}$ reflects some omitted variables which are skill-independent. In order to avoid the omitted-variable bias which is skill-independent, we define a skill-difference model (a version of difference-in-difference model), by subtracting the two equations in (19) and obtain

$$\triangle m_{s,h} = \triangle\beta_0 + \triangle\beta_1 R_{s,h} + \triangle\beta_2 B_h + \triangle\beta_3 R_{s,h} \cdot B_h + \triangle\beta_4 X_{s,h} + \triangle\beta_5 X_{s,h} R_{s,h} + \epsilon_{s,h}, \tag{20}$$

where $\triangle$ is the skill-difference operator.

The dependent variable, $\triangle m_{s,h} = m^s_{s,h} - m^u_{s,h}$, can be considered as a measure for the skill composition of migrants. The model in equation (20) estimates relative effects of the regressors over $\triangle m_{s,h}$. A positive estimation of a certain coefficient indicates a positive effect on the skill composition measure of the migrants, and vice versa. 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

$$\triangle\beta_2 < 0. \tag{21}$$

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

$$\triangle\beta_3 > 0. \tag{22}$$

An important statistical feature of the difference-in-difference model is that it eliminates the skill-independent error term, $\theta_{s,h}$. Any variable whose impact on migration is skill-invariant drops out. Additionally, by including

past migration stocks in 1990 as a apart of $X_{s,h}$, we are able to account for other invariant effects.

A potential endogeneity problem may arise, in particular between the level of benefits in the host country, B_h , and the skill composition of the migrants, $\Delta m_{s,h}$, because skilled immigrants can influence the political economic equilibrium level of benefits.[8] One way to go around this problem is to take the average level of benefits over a long period before the year 2000, as we indeed do (using 1974-1990 data). Recall that we also control for the past migration stock rate (in 1990). Thus only migration between 1990-2000 is to be explained by the lagged benefit variable, which is completely predetermined.

In addition, we also run an IV estimation, using the legal origin in the host country (English, Scandinavian, or French-German) as an 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, yet with little direct relationship to the skill composition of migrants in the year 2000, $\Delta m_{s,h}$. Note that we cannot use an IV estimation with usual instruments such as distance and common language. These variables would generate incongruent dimensions with other data, because the variables of interest is summed across *source* countries while the distance (or common language) are source-host variables. The IV estimation generates the fitted values of the migration variables, using the instrumental variables and the

[8]Indeed, this is the subject matter of the next chapter.

control variables in auxiliary regressions. After constructing the fitted value of our variables of interest, we use these new variables in the regressions.

5.3 Data Description

Migration data are taken from Docquier and Marfouk (2006). The dataset consists of bilateral stock of migrants, based on census and register data for the years 1990 and 2000. Migration stock variables are more suitable for testing the predictions of our model than flow variables because our model describes a long-run equilibrium of migration and voting decision.[9] Migrants 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). The countries in the dataset are all developed countries where the first schooling group (0-8 years) is extremely small. Therefore, we will refer to the second schooling group (9-12 years) as the unskilled group, and the third schooling group (13+ years) as the skilled group. Non-movers, that is, the stocks of the labor force for all the countries, especially the source countries, are also recorded.

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

[9] Also, as indicated by Docquier and Marfouk (2006), data on migration flows are less reliable than stock data, because flow data disregard return migration movements.

from Razin, Sadka, and Swagel (2002a), which include dependency ratio, output, and voters of each skill level. The variables of our interest are the migration stock share for each education level $i = s, u$ in period t.

5.4 Findings

Table 1 presents the baseline estimation results. The dependent variable is the log difference between high and low skilled stocks of immigrants (as ratios of the native-born) in 2000. Columns 1 and 2 report OLS regression results; columns 3 and 4 report instrumental variable (IV) regression results. The difference between columns 1 and 3, on the 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 and unskilled native labor stocks ratio in the host country of the year 1990.

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	-0.75	-0.75
	(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)***	(0.18)***	(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)***	(0.13)***	(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 16 (10) source countries whose emigration into the 16 host countries is (not) free; IV: legal originof the host country (English, Scandinavian, German-French) Robust Standard Errors in parentheses				

Table 1

The first null hypothesis is that $\Delta\beta_2 < 0$. It captures the migrants' choice 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 in the OLS regressions. Whether we include the full set of control 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[10].

