Skill Composition of Migration and the Generosity of the Welfare State: Free vs. Policy-Restricted Migration

Alon Cohen* and Assaf Razin†

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(comments are welcome!)

Abstract

The paper analyzes the effect of the generosity of the welfare state on the skill composition of immigrants. 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 the welfare state serves as a magnet to the unskilled, and as a deterent to skilled immigrants. However, this effect is positive under political-economy-based policy restrictions on migration. The reason is that skilled immigrants are net contributors to the welfare state,

*Tel-Aviv University

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

whereas unskilled immigrants are net consumers of it. We confront the prediction of the model with data, using cross section immigration stocks of OECD countries in the year 2000. Our identification strategy is to decompose the source-host country pairs into two groups: "free migration" (within the EU) and "policy-restricted migration" (from non-EU countries into the EU). Plausibly, this decomposition is exogenous to the dependent variable, the skill composition of immigrants. We find supportive evidence of the main prediction of the model.

1 Introduction

Free labor mobility has been one of the important hallmarks of the European Union (and its predecessor, the European Community). Freedom of movement and the ability to reside and work anywhere within the EU is one of the fundamental rights to which all those countries are obligated towards each other.[1] Thus far, however, there is no coordinated EU policy concerning migration from non EU countries into EU countries. Labor mobility into the EU members states is restricted by national policies, whereas labor mo-

[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 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.

bility within the EU is not. This state of affairs offers economists a fertile ground to test hypotheses about the different mechanisms underlying free and restricted migration.

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, the native born population is both declining and ageing. A dwindling productive workforce needed to finance the increased economic burden of the costly welfare-state institutions puts a downward pressure on output growth. The decisive voter in such an ageing welfare state may opt for a migration policy which will upgrade the skill composition of immigration.[2]

There is a large controversy in the economic literature regarding the overall fiscal influence of migration on host economies. Some argue that the net tax revenue generated by immigrants is not significant because immigrants consume much of the benefits they produce - especially in terms of health care, pension and education. However, especially in light of the rapid demographic changes, migration is often viewed as a policy that may come to the

[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 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).

rescue the welfare state institutions. This view reflects the fact that the flow of immigrants can alleviate the current demographic imbalance, by influencing the age structure of the host economy. Therefore, even if migration does not provide in itself a full-fledged long-term solution to falling birth rates and ageing population, migration policy is considered to be one of the available tools within a broader policy mix; such as importantly a policy which admits immigrants based on their skills.

The paper analyzes the effect of the generosity of the welfare state on the skill composition of immigrants. 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 the welfare state serves as a magnet to the unskilled, and as a deterrent to skilled immigrants. However, this effect is positive under political-economy-based policy restrictions on migration. The reason is that skilled immigrants are net contributors to the welfare state, whereas unskilled immigrants are net consumers of it.

We confront the prediction of the model with data, using cross section immigration stocks of OECD countries in the year 2000. Our identification strategy is to decompose the source-host country pairs into two groups: "free migration" (within the EU) and "policy-restricted migration" (from non-EU countries into the EU). Plausibly, this decomposition is exogenous to the dependent variable, the skill composition of immigrants.

The paper is organized as follows. Section 2 briefly describes related literature, focusing on the interaction between international migration and the welfare state. Section 3 develops a static stylized model of migration, separated into two alternative options. In the first option, equilibrium migration

is achieved under policy restriction within the host country, capturing the interests of the voters therein; in the second option migration is free and determined in accordance with the incentives of the immigrants. In section 4 we provide some evidence to our main hypothesis, using cross section data of within-EU migration and of migration from outside the EU into the EU. Section 5 concludes.

2 Literature Background

TBC

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 2002a).

