Individual attitudes towards migration: a reexamination of the evidence*

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PRELIMINARY VERSION

Abstract

Recent economic research has highlighted the importance of labor-market and welfare-state mechanisms in the explanation of individual attitudes towards immigration. By contrast, political scientists argue that attitudes are mostly determined by individual cultural values and beliefs. This paper takes a fresh look at this debate and contains the following contributions to the literature. First, we address the problem that unobserved cultural values and beliefs might be correlated with education, a potential source of bias in the estimations. Second, we compile a detailed database on the education levels of immigrants and natives and on the degree of fiscal redistribution in European countries. Third, our econometric estimates rely on a simple structural model, taking individual heterogeneity (with respect to education) explicitly into account. The structural model enables us to evaluate quantitatively the importance of the labor-market and welfare-state channels and of other individual factors (such as cultural values and beliefs). Our results show that the labor-market and welfare-state mechanisms play a significant role in explaining individual attitudes. However, the quantitative importance of these two mechanisms turns out to be rather limited compared to other individual factors.

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1 Introduction

Although migration has been the neglected factor in globalization, its importance is rising fast. In Europe, many countries have seen important immigration flows in recent years and a large share of new jobs is occupied by immigrants. In 2003, 9% of the population in Austria was composed by immigrants, 8% in Belgium, 9% in Germany, 40% in Luxembourg, 7% in Spain, 20% in Switzerland and 5% in United Kingdom[1]. These trends can be expected to continue in the future, with growing migration pressure on the supply side and increasing needs for young workers in ageing societies. However, public opinion is not very favorable to further immigration in many European countries. For policy makers, it is crucial to understand the underlying causes of individual attitudes towards immigration. Are they mainly due to fears about labor market competition? Or are natives seeing immigration as a threat to the welfare state?

Recent economic research on attitudes toward migration applies individual-level data to distinguish labor market and welfare state channels. According to the first channel, the skill level of immigrants relative to that of natives influences the natives' receptiveness toward immigration (Scheve and Slaughter, 2001; Mayda, 2006; O'Rourke and Sinnott, 2006). Natives are more receptive to immigrants whose skills are complementary to their own (e.g., high-skill natives are in favor of low-skill immigration). More recently, Facchini and Mayda (2009) and Hanson et al. (2007) argue that individual attitudes depend also on the expected impact of immigration on the tax-benefit system in modern welfare states. In particular, low-skill immigrants might represent a burden especially for high-income natives in a redistributive system where low-income individuals receive (net) assistance from the state. By contrast, Hainmueller and Hiscox (2007) argue that attitudes toward immigration are mostly determined by individual values and beliefs, i.e. some individuals place greater value on ethnic diversity because of their cultural background. Dustman and Preston (2007) use a factor model to statistically compare the relative effect of the economic and non-economic channels. The existing literature does not succeed entirely in disentangling these different motives because the correlation between education and (unobserved) cultural values and beliefs has not been accounted

[1]Source: OCDE (2007)

for.

Our paper sheds new light on this debate and differs from past contributions in three respects. First, we exploit the fact that in the European Social Survey (2002), the same individual answers different questions on the desirability of immigration. Hence, we are able to take account of an individual-specific effect, capturing unobserved beliefs and values about immigration in general. Second, our econometric estimates rely on a simple structural model, taking individual heterogeneity (with respect to education) explicitly into account. Third, we use recent OECD data about the level of human capital of immigrants and natives in European countries, which allows us to measure the relative skill of immigrants with greater precision than in past work. In the following paragraphs, we discuss each aspect in turn.

We address the concern raised by Hainmueller and Hiscox (2007) that existing estimates of the relationship between education (or human capital) and attitudes towards immigration might be biased due to unobserved beliefs about immigration. First, we confirm their point that cultural values and beliefs seem to be linked more closely to immigration in general than to immigration from a specific region of origin. Second, we exploit the fact that each individual answers questions about the desirability of immigrants from different origins (rich or poor European countries, rich or poor non-European countries). By estimating jointly attitudes towards different immigrant groups, we are able to control for unobserved individual factors that are linked to attitudes toward immigration in general.

Second, the use of a structural model with a continuous indicator of human capital enables us to identify the elasticity of substitution between (raw) labor and human capital. If this substitution elasticity is large (as we find), the impact of immigration on relative wages is small. This indicates that natives do not perceive the labor market channel as very important and tends to show that welfare state considerations are relatively more important. This result sheds new light on the relative importance of the labor market and welfare state channels, from an economic rather than statistical point of view.

Third, consistently with the theoretical model, we calculate relative skill ratios using a recent OECD

(2008a) dataset. The relative skill ratios are defined for each destination country, and for different immigrant groups, based on a direct measure on the educational levels of immigrants. Therefore our relative skill ratio is much less subject to measurement error than the proxies (e.g. GDP per capita) used in previous contributions.

This paper is structured as follows. Section 2 presents the theoretical model and section 3 details the data. Section 4 reports on the findings and Section 5 presents the conclusion.

2 Theoretical Model

This section describes the simple economic model that will help us to determine how concerns about the labor market and and about the welfare state influence attitudes towards immigrants. We develop the model in two steps. First, the labor-market mechanism is analyzed using a model without taxation. Second, we consider the welfare-state channel by introducing a linear tax-benefit schedule in the model. Because of the assumption of a balanced government budget, the tax-benefit schedule has to adapt to the arrival of new immigrants. We will consider two polar cases: either the benefit changes (at constant marginal tax rates) or the marginal tax rate varies (at constant per capita benefits).

2.1 The Labor Market Model

Suppose there are L^N national citizens and L^M immigrants in the economy. Each individual i supplies one unit of "raw" labor and h_i units of human capital. Aggregate output is given by $Y = F(H, L)$, where $L = L^N + L^M$ and $H = \sum_i h_i$ and F is an aggregate production function exhibiting constant returns to scale. Per capita output can be written as $y \equiv Y/L = F(H/L, 1) \equiv f(h)$, where $h = H/L$ is the per capita human capital stock.[2]

[2]Physical capital can be added to the model without changing the qualitative conclusions if perfect international mobility of capital is assumed. To see this, define aggregate output as $Y = G(K, H, L)$, where G is an aggregate production function with constant returns to scale. A factor-price constrained revenue function (Neary, 1985) can be defined as $\tilde{G}(r, H, L) = \max_K\{G(K, H, L) - rK\}$. With the world rental rate of capital r^* given, the optimal stock of physical capital is defined implicitly by $\partial G/\partial K = r^*$ and $\tilde{G}$ has the same properties as an unconstrained revenue (or aggregate production) function, as shown by Neary (1985). Moreover, $\tilde{G}$ is linearly homogeneous with

With perfectly competitive factor markets and profit maximization by the representative firm, prices and marginal products of production factors are equalized. Marginal products are given by $f'(h)$ (human capital) and $f(h) - hf'(h)$ (raw labor). Earnings of individual i (holding h_i units of human capital and 1 unit of raw labor) can therefore be written as

$$y_i = f(h) - hf'(h) + h_i f'(h_i) = f(h) + (h_i - h)f'(h). \tag{1}$$

We assume that individuals consider small changes in the average human capital h of their country when they are asked about their immigration preferences. A small change in human capital has the following impact on an individual's income:

$$dy_i = (h_i - h)f''(h)dh. \tag{2}$$

The economy's average human capital stock h increases (decreases) with immigration if immigrants are on average more (less) skilled than current residents. In the empirical implementation of the model, we consider different groups of immigrants, according to their region of origin. Denoting $h^m = H^m/L^m$ the average human capital of immigrants of group m, we have $dh = (h^m - h)(dL^m/L)$. Combining the latter expression with (refweq2) yields

$$z_i^m \equiv \frac{dy_i/y}{dL^m/L} = \left(\frac{h_i}{h} - 1\right)\left(1 - \frac{h^m}{h}\right)\frac{1}{\sigma}\theta_H\theta_L, \tag{3}$$

where σ is the elasticity of substitution between the inputs raw labor and human capital and θ_H and θ_L are the share of human capital and of raw labor in aggregate income.[3]

In view of the interpretation of our empirical results, it is useful to represent the relation between individual human capital and attitudes towards immigration as defined by equation (3). Figure 1 depicts the case where immigrants are on average less educated than the resident population (1 −

respect to H and L. Therefore, if we assume that r^* does not change with immigration, we can redefine f as follows: $f(h) = \tilde{G}(r^*, H/L, 1)$.

[3]Note that $[-hf''(h)f(h)]/[f'(h)[f(h) - hf'(h))]$ equals the inverse of the elasticity of substitution σ.

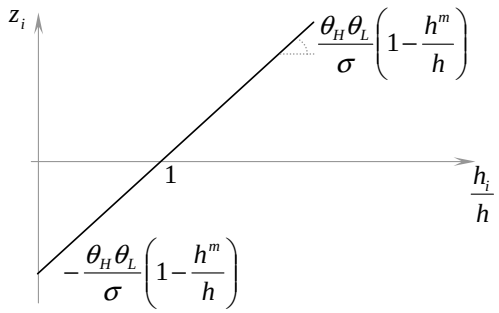

Figure 1: Labor Market Mechanism (Low-Skill Immigration, $h^m < h$)

$h^m/h > 0$). Due to labor market competition, immigration reduces earnings of low-skilled natives and increases earnings of high-skilled natives.

When considering several countries, it is useful to introduce subscript c for each destination country. In view of the estimation, we rewrite equation (3) as:

$$z_{ic}^m = \frac{dy_{ic}/y_c}{dL_c^m/L_c} = \frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\frac{1}{\sigma}\theta_H\theta_L + \gamma_c^m, \tag{4}$$

where $\gamma_c^m = \left(\frac{h_c^m}{h_c} - 1\right)\frac{1}{\sigma}\theta_H\theta_L$ collects all terms that are specific by country and by immigrant group.

2.2 Adding the Welfare State

The economic model can be extended to incorporate welfare state considerations by introducing income redistribution. This is the other major determinant of attitudes according to the recent economic literature (Facchini and Mayda, 2009; Hanson et al., 2007). Redistribution is accomplished using a linear tax-benefit schedule. A constant marginal tax rate t is applied to each individual's income and each individual receives an identical benefit b. We require that the government's budget is balanced, which implies: $tf(h) = b$. Earnings of an individual i can now be rewritten as: $y_i = (1-t)[f(h) + (h_i - h)f'(h)] + b$.

With immigration, the tax-benefit schedule has to be adjusted in order to ensure a balanced budget of the government. Following Facchini and Mayda (2009), we focus on the two extreme cases

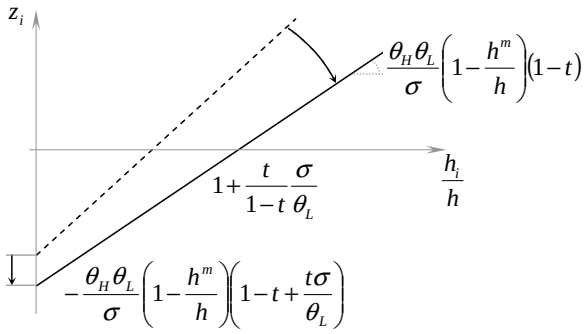

Figure 2: Welfare Mechanism - Benefit Adjustment (Low-Skill Immigration, $h^m < h$)

where either the taxation level t remains constant and the benefit b adjusts, or the benefit remains constant and the marginal tax rate adjusts. The next paragraphs detail these two cases.