[10]Note that the 16 European countries comprising the first group may be similar not just in terms of the mobility of migrants, but also in terms of the institutions (e.g. labor market policies, the importance of unions) that govern the labor markets in these countries. These institutions are presumably weaker in the second group of non-EU countries. However,

The second null hypothesis is that $\Delta\beta_3 > 0$, reflecting the policy preference 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 control 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 across all four regressions 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: one unskilled migrants bring about further waves of unskilled migrants; and similarly, more skilled migrants bring about further waves of skilled migrants. We also find in the free-migration regime that the host-country share of skilled labor in 1990 has a significant negative effect on the skill composition of migrants in 2000. The interpretation of this result is that the high share of skilled labor in the host country depresses the wage of skilled labor and deters skilled migrants.

Note that the effect of any control variable on the dependent variable in the policy-controlled regime is given by the sum of the coefficient of the

the latter are source countries so that their weaker institutions have little bearing on the appeal of the host countries for immigrants.

control variable and the coefficient of its interaction term. For instance, the effect of B_h on $m_{s,h}$ is given by $\Delta\beta_2+\Delta\beta_3$. In the policy-controlled migration regime, we find that past migration of the unskilled in 1990 increases the skill composition of migrants in 2000, whereas past skilled migration increases the skill composition of migrants in 2000, but less than that in the free-migration regime. An interpretation consistent with our model of this result is that having initially (in 1990) a large stock of unskilled migrants poses a fiscal pressure on the welfare state, and induces the decisive voter to opt for more skilled migrants in order to alleviate the burden. This explanation is supported in columns 2 and 4, where we account for the 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 $\sigma^s < \sigma^u$.

6 Reverse Causality

This section provides some sketchy empirical evidence in support of the reverse-causality hypothesis that a high proportion of skilled migrants has a positive effect on the welfare-state generosity of the host country, when this generosity is determined in majority voting (regardless of whether the median voter is skilled or unskilled).

6.1 Econometric Model

Assume that welfare-state per-capita spending in country i is determined according to the following equation:

$$b_i = \alpha_0 + \alpha_s m_{s,i} + \alpha_u m_{u,i} + X_i^b \beta + \epsilon_i^b, \tag{23}$$

where b is the welfare-state per capita spending; m_s and m_u denote the stocks of skilled and unskilled migrants, respectively; X^b is a vector of other control variables; and ϵ^b is an error term. The respective coefficients of these variables are depicted by α_s, α_u, and β.

Note that there is an endogeneity problem concerning equation (11). It is difficult to identify the direction of causality between spending (b_i) and migrations of the two skill types. Indeed, the m's affect b as specified in this equation. But, on the other hand, the generosity of the welfare state also affects the level of migrations of the two types. Specifically, as demonstrated in Cohen and Razin (2008), the generosity of the welfare state has a negative effect on migration of skilled individuals (who are net fiscal contributors), but a positive effects on the migration of unskilled individuals (who are net fiscal beneficiaries), when migration is free. The opposite is true when the welfare state can control the volume and skill composition of migration, as between EU and non-EU countries!

We therefore introduce an instrumental variables for the two skill types of migrants. We assume that bilateral migration stocks for skill level $e = s, u$, between any source-host country pair (i, j) are determined in accordance with the following equation:

$$m_{e,i,j} = a_0 + a_1 Comlang_{i,j} + a_2 Dist_{i,j} + X_{i,j}^m b + \epsilon_{i,j}^m, \tag{24}$$

where $e \in \{s, u\}$, $Comlang$ depicts a dummy variable, with the value 1 if the source and host countries share a common language, and 0 otherwise, $Dist$ captures the geographical distance between the source-host pair, $X^m_{i,j}$ is a vector of other control variables (note that it may be pairwise specific), and ϵ^m is an error term.