Migration is often viewed as an economic force, which can mitigate the fiscal burden induced by the process of aging since an inflow of young working age immigrants may slow down population aging and help paying for social security. 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 the 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 reach the conclusion that

since immigrants have lower education and higher fertility rates than that of the native-born, a higher amount of immigrant admitted into the economy will east temporarily the projected fiscal burden of retiring baby boomers in few decades although its overall fiscal consequences would be quite small. 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 obligation of the fiscal system to pay pension benefits to the incoming migrants, when they retire, could be shifted forward indefinitely. If, hypothetically, the world would come to a stop at a certain point of time in the future, the young generation at that point would bear the deferred cost of the present migration. But in an ever-lasting economy, the migrants, by supplying work and helping the financing the pension benefit of period zero to native-born retirees, are a boon to the host country population: old, young, and future generations.

Empirical works regarding welfare-state and immigrants can be divided into several categories. Some of the works address the simple question: do immigrants pay their way in the welfare-state (Borjas (1991, 1994, 1996)). In other words, do they take from the welfare-state more than they contribute to it. This question heavily relies on the relative skill composition of immigrants. Although this question is not entirely separated from the issues dealt with here, we will not address it directly.

A different group of works relate to the effect of immigration over the welfare-state benefits. Razin, Sadka and Swagel (2002) use data for 11 European countries during 1974-1992. They find that the labor tax rates decreases with the share of immigrants within the host country's population. This re-

sult, however, is not robust to switching the dependent variable into the social transfers per capita. They also find some evidence that the medium and high educated group among the immigrants have a positive effect over the tax rates. Facchini, Razin and Willmann (2004) treat welfare-benefits and immigration as endogenous. Some of the regressions showed that the leakage effect dominates and some showed the opposite. Nevertheless, we do not address the impact of migration over welfare-state policy directly in this work. We do, however, relate to its possible biasing effect over our primary empirical interest, which to is explore the welfare effect on the skill composition of immigrants.

A massive group of works examine how does welfare-state measures affect immigration features. Brueckner (2000) provides a broad description of empirical studies regarding welfare migration. The evidence of whether the welfare magnet effect actually exists, are mixed. Southwick (1981) uses data within U.S. to show that high benefits gap between origin and destination regions, increases the share of benefit recipients among the immigrants. Gramlich and Laren (1984) use a sample of 1980 U.S. Census data. Their calculation implies that high benefits region will have twice as many welfare recipients immigrants, than it would otherwise. Blank (1988) employs a multinomial logit model, showing that welfare benefits have a significant positive effect over the location choice of female-headed households. Enchautegui (1997) also find the expected positive effect of welfare benefits over the migration decision of women with young children, using the U.S. 1980 Census data. She estimates that additional 100$ in the value of states welfare package per month leads to nearly a doubling of migration. Meyer (1998, 2000)

uses conditional logit model as well as comparison group method over the 1980 and 1990 U.S. Census data. He finds significant welfare induced migration, particularly for high school dropouts. However, the estimates are fairly modest, suggesting that over five years period, less than 2% of high-school dropouts single mothers were motivated to migrate to receive welfare-state benefits. Borjas (1999) examines the geographic location of immigrants. He uses the 1980 and 1990 Census and finds that low skilled immigrants are much more heavily clustered in high benefit states, in comparison to other immigrants or natives. Gelbach (2000) use the same data, but more refined control groups, finding 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, as migration costs are lower for these individuals.

On the other hand, Walker (1994) find opposite results using 1980 U.S. Census data. The benefits gap between the origin and destination countries is found to have no significant effect over the ratio of poor women to poor men. In a following work, Walker (1995) uses the 1990 Census data, ending up with opposite result. That is, he finds strong evidence to welfare induced migration. His estimates implies that a 85$ difference in the monthly welfare aid between two states increases the migration of poor women by 39%. Levine and Zimmerman (1999) reinforces these results, for dataset during 1979-1992. They estimate a probit model of the probability to relocate. The welfare benefit is found to have no effect over the probability of female-headed households (the recipients of the benefits) to relocate, in comparison to several control groups.

