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

Alon Cohen* and Assaf Razin†

October 24, 2008

Abstract

The paper analyzes the effect of the generosity of the welfare state on the skill composition of immigrants. We develop a parsimonious model in which the effect of an increase in the generosity (and taxes) of the welfare state on the skill composition of immigrants 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 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

*Tel-Aviv University

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

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. We take the prediction 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, source-host country pairs within the EU, and another group, "policy-controlled migration" group, the pairs from non-EU countries into the EU. We find evidence in support of the predictions 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 controlled migration, relative to the free migration regime..

1 Introduction

The paper addresses the effect of the generosity of the welfare state on the skill composition of immigrants.

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.[1]

[1]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

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.

The differences in migration policies are also tightly linked to the generosity of the welfare state. 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 soundedness 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.[2]

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.

[2]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

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 migration. Furthermore, voters in relatively more generous welfare states are more likely to opt for migration policies that are more lax towards skilled migration and more tight towards unskilled migration. As a result, countries with more generous welfare systems are expected to have their skill composition of migrants biased towards unskilled migration, relative to countries with less generous welfare systems, if migration is free. The opposite is true when migration is controlled by national policies. Countries with more generous welfare systems are expected to have their skill composition of migrants biased towards skilled migration, if its voters can restrict migration, relative to countries with less generous welfare systems.

In this paper we also confront the predictions of our theory with empirical evidence. We consider the generosity of the welfare state as an exogenous variable, and study the effect of this variable on the skill composition of immigration stocks, in the cases of free and controlled migration. The EU provides a unique testing ground for the predictions of our parsimonious model, as there is more or less free migration among EU member states, whereas each EU member decides on whether, and to what extent, to restrict migration from the rest of the world.

We employ cross-sectional data from 14 EU countries and other 12 OECD

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).

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.

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 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 presents robustness tests, and Section 6 concludes.

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

2 Parsimonious Model of Migration

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 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 given by:

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

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,$i = s, u$.

Total population (native born and immigrants) is:

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

[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).

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:

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

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 level 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:

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

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:

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

2.1 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 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:

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

Differentiating Equation (10), and employing the envelope theorem, yields[5]:

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

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, as the new migrants are yet to enter the country after the vote is taken.

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

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, $\sigma = 1$.

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 preferred by an individual with skill level i in the host country, $i = s, u$,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:[6]

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

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

[6]Fo detailed derivations, see Appendix A.

a larger share of skilled immigrants. The reason is that when the tax rates rise, the redistribution burden upon a skilled decisive voter is increases, and allowing an additional skilled migrant can ease this fiscal burden.

2.2 Free Migration

Assume 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 $\overline{u}^i$ in the source country. There is a continuum of would be 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, $S(V_i)$ of potential migrants from the source country, for each skill level.

Let m_s be the number of skilled migrants, and m_u is the number of unskilled migrants. The proportion of skilled migrants, σ , is uniquely 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 dependent on σ , is rewritten as:

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

The following equations determine, for each τ, the cut-off levels of the

reservation utilities, $\overline{u}^s(\tau)$ and $\overline{u}^u(\tau)$.

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

As the number of migrants of each skill level is determined by the supply of migrants then

$$\#\ m_i(\tau) = S^i(\overline{u}^i(\tau)), i = s, u.$$

We now turn to find the effect of the generosity of the welfare state on the skill mixture of the immigrants. To simplify the analysis we abstract from the general-equilibrium effects of migration rates and labor supplies.[7] Hence, an increase in τ raises the demogrant, b, but lowers the net wage, $w_i(1-\tau)$. For skill migrants the fall in net wage outweighs the increase in the demogrant. Thus, an increase in τ reduces the well-being of skill workers. Consequently, an increase in τ reduces the cut-off reservation utility of skilled migrants, $\overline{u}^s(\tau)$. As a result, those skill 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 the generosity of the welfare state under free migration deters skilled migrants and attracts unskilled migrants; thereby tilting the skill composition of migration towards unskilled migrants.

We show in the appendix that:

$$\frac{d\sigma}{d\tau} < 0 \tag{17}$$

In sum, an exogenous increase of the tax rate, τ, deters skilled immigrants and attracts unskilled immigrants. An increase in τ raises benefits and lowers

[7] The general-equilibrium effects are second-ordere. They do not affect the qualitative results in this sub-section..

disposable private income. Consequently, among the net contributors to the welfare state, skilled migrants, those with high reservation wage decide not to migrate; among those who are potentially net beneficiary from the welfare state, the unskilled workers, infra-marginally change their decision in favor of migration.

3 Empirical Evidence on Welfare Migration

The existing literature addresses the issue of how the welfare-state generosity works as a magnet to migrants —- the "welfare migration" phenomenon.[8] 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. 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 compar-

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

ison 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 US Census data and finds strong evidence in support of welfare-induced migration. Levine and Zimmerman (1999) who employ data for the period 1979-1992, and estimate a probit model find, however, 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. He 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 migrants from outside the EU-15. Using the conditional logit approach, they find that welfare-state benefits do 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. [9] 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

[9] 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.

to three education levels.[10] 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.