Our identification strategy is twofold. First, we choose the distance and common language variables as instruments. We assume that these two variables are not correlated with the error term in the regression equation . On the other hand, it is quite plausible and well-established that these variables affect migration as in all gravity equations. Second, we employ a sample of EU countries within which there is free migration, so that the OLS biases concerning the coefficients α_s and α_u in equation (11) are unambiguous: upward for the first and downward for the second.[11]

Estimating equation (12) yields the fitted values for the bilateral skill-dependent migration stocks. We sum these fitted value across source countries:

$$\widehat{m}_{e,i} = \sum_{j \neq i} \widehat{m}_{e,i,j} \tag{25}$$

where the hat symbol denotes the fitted value estimation.

Therefore, our estimated equation is

$$b_i = \alpha_0 + \alpha_s \widehat{m}_{s,i} + \alpha_u \widehat{m}_{u,i} + X^b_i \beta + \epsilon^b_i. \tag{26}$$

[11] As indicated, the biases are opposite in the case where the welfare state can choose both the volume and the skill composition of migrants. Therefore, if we were to have both EU and non-EU countries in our sample, that is countries with both free and restricted-migration regimes, the biases of α_s and α_u would be ambiguous and, their estimates would be biased.

6.2 Data

Our country sample includes 16 European countries: 14 EU members (Austria, Belgium, Denmark, France, Germany, Italy, the Netherlands, Sweden, Finland, Greece, Ireland, Portugal, Spain, and the U.K.), Norway and Switzerland. Naturally, there is free labor mobility among the EU countries and the two other non-EU countries enjoy bilateral agreements with the EU, practically ensuring free labor mobility.

The dependent variable, b, is social expenditures per capita, in cash or in kind, at constant (2000) prices, PPP converted into U.S. dollars, averaged between 2000 and 2005 (source: OECD.stat). The averaging is done in order to filter out business-cycle variations. Social expenditures 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 stocks of migrants in either country, originated in all of the remaining countries, by education attainment, is our variables of interest. Migrants are at working age (25 and over), defined as foreign born, subdivided into two classes of schooling years: low (0-12), and high (13 and over). We also use lagged stocks of migrant from 1990 (source: Docquier and Marfouk (2006)).

We control for the domestic labor force for each skill level in each country in 2000 (source: Docquier and Marfouk (2006)). This control variable is essential in light of the fact that we employ the number of migrants rather than the proportions of migrants as dependent variables. It also captures the relative power of the different interest groups as manifested in the politico-economic equilibrium, and the effect of migration on wages. Additionally,

we include GDP per capita, PPP adjusted to USD in constant prices (2000), averaged between 2000 and 2004 (source: Penn World Tables 6.2). Normally, as a country's production is higher, its ability to dispense welfare-state benefits is higher. Given that the GDP per capita is potentially correlated with migration stocks, its inclusion is necessary. We also control for old age (65+) share in the population, averaged between 2000 and 2007 (source: U.S. Census Bureau, International). Pension benefits capture a vast portion of the welfare-state spending, thus, this variable should be highly positively correlated with the dependent variable, and therefore should be included as a control variable. Given the small number (16) of observations in the main equation (namely, equation (14)), we must focus on the two variables of interest ($\widehat{m}_{s,i}$ and $\widehat{m}_{u,i}$) and employ only the few most important exogenous control variables.

6.3 Some Evidence

The results of the regression are described in Table 1a.

Table 1a	*OLS*	*2SLS*
High skilled migrants(1990, thousands)	−17.532	
	(8.348)*	
Low skilled migrants(1990, thousands)	1.866	
	(0.245)***	
Fitted − high skilled migration(1990, thousands)		49.423
		(14.206)***
Fitted − low skilled migration(1990, *thousands*)		−6.678
		(2.324)**
GDP per capita(2000 − 2004)	368.130	446.791
	(58.054)***	(100.640)***
Old age share(2000 − 2007)	521.675	776.090
	(137.087)***	(140.853)***
High − skilled domestic(2000, *thousands*)	0.045	−0.471
	(0.109)	(0.157)**
Low − skilled domestic(2000)	−0.053	0.047
	(0.015)***	(0.033)
Observations	16	16
R − squared	0.884	0.835

* significant at 10%; ** significant at 5%; *** significant at 1%

Consider first the first column. Migrants with high (low) education level have a negative (positive) effect on the welfare-state spending in the host countries. This result could be due to reverse causality (despite the lagging of migration stocks): higher spending reduces the skill composition of migration in free migration regimes.

