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University of Neuchâtel

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# The Share of Foreigners in One's Occupation and Attitudes Towards Foreigners

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# The Share of Foreigners in One's Occupation and Attitudes towards Foreigners

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## Abstract

This paper examines the relationship between attitudes towards foreigners and the share of foreigners at the occupational level. Using a question on equal opportunities for foreigners from the Swiss Household Panel, ordered probit regressions with standard controls show that: (a) there is a *negative* association between the share of foreigners in one's occupation and positive attitudes towards foreigners; (b) there is a *positive* association between the share of recently arrived foreigners and positive attitudes towards foreigners. This suggests that workers are at the same time wary of competition with foreigners, and welcome their contribution to overcome labour shortages. Adding the occupational unemployment rate to the model indicates that objective competition may be as relevant as perceptions of competition. Controlling for other occupational characteristics establishes that the associations in (a) and (b) are probably caused by sorting on job quality. All results are robust to the potential endogeneity of the share of foreigners at the occupational level.

**Keywords:** Immigration, attitudes towards foreigners, labour market, occupational classification, ethnic concentration, unemployment, instrumental variables

**JEL Codes:** F22, J24, J61

# 1 Introduction

Migration has been a constant in the history of mankind (Goldin et al., 2011), but recent years have seen a concentration in receiving countries (Czaika and Haas, 2014). This has led to a rapid growth of the number of immigrants in Western countries often portrayed in dramatic terms (Van der Brug et al., 2015; Pecoraro and Ruedin, 2016). Some individuals have followed the growing share of immigrants with unease, and parties politicizing against immigration have received significant support across Western Europe (Ford and Goodwin, 2014; Green et al., 2016). Policies continue to exclude a significant part of the resident population from full membership in social and political life, which can lead to conflict as recent riots in Sweden (in 2003) and Paris (in 2005) remind us.

Researchers from fields as diverse as economics, sociology, political science, social psychology, and migration studies have examined the covariates of negative attitudes towards immigrants and foreigners (see Rustenbach, 2010; Hainmueller and Hopkins, 2014; Dancygier and Laitin, 2014; Hatton, 2014; Pettigrew, 2016, for recent reviews). A naive economic model often serves as the basis, assuming that opposition towards immigrants and foreigners is a direct consequence of unwanted competition in the labour market (Ceobanu and Escandell, 2010; Billiet et al., 2014; Polavieja, 2016). Economic studies generally find support for the labour-market competition hypothesis (e.g., Scheve and Slaughter, 2001; Mayda, 2006; Ortega and Polavieja, 2012). Other contributions seek to refine, extend, even refute this basic model with various success. For instance, some emphasize the dominant role of non-economic considerations over labour market concerns by drawing on identities, values and beliefs (e.g., Hainmueller and Hiscox, 2007; Sides and Citrin, 2007). More recently, Hainmueller et al. (2015) find no evidence for the competition hypothesis using a battery of tests devised to assess different relationships between more detailed economic characteristics of U.S. workers and their attitudes towards low- and high-skilled immigrants.

The mixed empirical evidence on the link between economic competition and attitudes towards immigrants may be due to inadequate attention to the segmented nature of the labour market in naive economic models: The reduction of the labour market into low- and high-skilled workers in many existing studies renders these unable to draw valid inferences about actual labour force competition and its impact on attitudes towards immigrants and foreigners. To a large extent, these shortcomings reflect the nature of available data (compare Hainmueller et al., 2015). Here we use linked data from the Swiss Household Panel and the Swiss Labour Force Survey to overcome shortcomings that we believe are important for analysing the impact of the

share of foreigners at the occupational level on attitudes towards foreigners.

Contrary to most existing studies, we use an outcome variable measuring attitudes towards competition from foreign workers more directly: a measure of individual preferences for equal opportunities for foreign citizens, which is well-suited to study the labour market determinants of attitudes towards immigration (Pecoraro and Ruedin, 2016). Moreover, we draw on the Swiss Labour Force Survey for reliable information on the labour market outcomes of migrants. Since 2003, the Swiss Labour Force Survey includes an additional sample of (at least) 15,000 immigrants per year, allowing us to calculate the occupational share of foreigners – our predictor variable – at the level of ISCO 4-digits. Using the same data we can also compute the occupational unemployment rate as a objective measure of exposure to competition with foreigners. With this, we can differentiate perceptions of competition from objective competition.