If we consider a constant marginal tax rate (b endogenous), a shock in tax revenues would lead to an adjustment in the level of the benefit. Therefore we have $tf'(h)dh = db$ and equation (3) becomes:

$$z_i^m = \frac{dy_i/y}{dL^m/L} = \left(\frac{h_i}{h} - 1\right)\left(1 - \frac{h^m}{h}\right)\frac{1}{\sigma}\theta_H\theta_L(1-t) - \left(1 - \frac{h^m}{h}\right)t\theta_H. \tag{5}$$

How does the introduction of the welfare state change the relation between individual human capital and attitudes towards immigration? We consider the case of low-skill immigration where the benefit level adjusts to ensure a balanced government budget. Figure 2 compares the pure labor market model (dashed line) with the complete model which includes income redistribution. Two changes stand out. First, low-skill immigration represents a net cost for the tax-benefit system and entails therefore a decrease in the income of all natives. This is reflected by a downward shift in figure 2. Second, taxation lowers the return to education and decreases therefore the slope in figure 2. It should be emphasized however, that the slope does not change sign, compared to the pure labor market model, if benefits adjust and the marginal tax rate is constant.

In view of the estimation, we can rewrite equation (5) as

$$z_{ic}^m = \frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\frac{1}{\sigma}\theta_H\theta_L - t_c\frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\frac{1}{\sigma}\theta_H\theta_L + \omega_c^m, \tag{6}$$

where $\omega_c^m = \left(1 - \frac{h_c^m}{h_c}\right)\left(\frac{t}{\sigma}\theta_H\theta_L - \frac{1}{\sigma}\theta_H\theta_L - t\theta_H\right)$ collects all terms that are specific by country and by immigrant group.

Turn now to the alternative case where the marginal tax rate t adjusts to compensate a variation in government revenues. Considering the benefit b constant, the marginal tax rate t is endogenous, $tf'(h)dh + f(h)dt = 0$, and equation (3) becomes:

$$z_i^m = \frac{dy_i/y}{dL^m/L} = \left(\frac{h_i}{h} - 1\right)\left(1 - \frac{h^m}{h}\right)\left(\frac{1}{\sigma}\theta_H\theta_L(1-t) - t\theta_H^2\right) - \left(1 - \frac{h^m}{h}\right)t\theta_H. \tag{7}$$

In the case of low-skill immigration, the marginal tax rate has to increase in order to ensure a balanced government budget. As a consequence, highly skilled natives have to bear a greater share of the welfare cost from immigration than unskilled natives. This adjustment is reflected by a large change in the slope in figure 3. As the analytical expression makes clear, the rotation is much larger than in the previous case and individual human capital and attitudes towards immigration may even become negatively related if the fiscal costs of low-skill immigration are higher than the complementarity advantages in the labor market. The latter outcome will be observed in countries with a large welfare state (i.e. a large initial t). As the benefit level is kept constant in this case, low-skill natives are better protected than in the benefit-adjustment case (the downward shift in figure 3 is less pronounced).

In view of the estimation, we can rewrite equation (7) as

$$z_{ic}^m = \frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\frac{1}{\sigma}\theta_H\theta_L - t_c\frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\left(\theta_H^2 + \frac{1}{\sigma}\theta_H\theta_L\right) + \kappa_c^m, \tag{8}$$

where $\kappa_c^m = \left(1 - \frac{h_c^m}{h_c}\right)\left(\frac{t}{\sigma}\theta_H\theta_L - \frac{1}{\sigma}\theta_H\theta_L - t\theta_H + t\theta_H^2\right)$ collects all terms that are specific by country and by immigrant group.

2.3 Cultural Values and Beliefs

In the economic model spelled out above, worries about labor market competition and the welfare state are the only determinants of natives' attitudes toward immigrants. In contrast, recent research

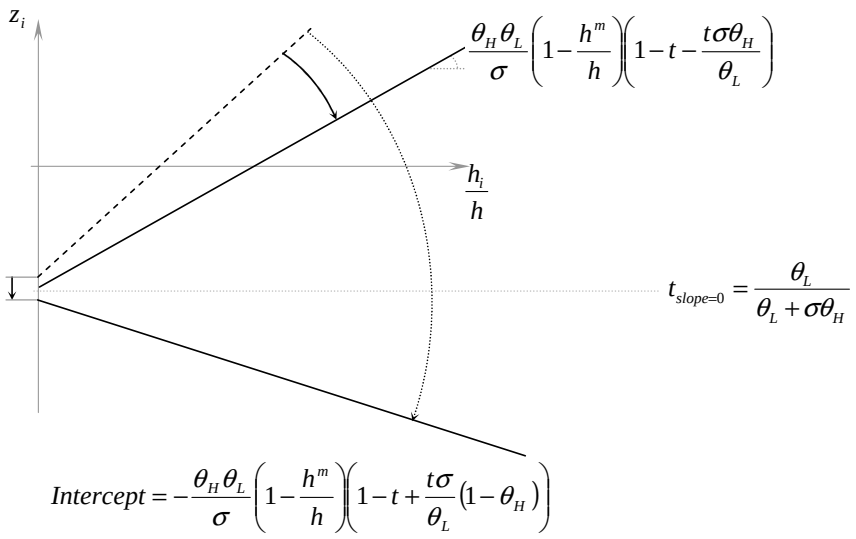

Figure 3: Welfare Mechanism - Tax Adjustment (Low-Skill Immigration, $h^m < h$)

in other disciplines (see Hainmueller and Hiscox, 2007) suggests noneconomic explanations for these attitudes. According to these authors, cultural or ideological factors would have a primary impact on natives' opinions, above any economic mechanism. Moreover, Hainmueller and Hiscox (2007) posit a correlation between openness to other cultures and the natives' education level, and relate low education levels and "xenophobic or racist predilections". In their view, education is not a proxy for human capital but has a direct link to general attitudes towards immigration. More educated individuals support more cultural diversity, regardless of the immigrants' skill level.

The correlation between education and openness towards other cultures is particularly a problem in the econometric analysis, since it implies a missing variable in equations (4) to (8). Clearly, the estimate equation incorporates not only a stochastic error ϵ_{ic}^m, but also a missing "cultural" or "ideological" variable correlated with the individual level of education. This important issue is addressed in the empirical analysis.

3 Data

3.1 Attitudes Towards Immigrants

Data on attitudes are taken from the first round of the European Social Survey (ESS) which covers the period 2002-2003.[4] This round of the ESS included a rotating module with detailed questions about attitudes to immigration, according to the location and the wealth of the immigrant's origin country. Using a scale from 1 (few) to 4 (many)[5], a respondent living in country C answers different versions of the question: "to what extent do you think country C should allow people from [region of origin] to come and live here?". The four regions of origin (and the corresponding answers) are the following:

rich_eur: allow many/few immigrants from richer countries in Europe

poor_eur: allow many/few immigrants from poorer countries in Europe

rich_out: allow many/few immigrants from richer countries outside Europe

poor_out: allow many/few immigrants from poorer countries outside Europe

Compared to previous studies, the analysis of this data base presents the advantage of assessing attitudes toward immigrants, taking into account individual variability. In other words, not only the general opinion concerning migration is available, but each respondent can express different attitudes according to the origin of immigrants. Figure 4 indicates the average opinions expressed in each destination country. In each destination country, these attitudes exhibit little variability with respect to the origin of the immigrants. Broadly speaking, respondents are either receptive or hostile to immigration regardless of the immigrants' origin (from Europe or not, from a rich country or not). At first glance this observation gives some support to the arguments of Hainmueller and Hiscox (2007) who point out that individuals base their attitudes more on cultural values and beliefs than on economic factors. While the economic factors would depend on the characteristics of immigrants relative to the characteristics of natives, the cultural factors and beliefs would depend solely on the education level of the native. Moreover, as these beliefs relate to immigration in

[4]Table A.1 in the appendix lists destination countries and their respective frequency in the survey. For more information, see `http://www.europeansocialsurvey.org/`

[5]Original questions use an inverted scale.

general, an individual tends to answer in the same way the four questions above, disregarding the origin of the immigrant.

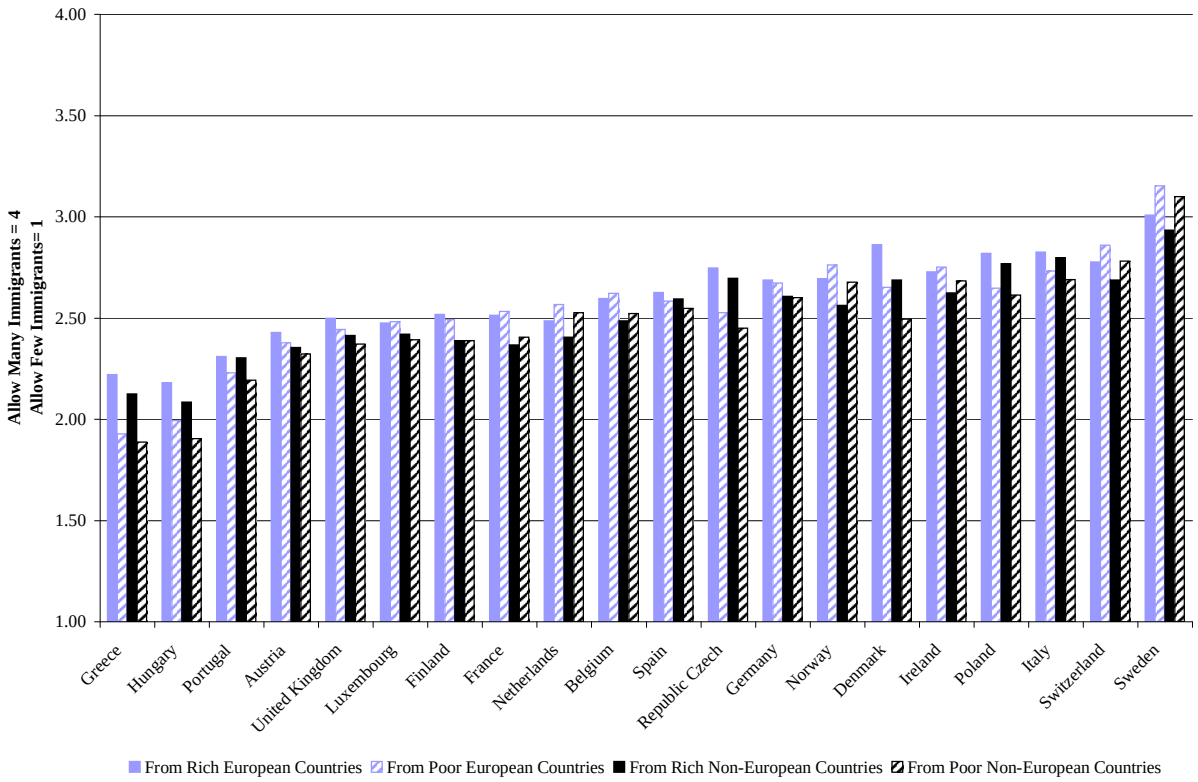

Figure 4: Average Attitudes by Destination Country

In the context of our analysis, it is important to check whether cultural values and beliefs are related to attitudes to immigration in general or if they vary with the origin of immigrants. Thus, we decompose the answer to each of the four questions into a general component (common to all questions) and a component which is specific to the origin of the immigrants (rich or poor countries). The general component of attitudes is measured as the average attitude toward immigrants regardless whether they come from poor or rich countries. The specific attitude is the deviation of the attitudes regarding each category of immigrant (poor or rich) from the average. If the argument of Hainmueller and Hiscox (2007) stands, one would expect that individual cultural beliefs are more correlated with the general component than with specific attitudes. The ESS survey provides some questions with a cultural content (e.g."Is the country's cultural life undermined or enriched by immigrants?"). Table 1 presents the decomposition of the covariances between attitudes and some

"cultural content" questions. One can see that these "cultural opinions" are mostly correlated with the general component of attitudes. Specific attitudes to immigrants from poor countries (or from rich countries) are only weakly correlated to these individual opinions. Taking the second question as an example, this decomposition is formalized by:

$$Cov(ind\_opinion, poor\_eur) = Cov(ind\_opinion, avg\_eur) + Cov(ind\_opinion, \Delta poor\_eur)$$

where $avg\_eur = (poor\_eur + rich\_eur)/2$ and $\Delta poor\_eur = poor\_eur - avg\_eur$

More than 90% of the covariance between the opinion that "immigrants undermine a country's culture" and attitudes toward immigrants from poor countries can be attributed to the general component of attitudes. This result, and the other decompositions in table 1, seem to confirm the existence of individual values that are related to immigration in general. Our econometric analysis below take this into account.