To remedy this potential reversal of causality, the second column employs the fitted migration stocks from the first stage regression. The result is exactly the opposite: high (low) skilled migrants have a positive (negative) effect on the level of welfare state spending. This is in line with the conclusions of our parsimonious model: the host country adopts a more generous welfare system, when high-skill migrants (who net fiscal contributors) enter the country. The opposite applies in the case of low-skill migration: the host country is reluctant to increase its welfare generosity, when such migrants who are net fiscal beneficiaries arrive.

6.4 Robustness Tests of the Main Hypotheses

Our robustness tests of the effect of the generosity of the welfare state on the skill composition of migration are divided into three parts. First, we replace the measure of our variable of interests. Instead of using the log-value of the average between 1974-1990, we use different periods (1980-1985, 1980-1990, 1980-1995, 1980-2000, 1980-2005). All estimations supports our hypothesis regarding the negative, market-based, supply-side effect. The positive, policy-based, demand-side effect is only weakly supported, as the results are not significant. We also replace the welfare-state benefits by the log-value of the old age pension payment, averaged between 1980-2000. Clearly, this is the largest component of social security. Based on the PAYG systems, it reflects redistribution of income which stands at the heart of our parsimonious model (whereas other components of welfare benefits may reflect additional considerations, like insurance and others). The results are perfectly in-line with our main findings. We also constructed a different index

for the welfare generosity. We calculated the average tax proceeds per capita, excluding the portion for defense expenses.

The dependent variable in Table 2 is medium-skilled versus the low-skilled. The explanatory variables remain the same as in Table 1.

Dependent Variable: Medium-Low Difference in Migration Stock Shares at 2000				
	OLS	OLS	IV	IV
benefits per capita (host country)	-0.215	-0.126	-0.173	-0.152
	(0.082)***	(0.082)	(0.065)***	(0.068)**
benefits per capita (host country) X R	0.198	0.113	0.156	0.139
	(0.082)***	(0.083)	(0.065)***	(0.068)**
migration stock share in 1990 - low skilled	-0.668	-0.666	-0.67	-0.665
	(0.139)***	(0.133)***	(0.139)***	(0.132)***
migration stock share in 1990 - low skilled X R	0.13	0.133	0.132	0.132
	(0.224)	(0.221)	(0.224)	(0.221)
migration stock share in 1990 - medium skilled	0.89	0.895	0.892	0.894
	(0.159)***	(0.152)***	(0.159)***	(0.151)***
migration stock share in 1990 - medium skilled X R	0.293	0.286	0.29	0.287
	(0.402)	(0.401)	(0.402)	(0.401)
high-low labor ratio in 1990 (host country)		-0.065		-0.065
		(0.056)		(0.056)
high-low labor ratio in 1990 (host country) X F		-1.663		-1.614
		(0.485)***		(0.485)***
Observations	400	400	400	400
R-squared	0.727	0.746	0.726	0.746
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 16 (10) source countries whose emigration into the 16 host countries is (not) free; IV: legal originof the host country (English, Scandinavian, German-French) Robust Standard Errors in parentheses				

Table 2

In Table 3 we add gravity-type explanatory variables, such as distance and common language.

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	-0.32
	(0.068)**	(0.070)**	(0.122)**	(0.133)**
benefits per capita (host country) X R	0.159	0.167	0.301	0.34
	(0.072)**	(0.074)**	(0.123)**	(0.134)**
migration stock share in 1990 - low skilled	-0.75	-0.751	-0.742	-0.741
	(0.096)***	(0.095)***	(0.098)***	(0.097)***
migration stock share in 1990 - low skilled X R	1.71	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	-0.72
	(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)		(0.898)
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	0.01
	(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	-0.07	-0.051	-0.057
	(0.084)	(0.085)	(0.082)	(0.084)
GDP per capita (source country) X R	0.031	0.038	0.02	0.026
	(0.084)	(0.086)	(0.083)	(0.085)
Observations	400	400	400	400
R-squared	0.863	0.865	0.86	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 16 (10) source countries whose emigration into the 16 host countries is (not) free;
IV: legal originof the host country (English, Scandinavian, German-French)
Robust Standard Errors in parentheses
* significant at 10%, ** significant at 5%, *** significant at 1%

Table 3

In Table 4, we use sub-periods, prior to 1990, to measure the period average for the benefits.