We use a broad set of occupational indicators derived from both surveys to control for quality sorting into occupations, a mechanism generally ignored in the literature on attitudes towards immigrants and foreigners. Quality sorting is an important mechanism in cases where the occupational share of foreigners is correlated with the Swiss' attitudes (through wages) due to differences in skill-related job characteristics (compare Hirsch and Macpherson, 2004).

Here we show that – following standard controls – workers seem at the same time wary of competition with foreigners, and welcome their contribution to overcome labour shortages. Once a full set of job characteristics are controlled for, it appears that these differences in attitudes towards foreigners are due to a sorting of workers into jobs on the basis of skills. We check the robustness of the results by applying methods that deal with the potential endogeneity of the share of foreigners at the occupational level.

## 2 Attitudes towards Foreigners and Labour Market Competition

When different groups meet, it is common to reject the other and tread carefully when dealing with members of the other group. This is a universal phenomenon that applies to different ethnic and racial groups, social groups, as well as immigrants and foreigners (e.g. McLaren, 2003; Pasek et al., 2014; Pettigrew, 2016). However, individuals differ in their tendency to reject the other. Various reasons have been proposed for these differences, ranging from simple conservatism to personalities and indeed genetic influence (e.g Gallego and Pardos-Prado, 2014; Hatemi, 2013; Hatemi et al., 2013).

Blumer (1958) provided an important step in the study of attitudes towards different groups by shifting the focus from individual feelings to relations between groups. Today, this position is generally included in group threat theory: Prejudice towards other groups and inter-group hostility are primarily regarded as reactions to (perceived) threats by subordinate groups. Empirical studies often draw on a naive economic model focusing exclusively on (presumed) labour force competition, but group threat theory is formulated without reference to specific threats and can therefore equally be applied to economic threats as to cultural or symbolic threats (Bobo and Hutchings, 1996).

In the naive economic model, immigrants threaten the economic position of natives by potentially undercutting wages or ‘taking away’ the jobs of natives. The implication in terms of attitudes is that native workers who are more exposed to competition from immigrants are expected to have more negative attitudes, because it is in their interest to protect their wages or jobs. Economic research has generally supported the competition hypothesis, in particular that the relative *skills* composition of natives to immigrants in the receiving country determines the sign of correlations between education and attitudes towards immigrants (e.g. Mayda, 2006; O’Rourke and Sinnott, 2006).

Studies usually imply that immigrants are predominantly low-skilled, and draw on levels of education as a means to capture the degree to which workers are exposed to economic competition with immigrants (e.g. Espenshade and Hempstead, 1996; Scheve and Slaughter, 2001; Schneider, 2008). Arguably, skill levels and the sector of the economy would be more appropriate as indicators of labour market exposure Pecoraro and Ruedin (2016). Using skill- and occupation-based measures, some studies have also provided support for the labour market competition hypothesis according to which individuals employed in jobs less exposed to competition from immigrants are relatively more pro-immigration (Ortega and Polavieja, 2012; Lee and Lee, 2015; Polavieja, 2016): Labour market competition at the occupation level appears as an important economic channel for the formation of immigration attitudes (Kunovich, 2013, 2016).

While initial contact with new groups is often accompanied by rejection and opposition, it is also a common finding that contact between groups reduces tensions and opposition (Tausch and Hewstone, 2010; Allport, 1954; Ford, 2008). Attitudes towards immigrants and foreigners are therefore necessarily a dynamic phenomenon (DeWaard, 2015; Dancygier and Laitin, 2014), and matters are made more difficult for researchers by the fact that there are new inflows of immigrants at the same time as contact with immigrants takes place. It is particularly at the local level and at times of sudden inflows that

attitudes towards immigrants and foreigners seem to be affected (Hopkins, 2010, 2011; Dancygier, 2010). While a focus on the local is surely valuable, we argue that more attention should be paid on the labour market given that the workplace is a place where immigrants and natives often come into contact (Zorlu, 2016).

### 3 Theory and Expectations

As is common in the literature (Ceobanu and Escandell, 2010), this paper draws on competitive threat theory. Attitudes towards foreigners are regarded as a reaction to unwanted competition in the labour market where skills of foreign and native workers are substitutable (Borjas, 2001). The intuition behind competitive threat in our case is that a higher concentration of foreign workers potentially lowers wages in the sector or occupation an individual works in, and could increase the risk of unemployment. This is an economic threat, and the assumption is that this threat is expressed in terms of negative attitudes. We measure labour market competition at the occupation level without reference to regional labour markets because we assume a single national labour market given the small size of Switzerland (Favre, 2011; Basten and Siegenthaler, 2013).