Table 1: Decomposition of the Covariances: Some Native's Individual Characteristics

Individual Native's Opinions	Europe				RoW			
	allow poor immig?		allow rich immig.?		allow poor immig?		allow rich immig?	
Immigrants:	average	deviation	average	deviation	average	deviation	average	deviation
1. contribute to taxes?	89.2%	10.8%	113.8%	-13.8%	87.4%	12.6%	116.9%	-16.9%
2. bring down wages?	89.9%	10.1%	112.7%	-12.7%	89.9%	10.1%	112.7%	-12.7%
3. should belong to the majority's race?	96.4%	3.6%	103.9%	-3.9%	96.8%	3.2%	103.4%	-3.4%
4. undermine country's culture?	90.7%	9.3%	111.5%	-11.5%	90.1%	9.9%	112.4%	-12.4%
5. get crime problem worse?	89.2%	10.8%	113.8%	-13.8%	87.2%	12.8%	117.2%	-17.2%
6. should be christian?	88.4%	11.6%	115.1%	-15.1%	86.6%	13.4%	118.3%	-18.3%
7. should be white?	86.9%	13.1%	117.7%	-17.7%	84.6%	15.4%	122.2%	-22.2%

Note: Original questions are: 1. taxes and services: immigrants take out more than they put in or less, 2. average wages/salaries generally brought down by immigrants, 3. allow many/few immigrants of same race/ethnic group as majority, 4. country's cultural life undermined or enriched by immigrants, 5. immigrants make country's crime problems worse or better, 6. qualification for immigration: christian background, 7. qualification for immigration: be white.

3.2 Measure of Human Capital

In our model, two indicators play a crucial role: the ratio between a native's human capital and his country's average human capital (h_{ic}/h_c), and the ratio between immigrants' human capital and the host country's average human capital (h_c^m/h_c). To ensure consistent measurement, we will use a single data source for each of the two ratios (ESS for the former, OECD (2008b) for the latter) and define a measure of human capital that is consistent with our theoretical framework. Our measure of human capital is inspired by the empirical growth literature (Klenow and Rodriguez-Clare, 2005)

where human capital per capita is defined as a Mincerian function of schooling: $e^{\rho s}$, where s denotes years of schooling attainment.[6]

Our model differs from the aggregate production function used in these growth models because we distinguish "raw" labor from human capital. Therefore, our measure of human capital should exclude the return to raw labor. In our model, individual income is given by $y_i = F_L + F_H h_i$ whereas the Mincer model states that $y_i = ce^{\rho s_i}$, where ρ is the return to schooling (s_i). To ensure consistency between the two, we define individual human capital as $h_i = (ce^{\rho s_i} - F_L^0)/(F_H^0)$ where superscript 0 denotes values at the initial equilibrium. Defining the marginal productivity of "raw labor" as $F_L^0 = ce^{\rho s_{min}}$ (and assuming that $F_H^0 = F_L^0$ by choice of units) yields the following measure of individual human capital:

$$h_i = e^{\rho(s_i - s_{min})} - 1 \tag{9}$$

where s_{min} denotes "minimum" years of schooling which correspond to our definition of raw labor. The return to schooling ρ is set to 8.5%, following Klenow and Rodriguez-Clare (2005) who rely on the returns estimated by Psacharopoulos and Patrinos (2004) for a large set of countries.

Now turn to the measure of the ratio h_{ic}/h_c. The ESS survey presents two main variables concerning native individual education. The variable *edulvl* provides the level of education according to the following categories: not completed primary education, primary or first stage of basic, lower secondary or second stage of basic, upper secondary, post secondary non-tertiary, first stage of tertiary, second stage of tertiary. The variable *eduyrs* provides the years of education for each individual. We want to translate the different education levels into years of schooling attainment, regardless of how many years it takes an individual to reach a given education level. Therefore our measure of the individual years of schooling s_i of natives is defined as the median (in the entire sample) of *eduyrs* within each education level (*edulvl*). Individual human capital is then calculated using (9)

[6] A more complete version of the Mincer model would include individuals' work experience in addition to schooling. We do not include years of experience in our measure of human capital. First, experience could only be measured as *potential* experience using data on age (e.g., experience=age-schooling years-6), involving important measurement errors especially for women. Second, the literature agrees on the fact that substitution across experience groups is much easier than substitution between education levels. Our measure of human capital should reflect primarily differences between education levels since in our model, human capital and raw labor are imperfect substitutes.

and h_c is obtained by averaging over the natives of each country c. As the lowest education level in our sample corresponds to 4 years of schooling, we set s_{min} to 4.

Data on immigrants' education level are obtained from OECD (2008).[7] The level of education is provided for natives and immigrants by categories following the International Standard Classification of Education (ISCED) 1997.[8] In the data, four categories gather the six levels of ISCED classification, namely: primary level (ISCED 0/1/2), secondary level (ISCED 3/4), tertiary level 1 (ISCED 5A/5B) and tertiary level 2 (ISCED 6). Following the ISCED definitions and according to educational system the European countries, we attributed a certain number of years to each education category.[9]

To define the four group of immigrants that appear in the survey questions, we have to distinguish "poorer countries" from "richer countries" in Europe and in the Rest of the world. In both regions, we classify countries with a GDP per capita higher than $10,000 as "rich countries" and all others as "poor countries" (source: *World Development Indicators* for the year 2003). This classification yields country groups that seem to correspond to the general perception of rich and poor countries. For example, Hungary and Gabon are considered to be poor countries (for a complete listing, see figures A.1 and A.2 in appendix I). Our classification of rich countries is also very close to the category of "high income" countries established by the World Bank.[10]

Is it true that immigrants from poor countries are generally less educated than natives, as many authors assume? The database helps to shed light on this question. Figure 5 plots the relative level of human capital ($h_c^m/h_c - 1$) of immigrants from poor countries of Europe against the relative level of immigrants from rich countries of Europe (Figure 6 does the same for countries outside Europe). In both figures the first quadrant includes destination countries where immigrants from

[7] Docquier et al. (2009) provide another, widely used database on stocks of immigrants and natives by education level. As the disaggregation of education levels is finer in OECD (2008), we chose to use the latter.

[8] Available at http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm

[9] We attribute 8 years to the primary level, 12 years to the secondary level, 15 years to the tertiary level 1 and 17 years to the tertiary level 2.

[10] The World Bank divides countries into four groups according to their GNI per capita. For the year 2003 the categories were defined as follows: low income, $735 or less; lower middle income, $736 - $2,935; upper middle income, $2,936 - $9,075; and high income, $9,076 or more.

rich and poor countries have a higher level of education than the total population. Here we find countries as diverse as Great Britain, Ireland, Hungary, Italy, Portugal and Spain. In the second quadrant immigrants from rich countries are more educated than total population while immigrants from poor countries are less educated than total population. Finally, the third quadrant indicates destination countries where immigrants from rich and poor countries have a lower level of education than the total population. The only clear pattern that seems to emerge from these two figures is that most countries can be found above the 45 degree line. This indicates that in most host countries, immigrants from rich countries are more educated than immigrants from poor countries.

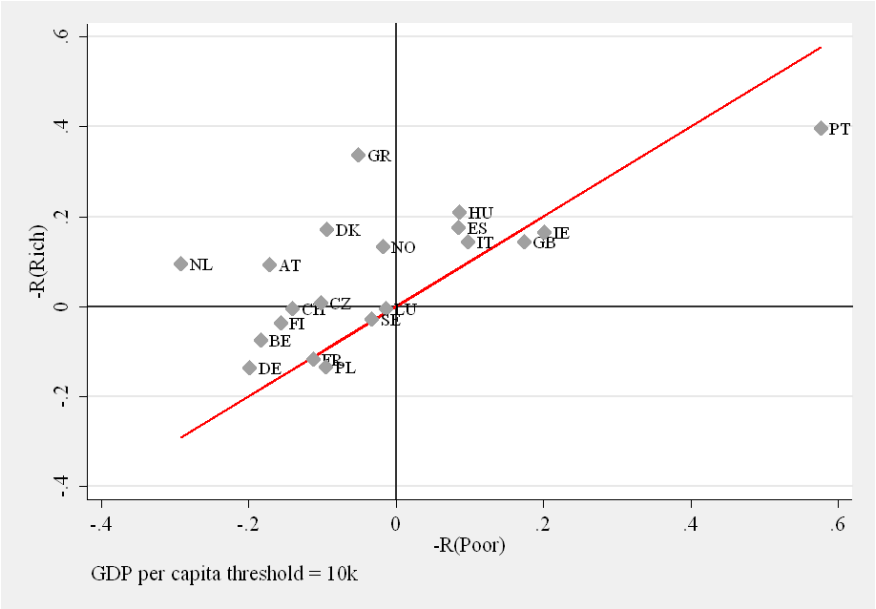

Figure 5: Immigrant's Human Capital from European Countries (threshold=10k)

3.3 Other Explanatory Variables

In our model, the welfare state is represented by a simple linear tax-benefit system. To measure the degree of redistribution in all destination countries, we rely on indicators published by the OECD in the *"Taxing Wages"* series. For all 20 destination countries, we estimate marginal tax rates that are representative of the real income tax paid by wage earners. The OECD provides average and marginal tax rates at four different points of the wage distribution for adult, full-time workers in

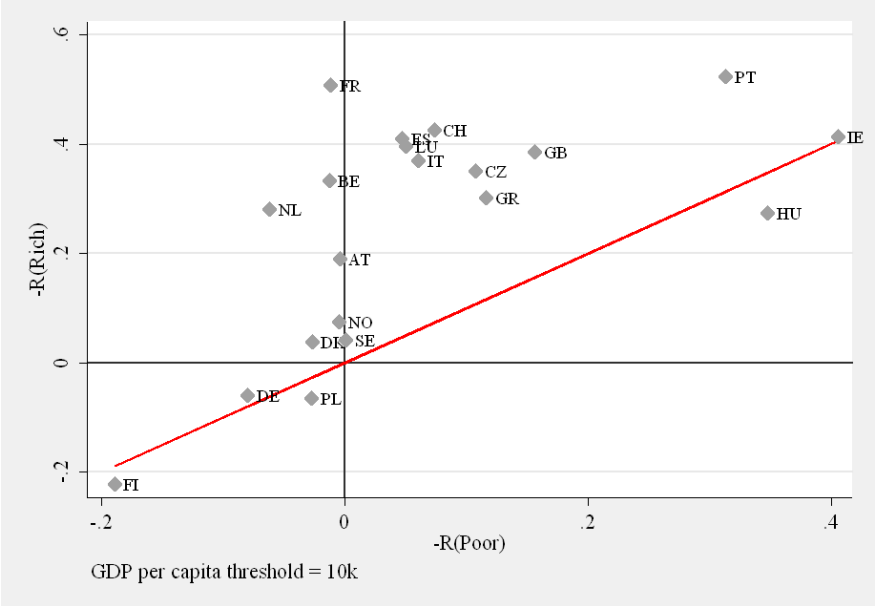

Figure 6: Immigrant's Human Capital from RoW countries (threshold=10k)

manufacturing sectors: at 67%, 100%, 133% and 167% of average earnings.[11]

We use two simple methods to estimate a unique marginal tax rate for each country, based on the tax schedule for single wage earners. First, we calculate a simple average of *marginal* tax rates at the four points of the income distribution. Second, we adjust a linear tax-benefit schedule to the *average* tax rates at the four points of the wage distribution.[12] Reassuringly, the two simple methods yield very similar results (see Table 2). The only noticeable differences between the two methods appear when there is a large jump in marginal tax rates at one point of the income distribution (Greece, United Kingdom). In the following section, we report estimation results using the tax data obtained from the first method but none of our results change significantly if we use the alternative data set.