Dependent variable: High - Low Difference in Migration Stock Shares at 2000					
Average years for the benfits:	80-85	80-90	80-95	80-00	800-05
Benefits per capita (in logs) (host)	-0.054	-0.053	-0.059	-0.061	-0.078
	(0.024)**	(0.023)**	(0.025)**	(0.026)**	(0.032)**
Benefits per capita (in logs) (host) X R	0.026	0.029	0.034	0.037	0.055
	(0.025)	(0.025)	(0.026)	(0.027)	(0.033)
Migration stock share in 1990 - low skilled	-0.762	-0.762	-0.762	-0.762	-0.762
	(0.098)***	(0.098)***	(0.098)***	(0.098)***	(0.098)***
Migration stock share in 1990 - low skilled X R	1.685	1.683	1.683	1.683	1.682
	(0.186)***	(0.186)***	(0.186)***	(0.186)***	(0.187)***
Migration stock share in 1990 - high skilled	1.088	1.088	1.088	1.088	1.088
	(0.132)***	(0.132)***	(0.132)***	(0.132)***	(0.131)***
Migration stock share in 1990 - high skilled X R	-0.741	-0.741	-0.741	-0.741	-0.741
	(0.134)***	(0.134)***	(0.134)***	(0.134)***	(0.134)***
Observations	400	400	400	400	400
R-squared	0.853	0.853	0.853	0.853	0.854

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 16 (10) source countries whose emigration into the 16 host countries is (not) free;
Robust Standard Errors in parentheses
* significant at 10%, ** significant at 5%, *** significant at 1%

Table 4

In Table 5 we shorten the period, prior to 1990, in measuring the period average of the benefits.

Dependent Variable: High-Low Difference in Migration Stock Shares at 2000		
	OLS	OLS
Old age benefits (in logs) 1980-2000 (host)	-0.109	-0.079
	(0.040)***	(0.030)***
Old age benefits (in logs) 1980-2000 (host) X R	0.096	0.093
	(0.042)**	(0.034)***
migration stock share in 1990 - low skilled	-0.763	-0.764
	(0.097)***	(0.097)***
migration stock share in 1990 - low skilled X R	1.680	1.696
	(0.186)***	(0.183)***
migration stock share in 1990 - high skilled	1.088	1.092
	(0.131)***	(0.129)***
migration stock share in 1990 - high skilled X R	-0.741	-0.744
	(0.134)***	(0.131)***
high-low labor ratio in 1990 (host country)		-0.455
		(0.144)***
high-low labor ratio in 1990 (host country) X F		-0.074
		(0.494)
Observations	400	400
R-squared	0.856	0.857
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 emigration into the 16 host countries is (not) free; Robust standard errors in parentheses * significant at 10%; ** significant at 5%; *** significant at 1%		

Table 5

In table 6 we proxy the benefit variable by the index of non-defense spending.

Dependent variable: High - Low Difference in Migration Stock Shares at 2000		
	OLS	OLS
Benefits index (host)	-0.127	-0.083
	(0.049)**	(0.053)
Benefitx index (host) X R	0.102	0.092
	(0.056)*	(0.065)
Migration stock share in 1990 - low skilled	-0.759	-0.762
	(0.098)***	(0.096)***
Migration stock share in 1990 - low skilled X R	1.674	1.692
	(0.186)	(0.182)***
Migration stock share in 1990 - high skilled	1.083	1.089
	(0.123)***	(0.128)***
Migration stock share in 1990 - high skilled X R	-0.736	-0.741
	(0.135)***	(0.131)***
high - low labor ration in 1990 (host country)		-0.424
		(0.209)**
high - low labor ration in 1990 (host country) X F		-0.161
		-0.593
Observations	400	400
R-squared	0.855	0.857
benefits index=log(real GDP per worker*(tax rate - defense expenses/GDP))		
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 16 (10) source countries whose emigration into the 16 host countries is (not) free;		
Robust Standard Errors in parentheses		
* significant at 10%, ** significant at 5%, *** significant at 1%		

Table 6

In Table 7 we add the Gini Coefficient, as an explanatory variable.