Only few works have been studying the welfare magnet effect outside the U.S. In Facchini, Razin and Willmann (2004) there is an empirical attempt to capture the interaction between tax-welfare and immigration, both as endogenous variables. The results were not conclusive. The analysis supported the welfare magnet argument, when labor tax rates captured the welfare-state program. However when replaced by transfers per capita, the results were not statistically significant. A simpler approach is taken by Peridy (2006), who uses migration rates in 18 OECD countries from 67 source countries, as dependent variable. Welfare-state benefits ratio (destination to source country) are measured by total public spending, and is found to have positive effect migration. De Giorgi and Pellizzari (2006) conduct an empirical investigation of migrants from outside the EU-15, distributed in 14 countries of the European Union. They are divided into males and females, as well as according to three levels of education attainment. The migrants arrived between 1970-1994, and the data separates them according to their arrival year. Using conditional logit approach, they find that, in general, welfare benefits do attract immigrants. Somewhat opposite to the above findings, however, women's propensity to emigrate are less affected by welfare benefits. When interacted with education level, welfare benefits show a clear positive effect on the probability of the lowest group of education. The secondary and tertiary education groups are not significantly different. This results indicate that all education groups are positively effected by the welfare benefits, without significant difference.[3]

[3]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

The working hypothesis in this study is that migration flows of skilled and unskilled are mainly determined by the choice made by the emigrants from the source countries. Our approach is to estimate the determinants of immigrants flows from the migration-policy perspective of the host country.

There is a different finding by Docquier at el. (2006). Their work relate to migration stocks in the OECD countries by 2000, where migrants are separated into three education levels, by 184 countries of origin[4]. They find that social welfare programs encourage the migration of both skilled and unskilled migrants. This results is obtained for several alternatives for measuring welfare programs. However, the unskilled are motivated by social expenditure much more than the skilled. This evidence can suggest that the marginal skill composition of immigrants is adversely effected by the welfare-state benefits.

This study, however, does not differentiate among source-host pairs between which migration flows is free, and source-host pairs between which migration flows is restricted.

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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.

[4]The data used in Part 3 of this work is extracted from the same database used in Docquier et al. (2006), that is, the database presented in Docquier and Marfouk (2006).

3 Policy-Restricted vs. Free Migration: Theory

Assume a simple Cobb-Douglas production function, with two kinds of labor inputs, skilled and unskilled[5]:

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

where Y is the GDP, A denotes Hick neutral productivity parameter and L_i denotes the aggregate labor of skill level i, where $i = \{s, u\}$, for skilled and unskilled, respectively.

In competitive markets, the wage of skill type i, w_i, is determined as follows:

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

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

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

where we normalize the number of native born to 1, s is the share of native born skilled in the total native born labor supply, σ is the share of skilled immigrants in the total flow of immigrants, μ is the total number of immigrants and l_i is the labor supply of an individual with skill level i.

[5]The data to be used in this work is cross section stocks of immigrants. In order to interpret the estimation we choose, therefore, a non-dynamic model, which captures the main mechanisms underlying free versus policy-restricted migration.

Total population (native born and immigrants) is therefore:

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

We assume a uniform labor income tax, τ, levied by the government and redistributed equally to all residents. The government budget constraint:

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

where b is the benefit per capita (all residents are assumed eligible for these benefits) and τ is the income tax rate.

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.

The individual budget constraint is:

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

Individual optimization yields the labor supply as follows[6]:

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

Solving the model (using equations (1), (2), (3) and (8)) yields the equilibrium wages, as follows:

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

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

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

[6]Second order condition is satisfied without further assumption.

To get $w_s > w_u$, we assume:

$$\frac{\alpha\theta}{1-\alpha} > 1 \tag{10}$$

3.1 Policy-Restricted Migration

Migration policy is determined in the host country by the median voter. Assume that the host country faces a perfectly elastic supply of immigrants of each one of the two skill types.