[11]Prior to 2004-2005, the OECD calculated average earnings only for manual workers in manufacturing. We use the "new definition" which is an average for both manual and non-manual workers in manufacturing.

[12]Denote the tax paid by the individual by $T = tY - b$, where Y is the individual's income. The average tax rate is $T/Y = t - b(1/Y)$. Therefore, we regress the average tax rate on the inverse of income. The constant term of the regression is the estimated unique marginal tax rate.

Table 2: Marginal Income Tax Rates (Percentages)

Country	Average of Marginal Rates	Regression on Average Rates
Austria	28.1	29.2
Belgium	43.5	43.6
Czech Republic	17.5	16.4
Denmark	46.2	47.8
Finland	40.9	41.7
France	26.3	26.0
Germany	42.8	42.0
Greece	24.2	20.8
Hungary	40.5	41.0
Ireland	31.0	30.3
Italy	29.7	30.8
Luxembourg	29.8	30.7
Netherlands	35.6	35.9
Norway	38.1	37.0
Poland	9.1	9.2
Portugal	24.0	23.8
Spain	25.5	24.7
Sweden	39.9	39.7
Switzerland	20.7	20.0
United Kingdom	31.0	26.6

Note: Reference year 2002. See the main text for details.

4 Results

As our discussion in section 3.1 made clear, the descriptive evidence points to the existence of cultural values and beliefs that influence individual attitudes towards immigration in general. In the estimation of the model, we will therefore focus on the question whether economic factors matter in the relationship between education (or human capital) and attitudes towards immigration even if unobserved beliefs about immigration in general are taken into account in the estimation procedure. Following the discussion in the recent literature, we explore first the labor market channel which was put forward by Scheve and Slaughter (2001), Mayda (2006) and O'Rourke and Sinnott (2006) and put into question by Hainmueller and Hiscox (2007). It turns out that fears about labor market competition, when taken on their own, do not provide a consistent explanation of attitudes towards immigration in Europe. In a second step, we add welfare state considerations (as explored by Hanson et al., 2007, and Facchini and Mayda, 2009) and find consistent results.

4.1 The Labor Market Model

According to the labor market model (4), the relation between human capital and attitudes towards immigration depends on the relative skill of immigrants. In the econometric implementation of (4), attitudes towards immigration are captured by a latent variable $\tilde{z}$, as follows:[13].

$$\tilde{z}_{ic}^{m} = \alpha_0 + \alpha_1 A_{ic} + \alpha_2 A_{ic} R_c^m + \delta' X_{ic} + \gamma_c^m + \mu_{ic} + \epsilon_{ic}^m, \tag{10}$$

where m denotes the immigrant group (from poor or rich countries), $A_{ic} = h_{ic}/h_c$, $R_c^m = 1 - h_c^m/h_c$ and X_{ic} a vector with personal characteristics. The γ_c^m are fixed effects depending on the country c and the immigrant group m and μ_{ic} is an unobserved individual effect, capturing individual beliefs and values related to immigration in general. The observed variable z_{ic}^m is qualitative and can take four (ordered) values expressing individual i's opinion about the desired level of immigration of immigrant group m. In some estimations (random-effects and fixed-effects logit), we recode z_{ic}^m as a dichotomic dependent variable.

From the economic model (4), we would expect that $\alpha_1 = 0$ (a restriction which can be tested) and that α_2 is proportional to $\frac{1}{\sigma}\theta_H\theta_L$. Note that the elasticity of substitution σ between raw labor and human capital cannot be identified in a model with a qualitative dependent variable (even if θ_H and θ_L are known).

Estimation of equation (10) by (ordered) probit is problematic if the unobserved individual effect μ_{ic} is an important determinant of attitudes towards immigration. First, Hainmueller and Hiscox (2007) argue forcefully that individual beliefs are correlated with education and therefore with some of the explanatory variables in (10). In this case, these variables are endogenous and the (ordered) probit model leads to inconsistent estimates. Second, even if μ_{ic} is not correlated with the explanatory variables, the probit maximum likelihood estimator is not consistent (Greene, 2003, p.679). In this omitted-variable case, the inconsistency of the ML-estimator stems from the non linearity of the model. In practice, this might be less of a problem than in the first case.

[13]While in section 2 the variable z refers to the individual's earnings, the estimable equation considers individual's attitudes $\tilde{z}$ incorporating earnings and individual-specific cultural values

To address these problems, we estimate the model using four different approaches. First, we estimate equation (10) separately for $m = poor, rich$ using ordered probit models. This is the approach used in past research (Scheve and Slaughter, 2001; Mayda, 2006; O'Rourke and Sinnott, 2006; Hanson et al., 2007; Facchini and Mayda, 2009) and it fails to address the problems of omitted variables and endogeneity by ignoring μ_{ic}.

Second, we estimate equation 10 jointly for $m = poor, rich$ using a random-effects logit model. This model accounts for omitted individual factors by treating μ_{ic} as an unobserved random variable which is assumed to follow a normal distribution. Note that the random-effects logit estimator is consistent only if the individual-specific effect μ_{ic} is not correlated with regressors.

Third, applying a procedure developed by Chamberlain (1984), we can use the random-effects logit model if the individual omitted factor follows a determined correlation with regressors. Imposing the relation: $\mu_{ic} = \nu_1 A_{ic} R_c^{poor} + \nu_2 A_{ic} R_c^{rich}$, our estimated equation becomes:

$$\tilde{z}_{ic}^m = \alpha_0 + \alpha_1 A_{ic} + \alpha_2 A_{ic} R_c^m + \nu_1 A_{ic} R_c^{poor} + \nu_2 A_{ic} R_c^{rich} + \delta' X_{ic} + \gamma_c^m + \epsilon_{ic}^m \tag{11}$$

In our fourth approach, we allow for the possibility that μ_{ic} is correlated in any way with explanatory variables by using a fixed-effects logit model. The estimation of this model relies on conditional maximum likelihood, where the incidental parameters problem can be avoided. Only observations for individuals whose attitudes differ between immigration from poor countries, on the one hand, and immigration from rich countries, on the other hand, are taken into account in this method. In this method, all criticisms formulated by Hainmueller and Hiscox (2007) are taken into account and the estimated relationship between human capital and immigration preferences is purged from all unobserved beliefs about immigration in general.[14]

Table 3 presents the results for the estimation of the labor market model using our three econometric approaches. Regressions (1) to (4) apply an ordered probit estimator while regressions (5) and

[14]In all estimations (except random-effects logit), standard errors are corrected for heteroscedasticity and clustering at the country level using White's (1980) method.

(6) apply a random-effects logit estimator and regressions (7) and (8) apply a fixed-effects logit estimator.

Using the first approach, regressions (1) to (4) show a very significant effect of the labor market on the natives' attitudes toward immigrants: the coefficient of the interaction term $A_{ic}R_c^m$ (α_2) has the expected sign and is significantly different from zero in all cases. No matter if immigrants are from a rich, a poor, an European, a non European country, natives are more receptive to immigrants whose skills are complementary to their own (e.g., high-skill natives and low-skill immigrants are complementary). This confirms the results found by Scheve and Slaughter (2001), Mayda (2006) and O'Rourke and Sinnott (2006) who used different datasets and different definitions of the relative-skill indicator. Note, however, that the economic model does not provide an exhaustive explanation of attitudes since the prediction that $\alpha_1 = 0$ is rejected in all cases and individual education seems to have an independent effect on attitudes.

Do the results change if we take unobserved individual beliefs into account? Assuming that these beliefs are not correlated with explanatory variables, we estimate jointly equation (10) for attitudes towards immigration from poor or rich countries (i.e. for immigration groups m of a same geographical region: Europe or rest of the world). In regressions (5) and (6), the labor market effect remains highly significant but the relative importance of this effect, compared to the direct influence of education, has become slightly smaller than in regressions (1) to (4), especially for the case of non European immigrants.[15]

Using the third approach — the random-effects logit model with Chamberlain's (1984) correction — regressions (7) and (8) present no significant coefficients regarding the interaction term $A_{ic}R_c^m$. This result suggests that omitted variables are indeed correlated with regressors, following the structure indicated in equation 11. The empiric validity of the labor market mechanism is questionable, potentially associated with a bias.

[15]Note that the absolute values of the coefficients cannot be compared between regressions (1) to (4), on the one hand, and (5) to (10), on the other hand, because the distribution of the error term differs between the probit and the logit. However, the ratio between two coefficients (in our case, α_2/α_1) are comparable.

Table 3: Determinants of Attitudes - Labor Market Model

Specification		Ordered Probit				R.E. Logit		R.E. Logit Chamberlain		F.E. Logit	
Origin Region		Europe	RoW	Europe	RoW	Europe	RoW	Europe	RoW	Europe	RoW
Poor/Rich/Pooled		Rich	Rich	Poor	Poor	R+P	R+P	R+P	R+P	R+P	R+P
Variable	*Coeff.*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A_{ic}	α_1	0.47***	0.46***	0.37***	0.41***	1.24***	1.22***	1.33***	1.41***		
		(0.03)	(0.05)	(0.03)	(0.03)	(0.03)	(0.04)	(0.04)	(0.06)		
$A_{ic}R_c^m$	α_2	0.56***	0.16	0.26***	0.48***	1.01***	0.33***	0.04	-0.17	-0.6	-0.36**
		(0.13)	(0.15)	(0.09)	(0.10)	(0.14)	(0.11)	(0.24)	(0.12)	(0.63)	(0.16)
Observations		32719	32719	32719	32719	65438	65438	65438	65438		
N groups (id-ctry)						32719	32719	32719	32719		
ρ						0.57	0.59	0.57	0.59		
σ_u						2.09	2.17	2.09	2.17		
log likelihood						-35875.22	-35408.85	-35858.83	-35370.06		

Notes: All regressions include country fixed effects, in regressions (5) to (10) these effects are interacted with m (poor or rich). Dummies variables control for gender and political orientation. Continuous variables control for individual age and individual age squared. Robust standard errors are country clustered in regressions (1)-(4) and (9)-(10). ***, **, * denote significance at the 1%, 5%, 10% levels.

In a fourth step, we estimate jointly equation (10) for $m = rich, poor$ assuming that μ_{ic} are fixed effects. The fixed-effects logit estimator used in regressions (9) and (10) allows for possible correlation between estimators and individual effects μ_{ic}. In this estimation procedure, only individuals who express different attitudes towards immigrants from poor or rich countries are taken into account. Here the labor market effect vanishes again or becomes even negative (significant at the 10 percent level for immigration from the rest of the world).