Throughout the paper we use the following notation to allow a formal statement of the hypotheses. The observed outcome variable  $y_i$  captures the attitudes towards (equal opportunities for) foreigners of individual  $i$ . We consider two groups of predictor variables:  $S_{j(i)}$  refers to the share of foreigners in occupation  $j$  of individual  $i$  and is shared by all individuals in the same occupation. The corresponding regression coefficient is  $\alpha$ . In a second step,  $S_{j(i)}$  is decomposed into two components: the share of *early* foreigners – who came to settle in Switzerland – in an occupation  $S_{j(i)}^e$ , and the share of foreigners who have recently arrived in Switzerland – *recent* foreigners – in an occupation  $S_{j(i)}^r$ , with corresponding regression coefficients of  $\alpha^e$  and  $\alpha^r$ .

The first set of hypotheses is derived from a neoclassical competitive model of supply and demand in the labour market, according to which immigration leads to lower wages for native workers whose skills are substituted by immigrants (i.e. a negative wage effect) while wages are expected to increase for native workers with complementary skills to those of the immigrants (i.e. positive wage effect). These pressures on wages translate into negative attitudes towards foreigners. If attitudes towards foreigners are a reaction to competition in the labour market, it is necessary to take into consideration the segmented nature of the labour market.

### **Hypothesis 1A**

*We expect that a larger share of foreigners in an occupation is associated with larger pressures on wages in a particular occupation, which in turn leads to more negative attitudes towards foreigners, formally:  $\alpha < 0$ .*

Even with a focus on labour market segments, not all foreign workers constitute unwanted competition: In segments where immigrant and native skills are complementary, foreign workers do not constitute competitors and there are no pressures on wages. This is particularly relevant in sectors with labour shortage, in which case employers frequently resort to immigrant workers.

### **Hypothesis 1B**

*We assume that the share of recently arrived foreigners working in a sector is indicative of a sector with labour shortages. In this situation, a larger share of recent foreign workers is beneficial for native workers in a particular occupation, and attitudes are expected to be positive. Formally, we expect  $\alpha^e < 0$  and  $\alpha^r > 0$ .*

Arguably, approaching competition solely in terms of the share of foreigners by occupation provides an incomplete test of labour-market competition. Indeed, following the contact hypothesis, it can be expected that interpersonal contact between groups reduces negative feelings (Allport, 1954; Amir, 1969). Because competitive threat and contact are likely to occur concurrently, they are empirically difficult to disentangle (Wagner et al., 2006). It follows that estimates of  $\alpha^e$  and  $\alpha^r$  may overestimate the strength of the relationship between the share of foreigners and attitudes.

Following work that highlights how negative attitudes towards foreigners can be a result of *perceived* group threat (Quillian, 1995; Schlueter et al., 2008; Manevska and Achterberg, 2013), we propose to account for the economic situation at the occupational level through the inclusion of the occupational unemployment rate  $U_{j(i)}$  (the corresponding regression coefficient is  $\gamma$ ). This extension allows us to control for objective pressures and formulate a hypothesis about the role played by perceptions of threat in explaining attitudes towards foreigners.

### **Hypothesis 2**

*Objective competition may be as relevant as perceptions of competition, that is,  $\gamma < 0$ .*

A third hypothesis is taken from Hirsch and Schumacher (1992) and Hirsch and Macpherson (2004). Hirsch and Macpherson indicate a spurious relationship between racial composition of jobs and individual wages due



to the omission of occupational skills in the analysis of wage determination. Their study provides support for a *quality sorting* explanation in the sense that the occupational share of black workers is correlated with worker quality and job skill differences that are generally not accounted for in standard models. As a result, wages vary with the racial density of occupations but density may not be a causal determinant of individual wages.

The quality sorting hypothesis is a related explanation for the relationship between the share of foreigners in occupations and attitudes. If foreigners – but not Swiss workers – are crowded into low-paying occupations because of past or present discriminatory barriers (possibly linked to national Swiss immigration policy, e.g. Ruedin et al., 2015), then the share of foreigners in an occupation becomes an indicator of labour quality for Swiss workers. For instance, relatively *less productive* Swiss workers accept lower-paying jobs in occupations predominantly held by foreigners and this may explain why these Swiss workers appear to have *less positive* attitudes. In this case, a non-significant association between positive attitudes and the occupational share of foreigners would be consistent with the quality sorting explanation.