Dependent variable: High - Low Difference in Migration Stock Shares at 2000		
	OLS	OLS
Benefits per capita (in logs) 1974 - 1990 (host)	-0.141	-0.109
	(0.050)***	(0.064)*
Benefits per capita (in logs) 1974 - 1990 (host) X R	0.142	0.146
	(0.055)**	(0.072)**
Migration stock share in 1990 - low skilled	-0.755	-0.757
	(0.097)***	(0.095)***
Migration stock share in 1990 - low skilled X R	1.677	1.7070
	(0.814)***	(0.178)***
Migration stock share in 1990 - high skilled	1.076	1.082
	(0.131)***	(0.125)***
Migration stock share in 1990 - high skilled X R	-0.729	-0.734
	(0.134)***	(0.128)***
ginig coeficient (before tax-transfers) (host)	0.084	-0.044
	(0.234)	(0.369)
ginig coeficient (before tax-transfers) (host) X R	-0.226	-0.238
	(0.245)	(0.385)
high - low labor ration in 1990 (host country)		-0.601
		(0.214)***
high - low labor ration in 1990 (host country) X F		0.032
		(0.729)
Observations	400	400
R-squared	0.857	0.859

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 16 (10) source countries whose emigration into the 16 host countries is (not) free;
Robust Standard Errors in parentheses
* significant at 10%, ** significant at 5%, *** significant at 1%

Table 7

All in all, Tables .2-7 lend some support the findings in the baseline table (Table 1). That is, the free-migration coefficient of the benefit is negative (that is, a more generous welfare state attracts relatively more unskilled immigrants and relatively fewer skilled immigrants); and the coefficient measuring the effect of the difference between free and restricted migration is

positive (that is, host countries that regulate migration opt for relatively more skilled immigrants).

7 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 and skilled immigrants may slow down population aging, raise productivity, and thereby help paying for social security. But because immigrants often have low education and high fertility rates, their net fiscal impact may be 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, 1999). 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.[12]

The present paper analyzes the effect of the generosity of the welfare state on the skill composition of migrants. We develop a parsimonious model in which the effect of an increase in the generosity of the welfare state (which implies tax burden) on the skill composition of migrants under free-migration is negative. The reason is that welfare-state benefits attract unskilled migrants because they contribute to tax revenues less than what they gain from benefits; and this generosity works to deter skilled immigrants, because they contribute in taxes more than they receive in benefits. In sharp contrast, the effect of an increase in the generosity (and taxes) of the welfare state on the skill composition of migrants is positive, if migration is controlled by policy. Being net contributors to the welfare state, skilled migrants can help finance a more generous welfare-state system; thus, they are preferred by the policy maker over unskilled migrants. This chapter brings the predictions of the model to cross-sectional data on source-host, OECD-EU country pairs in the year 2000. The identification strategy is to use the decomposition the source-host country pairs into two groups: one group, a "free-migration" group, consists of source-host country pairs within the EU; and another group, "policy-controlled migration" group, consists the pairs from non-EU countries into the EU. We find evidence in support of the predictions

[12] 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 parsimonious model that the generosity of the welfare state adversely affects the skill-composition of migrants under free-migration; but it exerts a more positive effect under a policy-controlled migration regime relative to a free-migration regime.

8 Appendix 1

8.1 Proof of Equation (13)

We first show that $\frac{\partial b(\sigma;\tau)}{\partial \sigma} > 0$. Employing equation (15), we find that

$$\frac{\partial b(\sigma;\tau)}{\partial \sigma} = \frac{A\mu\tau\left(1-\tau\right)^{\varepsilon}}{1+\mu}\left\{\alpha w_s^{\varepsilon}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{1-\alpha}{1+\varepsilon}}\left[1-\frac{\varepsilon\left(1-\alpha\right)\left(1+\mu\right)}{\left(1+\varepsilon\right)\left(1-S+\left(1-\sigma\right)\mu\right)}\right]\right. \tag{27}$$