The indirect utility of an individual with skill level i can be written as:

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

We assume that the policy decisions on τ and μ are exogenous, and we focus on σ. Setting the derivative of the indirect utility function, with respect to σ, equal to zero, we get[7]:

$$\frac{dV_i(\sigma)}{d\sigma} = \frac{db}{d\sigma} + (1-\tau)\, l_i(\sigma)\, \frac{dw_i(\sigma)}{d\sigma} = 0 \tag{12}$$

The share of skilled immigrants, σ, has two effects on the indirect utility. First, an increase in σ increases labor productivity and thereby the level of benefits, b. Second, an increase in σ depresses skilled labor wages and raises unskilled labor wages. If the median voter is unskilled, both effects are positive. Thus, the unskilled median voter is unambiguously for skilled immigration. If the domestic median voter is skilled, however, the two effects are conflicting, one compared to the other each other. On one hand, larger

[7] We assume that second order condition for maximization holds and use the envelope theorem in equation (12).

supply of skilled workers put downward pressure on skilled labor wages. On the other hand, the increase in labor productivity raises benefits. Therefore the share of skilled immigrants as preferred by a skilled median voter is lower than the share of skilled immigrants as preferred by an unskilled median voter.

Define σ^i as the share of skilled immigrants that is most preferred by an individual with skill level i in the host country. We can now show (see Appendix A) that:

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

Namely, if the median voter is an unskilled individual, then an exogenous increase in the tax rate, τ, does not change the policy concerning the skill composition of immigrants. The reason is that the unskilled median voter prefers only skilled immigrants anyway. If, however, the median voter is a skilled individual, an exogenous increase in the tax rate, τ, will change the migration policy in the direction of larger share of skilled immigrants. The reason is that when the tax rates are higher, the redistribution burden upon a skilled median voter is higher, and therefore additional skilled immigrants can alleviate such burden. Naturally, if the political economy mechanism weights, to some extent, the preferences of both skill types, one can expect that the share of skilled immigrants increases with the tax rate (or the benefits rates).

3.2 Free Migration

We now assume that there is no restriction on immigration whatsoever. Each potential immigrants compares her/his prospect utility in the host country with reservation utility in the source country, $\overline{u}^i$. We make two simplifying

assumption in that regard. First, the source country is relatively small. That is, its outgoing migrants cannot affect labor supply, productivity and wages in the host countries. Second, The individuals in the source country, in each skill level, are a continuum (with respect to any other quality other than labor skills, for instance, migration costs). Hence the reservation utility level in the source country for a skill-type i individual increase with the emigration of skill type i individuals.

This simple setup aims to exhibit that if all other things are equal, a typical skilled immigrants would rather move into a country that has a less generous welfare programs, due to its redistributive nature. An unskilled immigrant, however, would rather move into the more generous country under the same conditions.

For simplicity of exposition we redefine our migration variables as follows:

$$\begin{aligned} m_s &= \sigma\mu \\ m_u &= (1-\sigma)\,\mu \end{aligned} \tag{14}$$

where m_s is the number of skilled immigrants and m_u is the number of unskilled immigrants.

In equilibrium, taking into account the labor equation, (8), the utilities in both countries must be equal for both skills:

$$V_i(\sigma,\mu;\tau) = b + \frac{1}{1+\varepsilon}\left(w_i(1-\tau)\right)^{1+\varepsilon} = \overline{u}^i(m_i),\ i=\{s,u\} \tag{15}$$

The set of equation in (15) implicitly determines the equilibrium quantities of immigrants, m_s and m_u.

Total derivative of both equations in (8) with respect to the tax rate, τ,

yields:

$$\frac{\partial b}{\partial \tau} - w_i \left(w_i \left(1-\tau\right)\right)^{\varepsilon} = \frac{d\overline{u}^i \left(m_i\right)}{dm_i} \frac{dm_i}{d\tau},\ i \in \{s,u\} \tag{16}$$

We show in the appendix that:

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

Namely, an exogenous increase of the tax rate, τ, deters skilled immigrants and attracts unskilled immigrants. The reason is simple. If migration has no effect on the markets in the host countries, then only the direct effect exists. Namely, more benefits on the one hand, and less disposable income on the other hand. Consequently, those who are net contributors to the welfare state (skilled workers) suffers and those who are net earners of the welfare state (the unskilled workers) benefit.