Recall that our 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 unbiased results. Other studies that employ samples that are confined to the policy-controlled migration regime, but at the same time employ a model of the migrants' choice, whether to migrate or not, and if so where to migrate to, are evidently inconsistent. In this case the estimates convey little information on the migrant choices (and, therefore on the welfare state as a magnet to unskilled migrants). Rather, the samle conveys information on the migration policy choices by 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 country, and on the individual migrant's migration choices in the source country.

[10]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).

4 Empirical Analysis

4.1 Testable Hypotheses

There are two main predictions of the parsimonious model, which we like to test. First, if migration is free, 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; and move to a less generous host country 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 tilted 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 immigrants, is a deterrent for skilled migration. In the policy-controlled migration regime, however, the interest 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 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.[11]

[11] In the data, possibly, both effects exist. That is, the skill composition of immigrants can be affected both by the political economy equilibrium policy in the host country, as

Formally, an increase in the generosity of the welfare state, as captured by the tax rate, τ, adversely affects the skill composition of migrants, in the free-migration regime, that is $\frac{d\sigma^F}{d\tau} < 0$.

An increase in the generosity of the welfare state has a more pronounced effect on the share of skilled migrants of total migrants when the migration-regime is policy-controlled, that is, $\frac{d\sigma^R}{d\tau} > 0$. Denote by $\sigma^F$and σ^R, respectively, the skill composition of migrants in free migration regime and the policy-controlled regime. Consequently, we expect $\frac{d\sigma^R - \sigma^F}{d\tau} > 0$.

4.2 Identification Strategy

To confront the prediction of the parsimonious model with a 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: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, Spain, Sweden, U.K., Norway and Switzerland. The data for this group, therefore, records bilateral migration stock for any pair of these countries.

well as by the considerations of the immigrant who considers other alternative host countries. Nevertheless, we expect the political economy consideration to be more dominant in restricted migration regimes than in free migration regimes. Similarly, we expect the considerations of the immigrants regarding alternative host countries to be more dominant in free migration regimes than in restricted ones.

The second group includes source-host pairs of countries, within which the source country residents cannot necessarily move freely into either of the host country without any restriction. The host countries are the same 16 countries from the first group; the source countries are 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** restricted by policy controls with respect to migrants from source countries of 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 thee dependent variable, th 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 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 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 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").[12]

[12]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 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.[13]

---

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.

[13]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.

4.3 The Econometric Model

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

$$m^e_{s,h} = \beta^e_0 + \beta^e_1 R_{s,h} + \beta^e_2 B_h + \beta^e_3 R_{s,h} \cdot B_h + X_{s,h}\alpha^e_1 + X_{s,h} R_{s,h} \alpha^e_2 + u^e_{s,h}; \quad (18)$$

$$e \in \{h, l\}\,;\; u^e_{s,h} = \theta_{s,h} + \epsilon^e_{s,h}$$

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

where $m^e_{s,h}$ denotes the ratio of the stock of migrants of skill level e, originated in source country s and residing in host country h, to the stock of all native workers of skill level e in the source, country s,, in the year 2000; R is a dummy variable, whis 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 (18):

$$\Delta m_{s,h} = \Delta\beta_0 + \Delta\beta_1 R_{s,h} + \Delta\beta_2 B_h + \Delta\beta_3 R_{s,h} \cdot B_h + X_{s,h}\Delta\alpha_1 + X_{s,h} R_{s,h}\Delta\alpha_2 + \epsilon_{s,h} \tag{19}$$

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, (19), 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.[14]

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 $\Delta\beta_3 > 0$.

[14]Naturally the estimation of $\Delta\beta$ can be obtained directly from (18), by estimating each skill-dependent equation separately. As all skill-dependent equations in (18) 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, (19), enables us to directly test the significance of the coefficients which are related to the differences in the levels of the explanatory variables.

A potential endogeneity problem, between the level of benefits in the host 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.[15] 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.

4.4 Data Description

Migration data are 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

[15] 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).

migration flows are less reliable than stock data, because flow data disregard 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.

4.5 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

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) free				
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

magnitude of the coefficient is even higher in the IV regressions than the 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 $\sigma^s < \sigma^u$.

4.6 Robustness Tests

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

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	-0.670	-0.665
	(0.139)***	(0.133)***	(0.139)***	(0.132)***
migration stock share in 1990 - low skilled X R	0.130	0.133	0.132	0.132
	(0.224)	(0.221)	(0.224)	(0.221)
migration stock share in 1990 - medium skilled	0.890	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	0.290	0.287
	(0.402)	(0.401)	(0.402)	(0.401)
medium-low labor ratio in 1990 (host country)		-0.065		-0.065
		(0.056)		(0.056)
medium-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 the 16 (10) source countries whose migration into the 16 host countries is (not) free				
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 2: Welfare Migration: The Medium-Low Skilled differential Effect between Free and Policy-Controlled Migration Regimes

As can be seen, the coefficient of welfare benefits, for free migration 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 standrd 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:[16]

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) free				
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

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

[16] 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.

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 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.[17]

[17] An empirical investigation of the effect of the proportion of elderly people in the

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 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.

---

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).

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

[19] 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.