At first glance, these results give some support to Hainmueller and Hiscox's (2007) argument that the estimates of labor market effects are biased by the fact that individual beliefs and cultural values are correlated with education. Indeed, once we control for unobserved individual beliefs and possible correlation with explanatory variables, we find no significant effect of the labor market channel on attitudes towards immigration. It remains to see whether the introduction of welfare state determinants will change this preliminary conclusion.

4.2 Taking the Welfare State into Account

The welfare state changes the relation between human capital and attitudes towards immigration. The sign of this relationship can even be reversed (compared to the labor market model) if there is a high level of income redistribution and if the marginal tax rate is adjusted in order to keep social benefits at the initial level. More specifically, a high-skilled native does not compete with a low-skilled immigrant in the labor market, but the arrival of the latter can deteriorate the former's fiscal situation.

In the theoretical framework, we allowed for two possible adjustments of the government budget: either the benefit level or the marginal tax rate adjusts to the new situation created by immigration. In view of the econometric estimation, the theoretical equations (6) and (8) corresponding to these two cases can be summarized as follows

$$\tilde{z}_{ic}^{m} = \lambda_0 + \lambda_1 A_{ic} + \lambda_2 A_{ic} R_c^m + \lambda_3 t_c A_{ic} R_c^m + \upsilon_c^m + \mu_{ic} + \epsilon_{ic}^m, \tag{12}$$

where υ_c^m is a country/immigrant group fixed effect and μ_{ic} is the unobserved individual effect capturing general attitudes to immigration.

As in the previous specification with labor market, the procedure developed by Chamberlain (1984) is applied. The random-effects logit model is regressed considering individual omitted factors correlated with regressors as follows: $\mu_{ic} = \nu_1 A_{ic} R_c^{poor} + \nu_2 A_{ic} R_c^{rich} + \xi_1 t_c A_{ic} R_c^{poor} + \xi_2 t_c A_{ic} R_c^{rich} + \eta_{ic}$. In this case, our estimated equation becomes:

$$\tilde{z}_{ic}^m = \lambda_0 + \lambda_1 A_{ic} + \lambda_2 A_{ic} R_c^m + \lambda_3 t_c A_{ic} R_c^m + \nu_1 A_{ic} R_c^{poor} + \nu_2 A_{ic} R_c^{rich} + \xi_1 t_c A_{ic} R_c^{poor} + \xi_2 t_c A_{ic} R_c^{rich} + \delta' X_{ic} + \upsilon_c^m + \epsilon_{ic}^m \tag{13}$$

The two versions of the theoretical model can be distinguished as follows. If the benefit level b is endogenous, the theoretical model predicts that

$$\lambda_1 = 0, \qquad \lambda_2 = -\lambda_3 = \theta_H \theta_L / \sigma.$$

Both restrictions can be tested.

By contrast, if the marginal tax rate t is endogenous, the theoretical model predicts that

$$\lambda_1 = 0, \qquad \lambda_2 = \theta_H \theta_L / \sigma, \qquad \lambda_3 = -(\theta_H^2 + \theta_H \theta_L / \sigma)$$

To choose the relevant version of the model, we proceed as follows. First, we test the restriction $\lambda_2 + \lambda_3 = 0$. If this restriction cannot be rejected, we conclude that the benefit level b adjusts endogenously. Note that, similarly to the labor market model, σ cannot be identified in this case. If the restriction $\lambda_2 + \lambda_3 = 0$ is rejected and if λ_2 and λ_3 have the signs predicted by the theoretical model, we conclude that the marginal tax rate t adjusts endogenously. In this case, the elasticity of substitution σ between raw labor and human capital can be identified assuming that θ_H and θ_L are known:[16]

[16]Using the entire sample, we calculate the average share of raw labor ($\theta_L = 1 - \theta_H$) as follows: $\sum_i \exp[\rho(s_i -$

$$\sigma = -\frac{\theta_L}{\theta_H}\left(\frac{\lambda_3}{\lambda_2} + 1\right)$$

Table 4 presents estimation results for this model, using the three different econometric approaches discussed above. Unlike the labor market model, the random-effects and fixed-effects logit models (regressions (5) to (10)) give consistent results when welfare state considerations are taken into account. This important result reverses our previous conclusions and seems to indicate that the correlation between cultural values and education does not matter in the estimation if the model accounts for taxation and redistribution. We can therefore conclude that the labor market model gives an incomplete description of attitudes towards immigration.

What do these results tell us about the way the government budget adjusts to immigration? The restriction $\lambda_2 + \lambda_3 = 0$ is rejected in specifications (5) to (10) at the 1 percent level. On the other hand, λ_2 and λ_3 have the signs predicted by the second version of the model where t adjusts endogenously. Hence, the impact of immigration on government revenues is predominantly absorbed by a rise in marginal tax rates instead of a reduction in the benefit level.

The ordered probit estimates in regressions (1),(3) and (4) do not yield significant results for the variables that are relevant from an economic point of view. A first explanation that comes to mind is that these estimates are biased since they do not account for the unobserved beliefs and values towards immigration.

$s_{min})] = 0.5421$, using $\rho = 8.5\%$.

Table 4: Determinants of Attitudes - Complete Model

Specification		Ordered Probit				R.E. Logit		R.E. Logit Chamberlain		F.E. Logit	
Origin Region		Europe	RoW	Europe	RoW	Europe	RoW	Europe	RoW	Europe	RoW
Poor/Rich/Pooled		Rich	Rich	Poor	Poor	R+P	R+P	R+P	R+P	R+P	R+P
Variable	*Coeff.*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A_{ic}	λ_1	0.46***	0.42***	0.37***	0.41***	1.25***	1.22***	1.29***	1.32***		
		(0.03)	(0.06)	(0.03)	(0.03)	(0.03)	(0.04)	(0.05)	(0.06)		
$A_{ic}R_c^m$	λ_2	0.73	0.90**	-0.31	0.76*	3.24***	2.25***	4.42***	1.34**	7.20***	1.71**
		(0.64)	(0.39)	(0.36)	(0.45)	(0.59)	(0.40)	(1.04)	(0.57)	(1.38)	(0.73)
$t_C A_{ic}R_c^m$	λ_3	-0.68	-2.71**	2.07	-0.83	-7.97***	-6.32***	-14.96***	-4.87***	-24.96***	-6.40***
		(2.21)	(1.21)	(1.49)	(1.27)	(2.03)	(1.28)	(3.43)	(1.80)	(4.90)	(2.14)
$-\lambda_3/\lambda_2$			3.01			2.48	2.81	3.38	3.63	3.47	3.74
σ			2.38			1.76	2.14	2.82	3.12	2.92	3.25
Observations		32719	32719	32719	32719	65438	65438	65438	65438	12818	11386
N groups (id-ctry)						32719	32719	32719	32719		
ρ						0.57	0.59	0.57	0.59		
σ_u						2.09	2.17	2.09	2.17		
log likelihood						-35867.42	-35396.98	-35846.57	-35354.44		

Notes: All regressions include country fixed effects, in regressions (5) to (10) these effects are interacted with m (poor or rich). Dummy variables control for gender and political orientation. Continuous variables control for individual age and individual age squared. Robust standard errors are country clustered in regressions (1)-(4) and (9)-(10). ***, **, * denote significance at the 1%, 5%, 10% levels.
Hausman tests for regressions (9) and (10) reject Ho: null individual effects at the 1% level

Finally, a remarkable result is that the ratio $-\lambda_3/\lambda_2$ does not vary much across the different regressions (between 2.48 and 3.74). This implies that our model yields a rather robust estimate of the elasticity of substitution between raw labor and human capital. For our preferred estimation methods (random-effects-Chamberlain logit and fixed effects logit), the values for σ vary between 2.82 and 3.25. In the context of our theoretical framework, these rather high elasticities indicate that natives perceive a small impact of immigration on relative wages, a result which seems consistent with the empirical literature on the labor market consequences of immigration.

(...)

4.3 Are Individual Values and Beliefs Relevant?

The econometric analysis developed so far allows us to identify the economic channels via which attitudes are determined. However, it does not evaluate the importance of individual values and beliefs. This section clarifies the role of these values, comparing them to the economic mechanisms. This is possible by simulating the econometric model with different configuration of parameters. Predicted values of the model give us the "total" attitudes towards immigration of the natives. The contribution of the "welfare state" mechanism to attitudes can be calculated as follows. Setting marginal tax rates equals to zero, we recalculate predicted attitudes of the model. This provides a measure of attitudes in the absence of a welfare state, including only the two mechanisms of "labor market competition" and "individual values and beliefs".[17] The difference between "total attitudes" and the latter predicted attitudes represents the contribution of the welfare mechanism. Analogously, we obtain the predicted values of attitudes determined by the labor market mechanism. The difference between the "total" prediction and the prediction determined by the economic factors is attributed to the individual beliefs.

[17] In practice, it corresponds to impose λ_3 equals to zero and to correct the fixed effects before the simulation, a detailed description of this procedure is available in Appendix III.

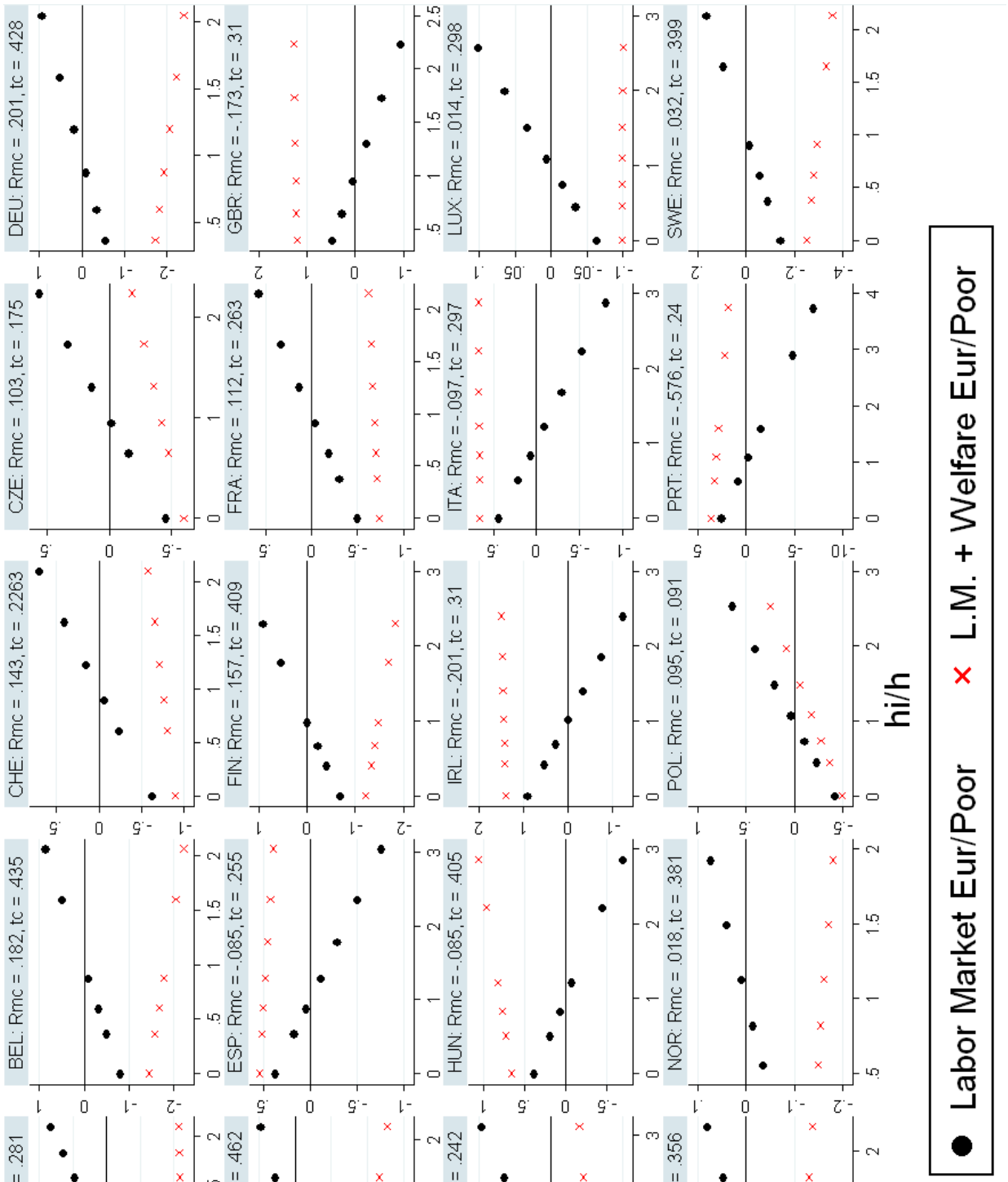

Figure 7: Simulation - Economic Determinants, Immigrants from Poor European Countries