3.3 Main Hypothesis

We can summarize the main predictions of the theory subsections, as follows:

$$\frac{d\sigma^R}{d\tau} \geq 0;\ \frac{d\sigma^F}{d\tau} < 0 \tag{18}$$

where σ^R denotes the share of skilled immigrants if migration is restricted by policy, and σ^F denotes the share of skilled immigrants if migration is free.

Namely, if migration is free, the generosity of the welfare state has an adverse effect on the skill composition of immigrants. A typical skilled immigrant would choose to move to a less generous country with lower tax rates rather than to a more generous country with higher tax rates, other things being equal. If, however, the skill mixture of migration is determined by policy, then the generosity of the welfare state has a positive effect on

it. The reason is that skilled immigrants are net contributors to the welfare state, whereas unskilled immigrants are net consumers of it. Therefore, skilled immigrants are more important for the susceptibility of the welfare state.

Both results hinge on the redistributive nature of the welfare state. Under free migration, equilibrium migration reflects (among other) the interests of the immigrants. Thus, a generous welfare state inflicts a fiscal burden on skilled immigrants. This serves as a deterrent. In the policy-restricted migration regime, however, political-economy considerations of the native born in the host country are prominently at play. Therefore, the fiscal burden of a generous welfare state falling on skilled native born, induces this group to endorse higher rates of skilled immigration. The unskilled native born is in favor of maximum level of skilled immigration, both for redistributive reasons and for labor complementarity reasons. The positive effect of the generosity of the welfare state on the skill-composition of immigrants is more pronounced as the political power of the skilled native born is stronger.

In reality, of course, it could be that 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 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. Hence, our hypothesis relates to the differential effect of the welfare state on the skill

composition of immigrants across both regimes:

$$\frac{d\sigma^R}{d\tau} > \frac{d\sigma^F}{d\tau} \tag{19}$$

4 Empirical Analysis

This section confronts the main theoretical hypothesis with data.

4.1 Choice of Data and Identification

We choose to confront the prediction of the model with a cross section data of source-host developed country pairs. We decompose the data into two groups. The first group contains only source-host pairs of countries which enable free mobility of labor among themselves. They also prohibit any kind of discrimination between native born and immigrants, regarding labor market accessibility and welfare-state benefits eligibility. These are 16 European countries (all members of the OECD): 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.

The second group includes only source-host pairs of countries, within which the source country residents cannot necessarily move 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 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 assume that migration is free among the 16 countries of the first group, and is effectively restricted by policy with respect to immigrants from the 10 remaining countries. Therefore, we 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 skill composition of immigrants, is that it 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 supranationalism, 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 either of 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 entail 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").[8]

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

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[9].

4.2 The Econometric Model

TBC

Assume that emigration stock rates are explained by the following equation:

$$m^e_{s,h} = \beta^e_0 + \beta^e_1 R_{s,h} + \beta^e_2 B_h + \beta^e_3 R_{s,h} \cdot B_h + X_{s,h}\alpha^e + u^e_{s,h}; \qquad (20)$$

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

$$R_{s,h} = \begin{cases} 1, & \{s,h\} \subsetneq EU \\ 0, & \text{otherwise} \end{cases}$$

where $m^e_{s,h}$ describes the source-host immigration stocks divided by their source country population peers in the year 2000, of skill-level e individuals

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.

[9] 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.

(either high or low skill-level). R is a dummy variable, equals 1 if the source-host pair exercise free migration between them, and zero otherwise. B_h denotes the lagged average benefits per capita in the host country h, between 1974-1990. The remaining controls and their interaction with the dummy variable R are denoted by $X_{s,h}$; α is a vector of their coefficients. The control variables include the source-host immigration stocks divided by their source country population peers in the year 1990; and the shares of skilled and unskilled native born of the host country in 1990. The error term is depicted by $u^e_{s,h}$, which can be divided into two elements: variables with skill independent effect, $\theta_{s,h}$, and variables with 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 stock rate, m, for each skill level. In order to obtain the effect of the benefits per capita over the skill composition of the immigrants, we define a skill-difference model (a version of difference-in-difference model), by subtracting the two equations in (20):

$$\Delta m_{s,h} = \Delta\beta_0 + \Delta\beta_1 R_{s,h} + \Delta\beta_2 B_h + \Delta\beta_3 R_{s,h} \cdot B_h + X_{s,h}\Delta\alpha + \epsilon_{s,h} \quad (21)$$

where Δ is the skill-difference operator.