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

To see this, observe that:

$$\begin{aligned}
&\alpha w_s^{\varepsilon}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{1-\alpha}{1+\varepsilon}} > \left(1-\alpha\right)w_u^{\varepsilon}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{-\alpha}{1+\varepsilon}} \\
&\Leftrightarrow \alpha w_s^{\varepsilon}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{1}{1+\varepsilon}} > \left(1-\alpha\right)w_u^{\varepsilon} \\
&\Leftrightarrow \frac{\alpha}{1-\alpha}\left(\frac{\alpha\theta}{1-\alpha}\right)^{\frac{\varepsilon}{1+\varepsilon}}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{1}{1+\varepsilon}} > 1 \\
&\Leftrightarrow \left(\frac{\alpha\theta}{1-\alpha}\right)^{\frac{2\varepsilon}{1+\varepsilon}} > 1 \\
&\Leftrightarrow \frac{\alpha\theta}{1-\alpha} > 1,
\end{aligned}$$

which is true by assumption, see equation (10). Also, observe that

$$1-\frac{\varepsilon\left(1-\alpha\right)\left(1+\mu\right)}{\left(1+\varepsilon\right)\left(1-S+\left(1-\sigma\right)\mu\right)}>1-\frac{\varepsilon\alpha\left(1+\mu\right)}{\left(1+\varepsilon\right)\left(S+\sigma\mu\right)}$$
$$\Leftrightarrow\frac{\alpha}{\left(S+\sigma\mu\right)}>\frac{\left(1-\alpha\right)}{\left(1-S+\left(1-\sigma\right)\mu\right)}$$
$$\Leftrightarrow\frac{\alpha\theta}{1-\alpha}>1,$$

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

We next observe that

$$\frac{\partial w_s\left(\sigma;\tau\right)}{\partial\sigma}=-\frac{A\alpha\delta^{\varepsilon}\left(1-\alpha\right)\theta^{-\alpha}\mu\left(1+\mu\right)\left(\alpha\delta^{\varepsilon}\theta^{1-\alpha}\right)^{\frac{1}{1+\varepsilon}-1}}{\left(1+\varepsilon\right)\left(S+\sigma\mu\right)^{2}}<0, \tag{28}$$
$$\frac{\partial w_u\left(\sigma;\tau\right)}{\partial\sigma}=\frac{A\alpha\delta^{\varepsilon}\left(1-\alpha\right)\theta^{-\alpha-1}\mu\left(1+\mu\right)\left(\left(1-\alpha\right)\delta^{\varepsilon}\theta^{-\alpha}\right)^{\frac{1}{1+\varepsilon}-1}}{\left(1+\varepsilon\right)\left(S+\sigma\mu\right)^{2}}>0,$$

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

It then 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, she opts for $\sigma^u=1$, no matter what τ is, leading to our conclusion that $\frac{d\sigma^u}{d\tau}=0$.When the decisive voter is a skilled individual, she will opt for a skill composition of migrants, σ^S, which is given by the first-order condition (12). Total differentiation of this first-order condition yields

$$\frac{\partial^2 V_s\left(\sigma;\tau\right)}{\partial\sigma\partial\tau}+\frac{\partial^2 V_s\left(\sigma;\tau\right)}{\partial\sigma^2}\frac{\mathrm{d}\sigma^s}{\mathrm{d}\tau}=0. \tag{29}$$

Given the second-order condition for maximization (that is, $\frac{\partial^2 V_s(\sigma;\tau)}{\partial\sigma}<0$), it follows from the equation above that

$$sign\left(\frac{\mathrm{d}\sigma^s}{\mathrm{d}\tau}\right)=sign\left(\frac{\partial^2 V_s\left(\sigma;\tau\right)}{\partial\sigma\partial\tau}\right). \tag{30}$$