In order to follow the description of the theoretical model which is summarized in figure 3, we plot these predicted values by the proportional education of the native (h_i/h). Moreover, we plot first the predicted values determined by the labor market mechanism (in black) and then the sum of the predicted values determined by the labor market mechanism and the tax-benefit mechanism (in red). Figure 7 plots the impact of the economic determinants on attitudes regarding immigrants from poor and European countries. The theoretical predictions are fully confirmed. Taking for example Belgium, where immigrants are less educated than the average resident ($R_c^m > 0$), the labor market mechanism is harmful to low skilled natives and beneficial for high skilled natives. This can be seen in the positive slope with a negative intercept (black points). From the tax-benefit point of view, less educated immigrants would represent a burden for all natives, reducing the slope according to the level of the taxes (t_c). We expect that the slope changes sign if the marginal tax rate is higher than 29%, which is indeed the case. For Belgium, the cumulated effect of economic mechanisms is that natives are against immigration, and this negative attitude is stronger for skilled natives. This exercise can be made for all countries giving a detailed panorama of attitudes according to the economic determinants.

Figure 7 provides a clear illustration of the economic factors determining attitudes, but does not clarify the importance of individual values and beliefs. Figure 8 concerns the same group of immigrants (from poor and European countries) and shows the impact of these values and beliefs comparing them to the total prediction. The first observation is that the attitudes are mostly determined by individual values and beliefs; by contrast, the economic determinants seem to play a marginal role. Second, individual values and beliefs are highly correlated to the level of native's education, the more the native is educated, the more positive is his attitude toward immigration. This seems to strongly confirm Hainmueller and Hiscox's (2007) even if economic determinants are very significant.[18]

[18]Another result supporting the thesis of Hainmueller and Hiscox (2007) is the positive and significant coefficient of natives' education in all regressions. Besides, to test their main argument, we proceed to regress the random effect regressions with a dummy variable equals to one if the native has college or university education. The coefficient of this dummy is positive and significant and coefficients of the economic determinants do not change significantly. However, the coefficient of the natives' education is smaller thought still positive and significant. This confirms that the effect of education on positive attitudes, especially for individuals with college or university degree.

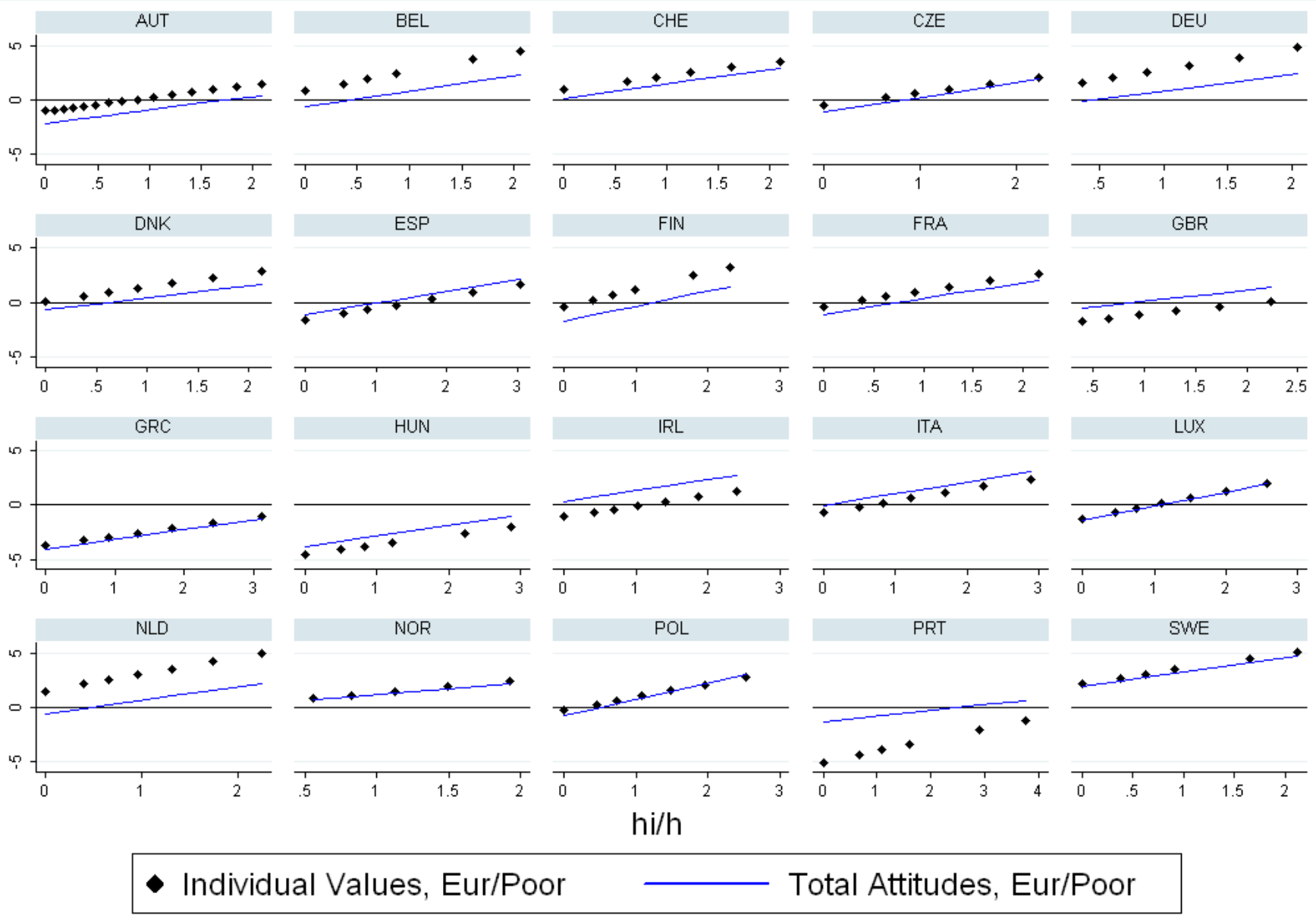

Figure 8: Simulation - Individual Beliefs and Predicted Values, Immigrants from Poor European Countries

Figures A.3 to A.8 in Appendix III reproduce this analysis for the other groups of immigrants, respectively for immigrants from rich and European countries, for immigrants from poor non-European countries and for immigrants from rich non-European countries. All theoretical predictions are confirmed for each case, accordingly to the level of the taxes (t_c) and the education level of the immigrant group (R_c^m). Also, the individual attitudes present the same shape, being an increasing function of the native's education.

(...)

5 Conclusion

This paper develops and estimates a structural model to assess the relative impact of the economic and non-economic determinants of attitudes toward immigration. We consider the labor market mechanism, the tax-benefit mechanism and the individual values and beliefs. According to the first mechanism, natives have a positive attitude to immigrants with a complementary level of education. The second mechanism implies that a low skilled immigrant represents a net burden to be supported by all natives in the welfare state. Finally, the third mechanism considers that individuals are more open to diversity and other cultures if they are more educated.

Using data for 20 European countries in 2002, we find a very significant impact of the labor market and the tax-benefit mechanisms on attitudes towards migration. By contrast to previous contributions (Facchini and Mayda, 2009; Hanson et al., 2007), our results are obtained by controlling for unobserved individual beliefs about immigration in general and by using detailed data on immigrants' education levels. Finally, simulations with our structural model indicate that although these two economic mechanisms matter, their net effect is much smaller than the impact of other individual factors on attitudes towards immigration. This result lends some support to Hainmueller and Hiscox's (2007) argument that individual values and beliefs are predominant in the explanation of these attitudes. It can be partly explained by the fact that the two economic mechanisms tend to neutralize each other. (...)

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Appendix I

Table A.1: Distribution of Attitudes: Data by Destination Country

Country	Frequency	Percent
Austria	1808	6%
Belgium	1588	5%
Denmark	1310	4%
Finland	1863	6%
France	1298	4%
Germany	2588	8%
Greece	2193	7%
Hungary	1453	4%
Ireland	1782	5%
Italy	1090	3%
Luxembourg	917	3%
Netherlands	2143	7%
Norway	1878	6%
Poland	1886	6%
Portugal	1311	4%
Republic Czech	1089	3%
Spain	1431	4%
Sweden	1682	5%
Switzerland	1606	5%
United Kingdom	1803	6%

Table A.2: Other RoW countries

Country	GDP cap	Country	GDP cap	Country	GDP cap
SUR	2300	LKA	948	UZB	392
THA	2263	COG	946	ZMB	384
NAM	2252	ARM	921	KGZ	381
SLV	2249	AGO	919	BGD	380
PER	2238	BOL	916	LAO	371
MDV	2204	AZE	884	GHA	359
DZA	2135	GEO	874	HTI	356
FSM	2132	DJI	817	MLI	341
ECU	2116	CMR	793	BFA	337
IRN	2102	NIC	788	KHM	321
KAZ	2068	CIV	780	MDG	311
GTM	2061	BTN	682	CAF	304
DOM	1914	SEN	675	TGO	301
JOR	1914	ZWE	615	TCD	286
COL	1811	KIR	606	TZA	279
MHL	1777	PNG	606	GMB	255
WSM	1742	LSO	598	MOZ	251
SWZ	1722	IND	564	TJK	244
TON	1658	YEM	558	UGA	233
CPV	1648	PAK	555	NPL	225
MAR	1521	COM	554	NER	209
VUT	1358	MNG	514	SLE	193
CHN	1274	SDN	510	RWA	192
TKM	1243	SLB	502	ERI	185
SYR	1175	VNM	488	GNB	160
EGY	1164	MRT	463	MWI	143
IDN	1111	NGA	463	LBR	135
PRY	1026	KEN	459	ETH	95
HND	996	BEN	449	BDI	85
GUY	990	GIN	403		
PHL	969	STP	399		