The dependent variable, Δm, can be considered as a measure for the skill composition of immigrants. The skill-differences model, (21), 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.[10]

[10]Naturally the estimation of $\Delta\beta$ can be obtained directly from (20), by estimating

An important statistical feature of the skill-differences model is that it eliminates part of the error term, $\theta_{s,h}$. Any variable whose impact over immigration is skill invariant, is canceled out. Additionally, including past migration stocks accounts for all time invariant effects.

The null hypothesis is that $\Delta\beta_3 > 0$. That is, the differential effect of the welfare state generosity across free and policy-restricted migration is predicted from the model to be positive.

4.3 Data Description

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Immigration data is taken from Docquier and Marfouk (2006). The data contains bilateral stock of immigrants, based on census and register data, for the years 1990 and 2000. As indicated by Docquier and Marfouk (2006), stock variables are more attractive for analysis than flow analysis. The main reason is that flow data are less reliable than stock data, as flow data disregards return migration movements, which may distort the estimated effects. Moreover, endogenous dynamic of equilibrium rates, are better captured by stocks than flows. 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). Non-movers, that is, the stock of the domestic-origin labor

each skill-dependent equation separately. As all skill-dependent equations in (20) 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, (21), enables us to directly test the significance of the results.

force for all the countries, are also recorded.

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

4.4 Results

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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 variable of interest is the interaction between the EU dummy variable and the benefits per capita. The null hypothesis is that $\Delta\beta_3 > 0$, where $\Delta\beta_3$ is the coefficient of the variable of interest (benefits pc 1974-1990 (H) X R). As can be seen, the coefficient is positive and significant at 5% in all of the regressions. Specifically, it is different from the benefits' coefficient (benefits pc 1974-1990 (H)), which captures, as predicted, the adverse effect of the welfare state generosity on the skill composition of immigrants, in the "free migration" group.[11]

[11] Note that the quantitative effect of the generosity of the welfare state on the skill mixture of immigrants in the "policy-restricted migration group" is not significantly different than zero, as verified by an F test.

Dependent Variable: High-Low Difference in Emigration Stock Rates at 2000				
	OLS	**OLS**	**IV**	**IV**
benefits pc 1974-1990 (H)	-0.139	-0.110	-0.199	-0.208
	(0.049)***	(0.049)**	(0.079)**	(0.086)**
benefits pc 1974-1990 (H) X R	0.135	0.125	0.195	0.224
	(0.054)**	(0.056)**	(0.079)**	(0.087)**
emigration stock rate 1990 - low	-0.755	-0.758	-0.750	-0.750
	(0.097)***	(0.097)***	(0.098)***	(0.099)***
emigration stock rate 1990 - low X R	1.673	1.718	1.669	1.710
	(0.185)***	(0.176)***	(0.185)***	(0.177)***
emigration stock rate 1990 - high	1.076	1.082	1.071	1.071
	(0.131)***	(0.128)***	(0.132)***	(0.131)***
emigration stock rate 1990 - high X R	-0.729	-0.733	-0.723	-0.722
	(0.134)***	(0.131)***	(0.135)***	(0.134)***
host labor 1990 - low		0.013		0.013
		(0.007)*		(0.007)*
host labor 1990 - low X F		0.025		0.004
		(0.023)		(0.023)
host labor 1990 - high		-0.036		-0.036
		(0.012)***		(0.012)***
host labor 1990 - high X F		0.005		0.023
		(0.041)		(0.039)
Observations	400	400	400	400
R-squared	0.857	0.859	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) necessarily 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: Table Caption

4.5 Robustness Tests

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5 Conclusion

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References

[1] ***TBC***

[2] 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, G.J., 1999. Heaven's door: immigration policy and the american economy. Princeton University Press, Princeton, N.J.

[4] 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.

[5] 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.