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

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

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

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

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

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

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

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

[28] Sala-i-Martin (1999)

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

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

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

A Proof

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

$$\frac{\partial b(\sigma;\tau)}{\partial \sigma} = \frac{A\mu\tau\left(1-\tau\right)^{\varepsilon}}{1+\mu}\left\{\alpha w_s^{\varepsilon}\left[\frac{\left(1-\alpha\right)\theta^{\varepsilon}}{\alpha}\right]^{\frac{1-\alpha}{1+\varepsilon}}\left[1-\frac{\varepsilon\left(1-\alpha\right)\left(1+\mu\right)}{\left(1+\varepsilon\right)\left(1-s+\left(1-\sigma\right)\mu\right)}\right]\right. \tag{20}$$

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

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*:

$$\frac{\partial w_s\,(\sigma;\tau)}{\partial\sigma} = -\frac{A\alpha\widehat{\alpha}^{\varepsilon}\,(1-\alpha)\,\theta^{-\alpha}\mu\,(1+\mu)\left(\alpha\widehat{\alpha}^{\varepsilon}\theta^{1-\alpha}\right)^{\frac{1}{1+\varepsilon}-1}}{(1+\varepsilon)\,(s+\sigma\mu)^2} < 0 \qquad (21)$$

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

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:

$$\frac{\partial V_s^{\shortmid}(\sigma;\tau)}{\partial \tau} + \frac{dV_s^{\shortmid}(\sigma;\tau)}{d\sigma}\frac{d\sigma^s}{d\tau} = 0 \tag{22}$$

Given the second order condition assumption:

$$sign\left(\frac{d\sigma^s}{d\tau}\right) = sign\left(\frac{\partial^2 V_s^{\shortmid}(\sigma;\tau)}{\partial\sigma\partial\tau}\right) \tag{23}$$

Hence, it follows that

$$\begin{aligned}
&\frac{\partial^2 V_i^{\shortmid}(\sigma;\tau)}{\partial\sigma\partial\tau} = \frac{d}{d\tau}\left[\gamma\tau(1-\tau)^{\varepsilon}\right] + \frac{d}{d\tau}\left[(1-\tau)\,l_i(\sigma)\,\frac{dw_s(\sigma)}{d\sigma}\right] = \\
&= \gamma\left((1-\tau)^{\varepsilon} - \tau\varepsilon(1-\tau)^{\varepsilon-1}\right) - \frac{dw_s(\sigma)}{d\sigma}w_s^{\varepsilon}(\sigma)(1+\varepsilon)(1-\tau)^{\varepsilon} = \\
&= \left[\gamma\tau(1-\tau)^{\varepsilon}\right]\left(\frac{1}{\tau} - \frac{\varepsilon}{1-\tau}\right) + \left[(1-\tau)\,l_i(\sigma)\,\frac{dw_s(\sigma)}{d\sigma}\right]\left(\frac{1+\varepsilon}{\tau-1}\right)
\end{aligned} \tag{24}$$

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 $\frac{\partial^2 V_i^{\shortmid}(\sigma;\tau)}{\partial\sigma\partial\tau} > 0$.

Hence $\frac{d\sigma^s}{d\tau} > 0$.

2. Observe from the equations in the text that:

$$\frac{\partial V_i(\sigma,\mu;\tau)}{\partial\tau} = \frac{d\overline{u}^i(m_i)}{dm_i}\frac{dm_i}{d\tau},\ i \in \{s,u\} \tag{25}$$

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

$$sign\left(\frac{dm_i}{d\tau}\right) = sign\left(\frac{\partial V_i(\sigma,\mu;\tau)}{\partial\tau}\right) \tag{26}$$

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:

$$\frac{\partial V_s(\sigma,\mu;\tau)}{\partial\tau} = \frac{(1-s+(1-\sigma)\mu)}{N}(w_u l_u - w_s l_s) = \tag{27}$$
$$= \frac{(1-s+m_u)(1-\tau)^{\varepsilon}}{N}\left(w_u^{1+\varepsilon} - w_s^{1+\varepsilon}\right) < 0$$
$$\Leftrightarrow w_u < w_s$$

which entails that m_s decreases.

Whereas, for unskilled migrants:

$$\frac{\partial V_u(\sigma,\mu;\tau)}{\partial\tau} = \frac{(s+\sigma\mu)}{N}(w_u l_u - w_s l_s) = \tag{28}$$
$$= \frac{(s+m_s)(1-\tau)^{\varepsilon}}{N}\left(w_s^{1+\varepsilon} - w_u^{1+\varepsilon}\right) > 0$$
$$\Leftrightarrow w_u < w_s$$

which entails that m_u increases.

Recall that:

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

Hence, it follows that

$$\frac{d\sigma}{d\tau} = \frac{\frac{dm_s}{d\tau}(m_s+m_u) - \frac{dm_s}{d\tau}m_s - \frac{dm_u}{d\tau}m_s}{(m_s+m_u)^2} = \tag{29}$$
$$= \frac{\frac{dm_s}{d\tau}m_u - \frac{dm_u}{d\tau}m_s}{(m_s+m_u)^2} < 0$$