Note: Dollars, reference year 2003

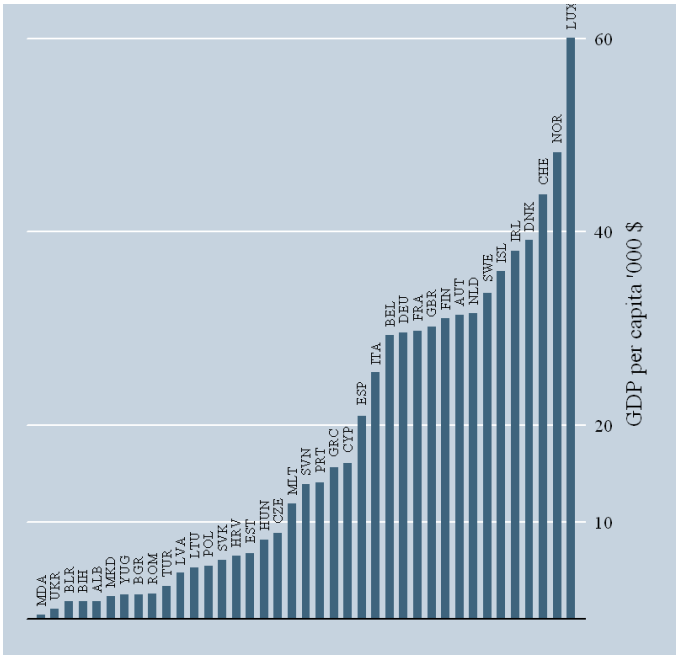

Figure A.1: Thresholds of GDP per capita for European countries

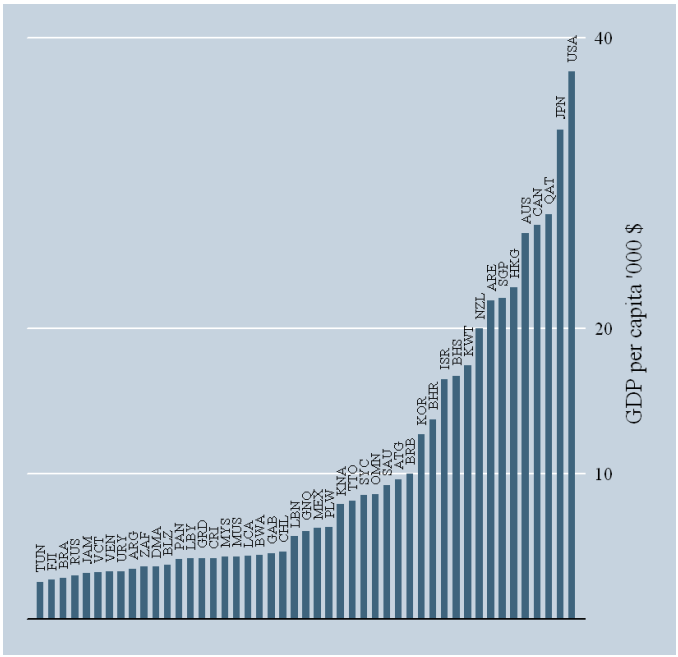

Figure A.2: Threshold of GDP per capita for RoW countries

Appendix II: Robustness Test: Applying Net Income data

This appendix tests for robustness of the empiric analysis controlling for native's net income. This data is available for about two thirds of the sample describing the net income of the household.[19] $y \equiv Y/L = \frac{F(H/L,1)+E}{L} \equiv g(h) + \frac{E}{L} \equiv f(h)$, where $E = \sum_c e_i$ and e_i is an individual exogenous income.

Taking into account this exogenous income, the complete model with tax adjustment is rewritten. Individual total income becomes:

$$y_i = (1-t)[f(h) + (h_i - h)f'(h) + \Delta e_i] + b \tag{A.1}$$

and equation (8) becomes:

$$z_{ic}^m = \frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\frac{1}{\sigma}\theta_H\theta_L - t_c\frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\left(\theta_H^2 + \frac{1}{\sigma}\theta_H\theta_L\right) - \Delta e_i t_c\left(1 - \frac{h_c^m}{h_c}\right)\frac{\theta_H}{f(h)} + \kappa_c^m \tag{A.2}$$

where $\kappa_c^m = \left(1 - \frac{h_c^m}{h_c}\right)\left(\frac{t}{\sigma}\theta_H\theta_L - \frac{1}{\sigma}\theta_H\theta_L - t\theta_H + t\theta_H^2\right)$ collects all terms that are specific by country and by immigrant group, and $\Delta e_i = e_i - E/L$.

Finally, the estimable equation is expressed by:

$$\tilde{z}_{ic}^m = \lambda_0 + \lambda_1 A_{ic} + \lambda_2 A_{ic}R_c^m + \lambda_3 t_c A_{ic}R_c^m + \lambda_4 \Delta e_i t_c A_{ic}R_c^m + \upsilon_c^m + \mu_{ic} + \epsilon_{ic}^m, \tag{A.3}$$

where υ_c^m is a country/immigrant group fixed effect and μ_{ic} is the unobserved individual effect capturing general attitudes to immigration.

Table A.3 shows the estimation of equation A.3 with the logit fixed-effect estimator. Then number of observations is limited by the availability of income data, table A.4 details this restriction by country. Notably, countries like France, Hungary and Ireland do not present data on income. Other

[19] Original data is available in categories that are convertible to yearly values in euros according to ESS documentation available on http://ess.nsd.uib.no/, page 59. Moreover, we applied the OCDE equivalence scale for providing individual incomes.

countries present slightly less observations.

Table A.3: Determinants of Attitudes - Complete Model + Income

Specification		F.E. Logit	
Origin Region		Europe	RoW
Variable	*Coefficient*	(1)	(2)
$A_{ic}R_c^m$	λ_2	6.01***	2.49**
		(1.28)	(1.11)
$t_C A_{ic} R_c^m$	λ_3	-18.55***	-7.41**
		(4.82)	(3.00)
$\Delta e_i t_C A_{ic} R_c^m$	λ_4	-0.16***	-0.07***
$\times 10^3$		(0.03)	(0.02)
$-\lambda_3/\lambda_2$		3.08	2.98
σ		2.46	2.34
Observations		8942	8074

Notes: All regressions include country fixed effects interacted with m (poor or rich). Dummy variables control for gender and political orientation. Continuous variables control for individual age and individual age squared. Robust standard errors are country clustered in all regressions. ***, **, * denote significance at the 1%, 5%, 10% levels.

Table A.4: Number of observations - Fixed Effects Logit, Total and Limited Sample

Country	Immig. from EU		Immig. from RoW	
	Total Sample	"Net Income" Sample	Total Sample	"Net Income" Sample
AUT	650	462	498	334
BEL	764	614	670	538
CHE	542	424	524	442
CZE	464	340	430	316
DEU	1186	956	1178	930
DNK	658	574	656	582
ESP	408	262	378	232
FIN	900	830	736	672
FRA	546	0	420	0
GBR	708	632	634	560
GRC	882	592	694	472
HUN	530	0	404	0
IRL	700	0	622	0
ITA	394	202	352	178
LUX	242	130	180	110
NLD	814	706	752	664
NOR	836	798	756	724
POL	798	704	690	606
PRT	254	196	246	184
SWE	542	520	566	530
Total	12818	8942	11386	8074

Appendix III: Simulations

This appendix explains the simulation procedure. Predicted values of the econometric model give us the "total" attitudes of the natives. Instead, predicted values of the model considering marginal tax equals to zero, give us attitudes regarding only the labor market competition and the individual values and beliefs. As the specification used is based on equation 8:

$$z_{ic}^{m} = \frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\frac{1}{\sigma}\theta_H\theta_L - t_c\frac{h_{ic}}{h_c}\left(1 - \frac{h_c^m}{h_c}\right)\left(\theta_H^2 + \frac{1}{\sigma}\theta_H\theta_L\right) + \kappa_c^m$$

where country fixed effect is $\kappa_c^m = \left(1 - \frac{h_c^m}{h_c}\right)\left(\frac{t}{\sigma}\theta_H\theta_L - \frac{1}{\sigma}\theta_H\theta_L - t\theta_H + t\theta_H^2\right)$. Imposing tax equals to zero corresponds to restrict λ_3 equals to zero and to subtract the terms related to t from the country fixed effects: $\left(1 - \frac{h_c^m}{h_c}\right)\left(\frac{t}{\sigma}\theta_H\theta_L - t\theta_H + t\theta_H^2\right)$.[20] The difference between the predicted "total" attitudes and the simulated attitudes (due to labor market and individual beliefs) results in the predicted attitudes solely due to the welfare mechanism.

Conversely, the predicted values of attitudes determined only by the labor market mechanism are obtained by the difference between the predicted"total" attitudes and the simulation determined by the tax-benefit and the individual values and beliefs. The simulation of the latter is made considering λ_2 equals to zero and subtracting $\left(1 - \frac{h_c^m}{h_c}\right)\left(-\frac{1}{\sigma}\theta_H\theta_L\right)$ from the country fixed effects.[21]

[20] This subtraction should take into account the normalization done by the logit estimator. The theoretical value is multiplied by $-(\lambda_2 + \lambda_3)/\theta_H^2$ before the substraction.

[21] The logit normalization is also taken into account here.

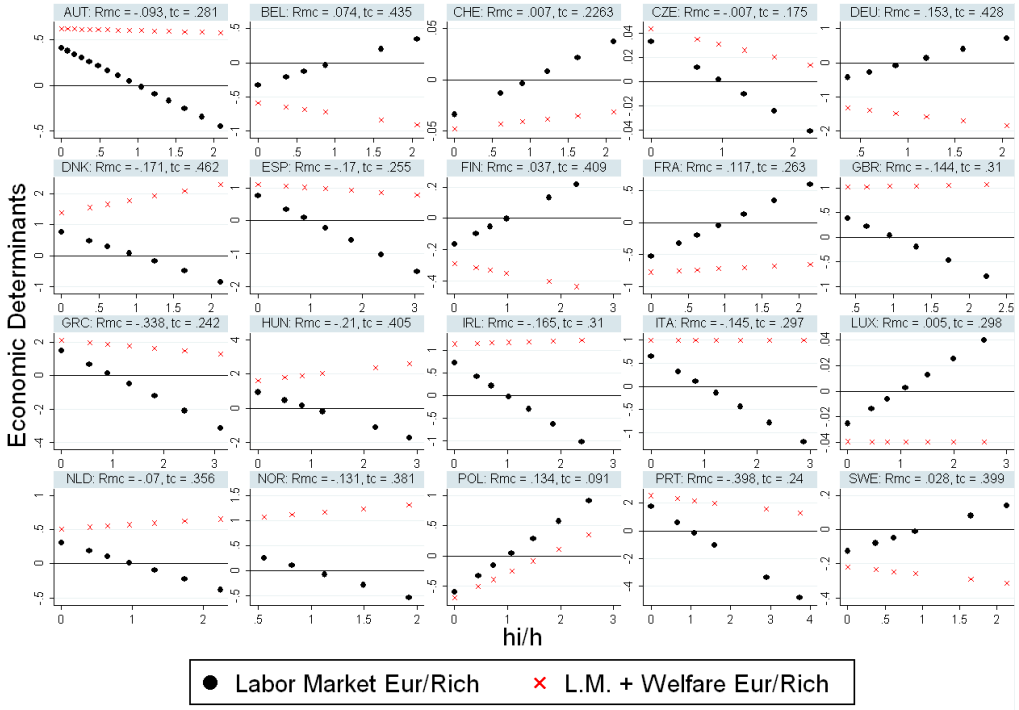

Figure A.3: Simulation - Economic Determinants, Immigrants from Rich European Countries