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

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

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

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

[10] Razin, A., Sadka, E., 2000. Unskilled migration: a burden or a boon for the welfare state. Scandinavian Journal of Economics 102, 463–479.

[11] Razin, A., Sadka, E., Swagel, P., 2002b. Tax burden and migration: a political economy theory and evidence, Journal of Public Economics 85,167–190.

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

A Proof

1. The first order condition of equation (11), with respect to σ, given the envelope theorem[12], is:

$$\frac{dV_i(\sigma)}{d\sigma} = \frac{db}{d\sigma} + (1-\tau) l_i(\sigma) \frac{dw_i(\sigma)}{d\sigma} = 0 \tag{22}$$

Developing the first term of equation (22):

$$\frac{db}{d\sigma} = A\frac{\mu\tau(1-\tau)^{\varepsilon}}{1+\mu}\left\{\alpha w_s^{\varepsilon}\left[\frac{(1-\alpha)\theta^{\varepsilon}}{\alpha}\right]^{\frac{1-\alpha}{1+\varepsilon}}\left[1-\frac{\varepsilon(1-\alpha)(1+\mu)}{(1+\varepsilon)(1-s+(1-\sigma)\mu)}\right]\right. \tag{23}$$

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

To see why $\frac{db}{d\sigma} > 0$, observe that:

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

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

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

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

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

[12] We assume the second order condition holds, $\frac{dV_i^2(\sigma)}{d\sigma^2} < 0$.

which is true by assumption, equation (10). Additionally, 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, equation (10). Hence, the effect of high skilled over the benefits is positive if and only if the wage of the skilled is higher than the wage of unskilled, as predicted, given the simple redistribution quality of the rendered benefits.

Developing the second term of equation (22):

$$\frac{dw_s\left(\sigma\right)}{d\sigma}=-\frac{A\alpha\widehat{\alpha}^{\varepsilon}\left(1-\alpha\right)\theta^{-\alpha}\mu\left(1+\mu\right)\left(\alpha\widehat{\alpha}^{\varepsilon}\theta^{1-\alpha}\right)^{\frac{1}{1+\varepsilon}-1}}{\left(1+\varepsilon\right)\left(s+\sigma\mu\right)^{2}}<0 \qquad (24)$$
$$\frac{dw_u\left(\sigma\right)}{d\sigma}=\frac{A\alpha\widehat{\alpha}^{\varepsilon}\left(1-\alpha\right)\theta^{-\alpha-1}\mu\left(1+\mu\right)\left(\left(1-\alpha\right)\widehat{\alpha}^{\varepsilon}\theta^{-\alpha}\right)^{\frac{1}{1+\varepsilon}-1}}{\left(1+\varepsilon\right)\left(s+\sigma\mu\right)^{2}}>0$$

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

Therefore, the preferences of the unskilled exhibit corner solution, $\sigma^u = 1$, since both effects are positive. The skilled may prefer interior solution, $0<\sigma^s<1$, under some technical conditions: $\frac{dV_s(1)}{d\sigma}<0<\frac{dV_s(0)}{d\sigma}$.

Clearly, a change in the tax-benefits scheme will not change σ^u. However, the skilled would prefer higher rate of skilled immigrants should the tax burden is increased. Total differentiation of their preferences yields:

$$\frac{\partial V_s^{\shortmid}\left(\sigma;\tau\right)}{\partial\tau}+\frac{dV_s^{\shortmid}\left(\sigma;\tau\right)}{d\sigma}\frac{d\sigma^s}{d\tau}=0 \qquad (25)$$

Given the second order condition assumption:

$$sign\left(\frac{d\sigma^{s}}{d\tau}\right)=sign\left(\frac{\partial V_{s}^{\shortmid}\left(\sigma;\tau\right)}{\partial\tau}\right) \tag{26}$$