We can see that $\frac{\partial b}{\partial \sigma} = \gamma\tau(1-\tau)^{\varepsilon}$, where γ is positive and independent of τ. Hence, it follows from equation (12) that

$$\begin{aligned}\frac{\partial^2 V_i(\sigma;\tau)}{\partial\sigma\partial\tau} &= \frac{\partial}{\partial\tau}\left[\gamma\tau(1-\tau)^{\varepsilon}\right] + \frac{\partial}{\partial\tau}\left[(1-\tau)\, l_i(\sigma)\frac{\partial w_s(\sigma)}{\partial\sigma}\right] = \\ &= \gamma\left((1-\tau)^{\varepsilon} - \tau\varepsilon(1-\tau)^{\varepsilon-1}\right) - \frac{\partial w_s}{\partial\sigma} w_s^{\varepsilon}(1+\varepsilon)(1-\tau)^{\varepsilon} = \\ &= \left[\gamma\tau(1-\tau)^{\varepsilon}\right]\left(\frac{1}{\tau} - \frac{\varepsilon}{1-\tau}\right) + \left[(1-\tau)\, l_s\frac{\partial w_s}{\partial\sigma}\right]\left(\frac{1+\varepsilon}{\tau-1}\right).\end{aligned} \tag{31}$$

Note that

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

Note also that $\gamma\tau(1-\tau)^{\varepsilon} + (1-\tau)\, l_s\frac{\partial w_s}{\partial\sigma} = 0$ at the level of σ chosen by the skilled workers (see equation (12)).

It then follows that $\frac{\partial^2 V_i^{|}(\sigma;\tau)}{\partial\sigma\partial\tau} > 0$. Hence $\frac{d\sigma^s}{d\tau} > 0$. This completes the proof of equation (13).

8.2 Proof of Equation (18)

Observe from the equations (16) and (17) that

$$\frac{\partial V_i(\sigma,\mu;\tau)}{\partial\tau} = \frac{\mathrm{d}\overline{u}^i(m_i)}{\mathrm{d}m_i}\frac{\mathrm{d}m_i}{\mathrm{d}\tau},\ i\in\{s,u\}. \tag{32}$$

As $\frac{d\overline{u}^i(m_i)}{dm_i} > 0$, we conclude that

$$sign\left(\frac{\mathrm{d}m_i}{\mathrm{d}\tau}\right) = sign\left(\frac{\partial V_i(\sigma,\mu;\tau)}{\partial\tau}\right). \tag{33}$$

Recall that

$$\frac{\partial V_i(\sigma;\tau)}{\partial \tau} = \frac{\partial b}{\partial \tau} - w_i\left(w_i(1-\tau)\right)^{\varepsilon} = \frac{Y}{N} - w_i l_i$$
$$= \frac{w_s l_s(S+m_s) + w_u l_u(1-S+m_u) - w_i l_i(1+m_s+m_u)}{N}. \tag{34}$$

Therefore, for the skilled migrants, it must be the case that

$$\begin{aligned} \frac{\partial V_s(\sigma,\mu;\tau)}{\partial \tau} &= \frac{(1-S+(1-\sigma)\mu)}{N}(w_u l_u - w_s l_s) \\ &= \frac{(1-S+m_u)(1-\tau)^{\varepsilon}}{N}\left(w_u^{1+\varepsilon} - w_s^{1+\varepsilon}\right) < 0, \end{aligned} \tag{35}$$

which implies that m_s is decreasing in τ. For unskilled migrants we have

$$\begin{aligned} \frac{\partial V_u(\sigma,\mu;\tau)}{\partial \tau} &= \frac{(s+\sigma\mu)}{N}(w_u l_u - w_s l_s) \\ &= \frac{(s+m_s)(1-\tau)^{\varepsilon}}{N}\left(w_s^{1+\varepsilon} - w_u^{1+\varepsilon}\right) > 0 \end{aligned} \tag{36}$$

which proves that m_u is increasing in τ.

Lastly, recalling the definition of σ,

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

it follows that

$$\begin{aligned} \frac{\mathrm{d}\sigma}{\mathrm{d}\tau} &= \frac{\frac{\mathrm{d}m_s}{\mathrm{d}\tau}(m_s+m_u) - \frac{\mathrm{d}m_s}{\mathrm{d}\tau}m_s - \frac{\mathrm{d}m_u}{\mathrm{d}\tau}m_s}{(m_s+m_u)^2} = \\ &= \frac{\frac{\mathrm{d}m_s}{\mathrm{d}\tau}m_u - \frac{\mathrm{d}m_u}{\mathrm{d}\tau}m_s}{(m_s+m_u)^2} < 0. \end{aligned} \tag{37}$$

This completes the proof of equation (18).

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