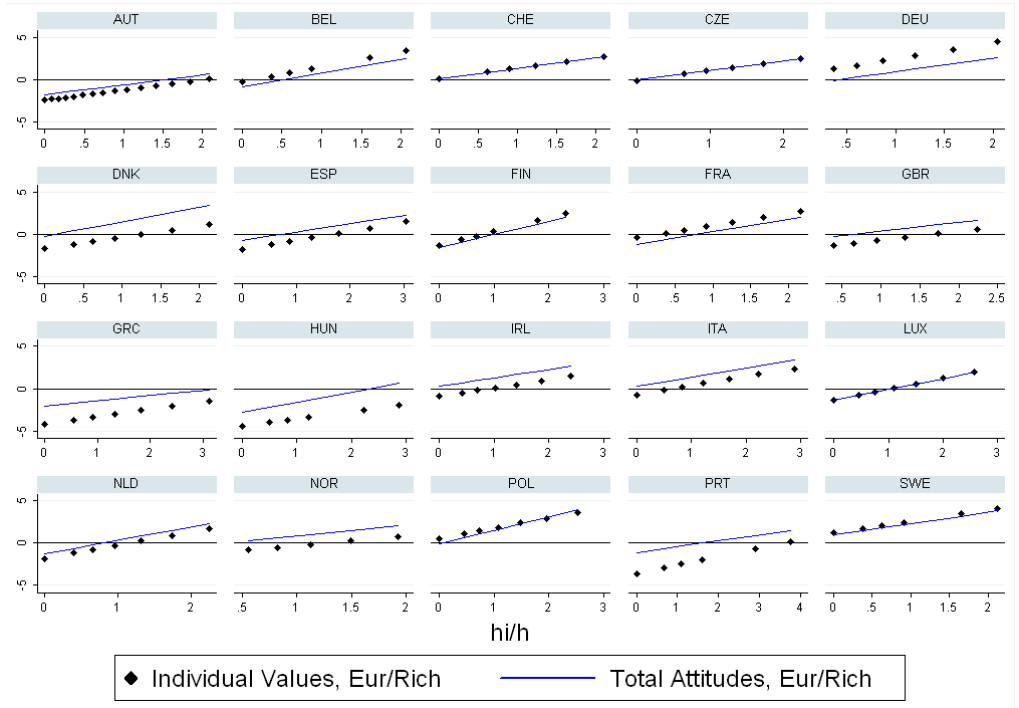

Figure A.4: Simulation - Individual Beliefs and Predicted Values, Immigrants from Rich European Countries

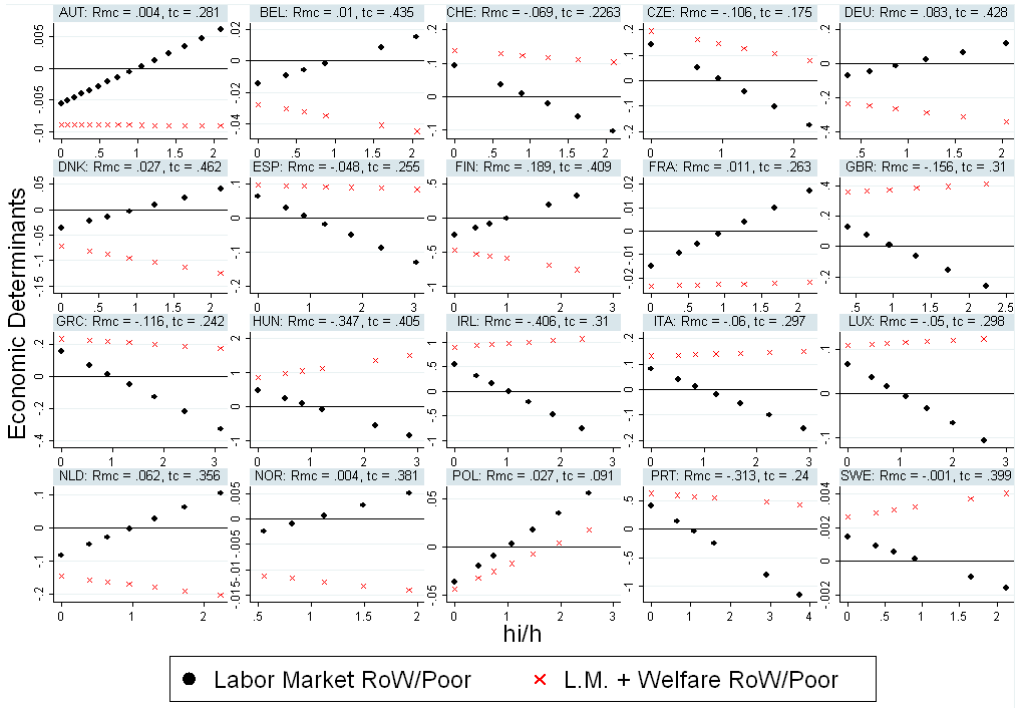

Figure A.5: Simulation - Economic Determinants, Immigrants from Poor R.o.W. Countries

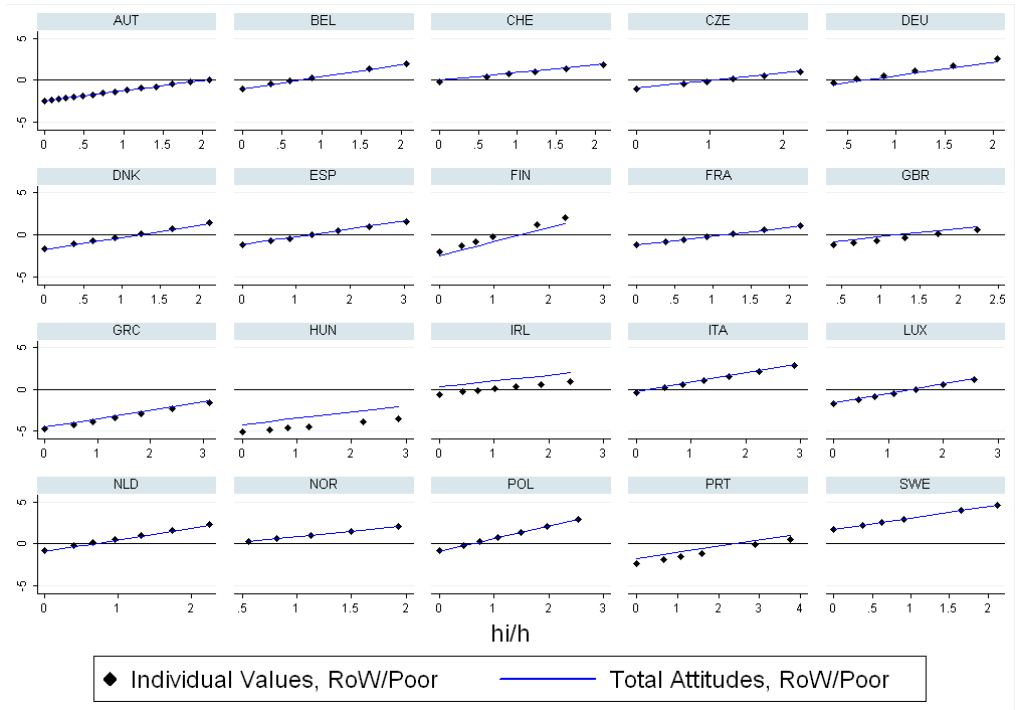

Figure A.6: Simulation - Individual Beliefs and Predicted Values, Immigrants from Poor R.o.W Countries

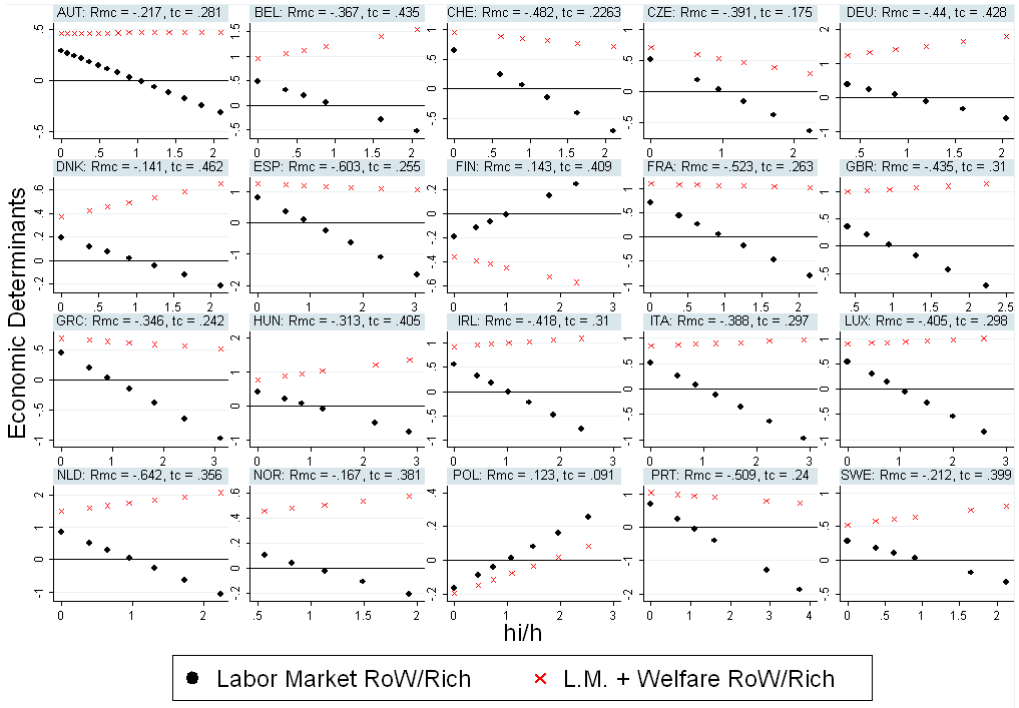

Figure A.7: Simulation - Economic Determinants, Immigrants from Rich R.o.W. Countries

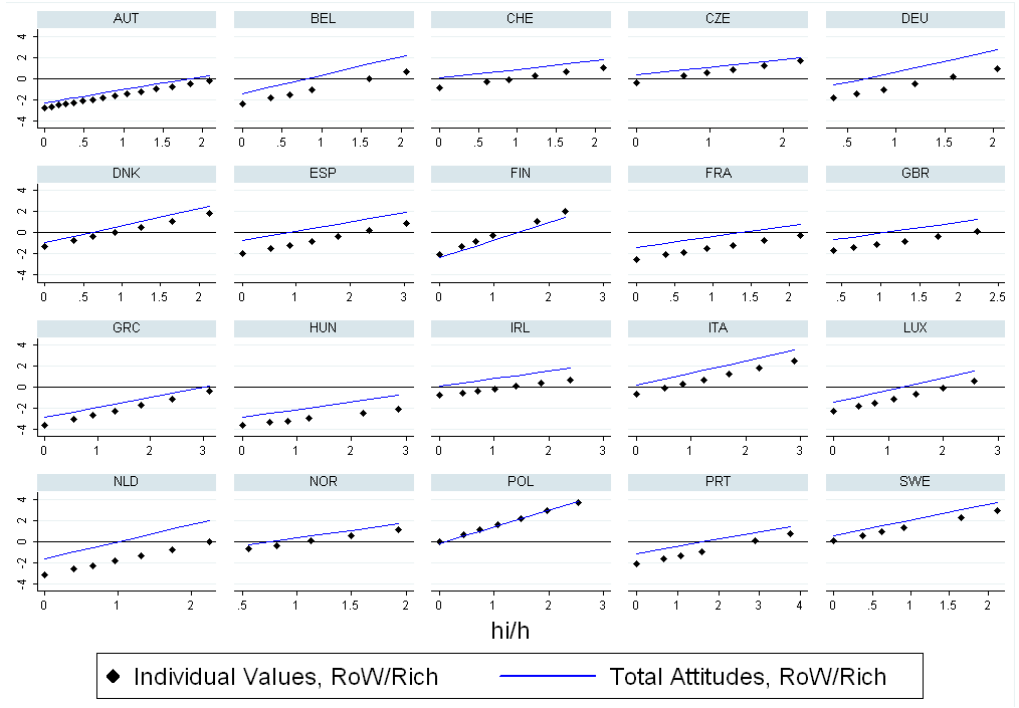

Figure A.8: Simulation - Individual Beliefs and Predicted Values, Immigrants from Rich R.o.W. Countries