Define $\frac{db}{d\sigma}\equiv\gamma\tau\left(1-\tau\right)^{\varepsilon}$ according to equation (23), where γ is positive and independent of τ. Hence:

$$\begin{aligned}&\frac{\partial V_{i}^{\shortmid}\left(\sigma;\tau\right)}{\partial\tau}=\frac{d}{d\tau}\left[\gamma\tau\left(1-\tau\right)^{\varepsilon}\right]+\frac{d}{d\tau}\left[\left(1-\tau\right)l_{i}\left(\sigma\right)\frac{dw_{s}\left(\sigma\right)}{d\sigma}\right]= \\ &=\gamma\left(\left(1-\tau\right)^{\varepsilon}-\tau\varepsilon\left(1-\tau\right)^{\varepsilon-1}\right)-\frac{dw_{s}\left(\sigma\right)}{d\sigma}w_{s}^{\varepsilon}\left(\sigma\right)\left(1+\varepsilon\right)\left(1-\tau\right)^{\varepsilon}= \\ &=\left[\gamma\tau\left(1-\tau\right)^{\varepsilon}\right]\left(\frac{1}{\tau}-\frac{\varepsilon}{1-\tau}\right)+\left[\left(1-\tau\right)l_{i}\left(\sigma\right)\frac{dw_{s}\left(\sigma\right)}{d\sigma}\right]\left(\frac{1+\varepsilon}{\tau-1}\right)\end{aligned} \tag{27}$$

Observe that $\frac{\partial V_{i}^{\shortmid}(\sigma;\tau)}{\partial\tau}$ is presented as the weighted first order condition (equation (22)). The first weight is $\frac{1}{\tau}-\frac{\varepsilon}{1-\tau}$; the second weight is $\frac{1+\varepsilon}{\tau-1}$. We now turn to compare these weights:

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

Recall that the weights are multiplied by two elements with opposite signs but equal absolute value (since it is the first order condition). Since the first weight is bigger than the second weight, and it multiplies a positive element, it must be that $\frac{\partial V_{i}^{\shortmid}(\sigma;\tau)}{\partial\tau}>0$.

2. Total derivative of both equations in (8) with respect to the tax rate, τ, yields:

$$\frac{\partial V_{i}\left(\sigma,\mu;\tau\right)}{\partial\tau}=\frac{d\overline{u}^{i}\left(m_{i}\right)}{dm_{i}}\frac{dm_{i}}{d\tau},\ i\in\left\{s,u\right\} \tag{28}$$

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

$$sign\left(\frac{dm_i}{d\tau}\right) = sign\left(\frac{\partial V_i\left(\sigma,\mu;\tau\right)}{\partial\tau}\right) \tag{29}$$

Therefore:

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

For the skilled immigrants:

$$\frac{\partial V_s\left(\sigma,\mu;\tau\right)}{\partial\tau} = \frac{\left(1-s+\left(1-\sigma\right)\mu\right)}{N}\left(w_u l_u - w_s l_s\right) = \tag{30}$$
$$= \frac{\left(1-s+m_u\right)\left(1-\tau\right)^{\varepsilon}}{N}\left(w_u^{1+\varepsilon} - w_s^{1+\varepsilon}\right) < 0$$
$$\Leftrightarrow w_u < w_s$$

For unskilled immigrants:

$$\frac{\partial V_u\left(\sigma,\mu;\tau\right)}{\partial\tau} = \frac{\left(s+\sigma\mu\right)}{N}\left(w_u l_u - w_s l_s\right) = \tag{31}$$
$$= \frac{\left(s+m_s\right)\left(1-\tau\right)^{\varepsilon}}{N}\left(w_s^{1+\varepsilon} - w_u^{1+\varepsilon}\right) > 0$$
$$\Leftrightarrow w_u < w_s$$

Recall that:

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

Hence:

$$\frac{d\sigma}{d\tau} = \frac{\frac{dm_s}{d\tau}\left(m_s+m_u\right) - \frac{dm_s}{d\tau}m_s - \frac{dm_u}{d\tau}m_s}{\left(m_s+m_u\right)^2} = \tag{32}$$
$$= \frac{\frac{dm_s}{d\tau}m_u - \frac{dm_u}{d\tau}m_s}{\left(m_s+m_u\right)^2} < 0$$