### **Hypothesis 3**

*The ethnic composition of an occupation can serve as a proxy for (unobserved) job skills when there is sorting on labour quality. That is, any correlation between the share of foreigners in an occupation and attitudes (through wages) may simply reflect differences in the proportion of Swiss and foreign workers with a given set of skills when a match between workers and occupations is based on skills. Formally,  $\alpha^e = 0$  and  $\alpha^r = 0$  once job-specific factors are taken into consideration..*

## **4 Data and Methods**

### **4.1 Swiss Household Panel**

The analysis is based on the Swiss Household Panel (SHP). This survey is an unbalanced panel where respondents may leave the sample due to attrition. Data collection started in 1999 with a random sample of about 5,000 households (*SHP\_I* sample), and a refreshment sample of about 2,500 households was added in 2004 (*SHP\_II* sample) to compensate for attrition in the initial sample. The SHP data are complemented by aggregate and contextual data on foreign workers from the Swiss Labour Force Survey (SLFS). Since 2003, the Labour Force Survey includes an additional sample of 15,000 immigrants, the only Swiss survey capable of providing reliable information on the labour market outcomes of immigrants.

We retain individuals from the initial and refreshment samples (*SHP\_I* and *SHP\_II*) who were interviewed between 2004 and 2009 (6 waves). Since 2010, the question on attitudes towards foreigners is no longer asked in every wave but only in every other wave. The final sample includes Swiss citizens of at least 18 years who are employed. We only include respondents with valid information for the variables of interest, namely opinion on equal opportunities for foreigners and occupation.

## 4.2 Analytical Approach

Our modelling strategy is built on Dustmann and Preston (2001) who studied the relationship between attitudes towards foreigners and the local (geographical) share of ethnic minorities. We modify the *baseline model* proposed by Dustmann and Preston to capture the share of foreigners within occupational categories:

$$y_i^* = \alpha S_{j(i)} + \mathbf{X}_i \boldsymbol{\beta} + \epsilon_i \quad (1)$$

where  $y_i^*$  is the unobserved latent variable of positive attitudes towards foreigners of individual  $i$ ,  $S_{j(i)}$  the occupational composition of foreigners of the individual's occupation  $j$ ,  $\mathbf{X}_i$  a vector of observed personal characteristics, namely levels of education, a dummy for gender, age, age squared, canton, sample and year dummies, as well as a constant. In the appendix, a full description of these variables can be found in Table 7 while various summary statistics are presented in Table 9 and Table 10. All models control for individual values and beliefs because the latter have been found to be important predictors of attitudes (e.g. Facchini et al., 2013; Pecoraro and Ruedin, 2016); variables for values and beliefs are: *general trust in people* (with ten response categories treated as dummy variables to account for non-linearities, with 'most people can be trusted' as the reference category, plus a dummy for missing values) and *political left-right* (with ten response categories treated as dummy variables to account for non-linearities, with 'right' as the reference category, plus three dummy variables for individuals who do not want/cannot place themselves, those without any particular political position, and missing values).

The share of foreign citizens by occupation is denoted by  $j$ . Occupations are classified by the 4-digit International Standard Classification of Occupations (ISCO-88), considering all occupations with at least 30 individuals in a year ( $\sum j \approx 250$  occupations). Using this finely disaggregated level of occupation allows us to classify workers into specific skill segments, providing a detailed and realistic picture of labour-force exposure with foreigners.

An *extended model* is also considered in which  $S_{j(i)}$  is decomposed into two components, the share of early foreigners in an occupation  $S_{j(i)}^e$  and the share of recent foreigners in an occupation  $S_{j(i)}^r$ :

$$y_i^* = \alpha^e S_{j(i)}^e + \alpha^r S_{j(i)}^r + \mathbf{X}_i \boldsymbol{\beta} + \epsilon_i. \quad (2)$$

Recent foreigners  $S_{j(i)}^r$  are calculated as the share of foreigners resident in Switzerland for less than five years among the total worker population by occupation  $j$ . By definition,  $S_{j(i)} \equiv S_{j(i)}^e + S_{j(i)}^r$ . Given that residence permits in Switzerland are generally granted to immigrants with a valid employment contract, accounting for the share of recent foreigners by occupational level allows us to identify jobs characterized by labour shortages. Put differently, recent immigration to Switzerland stems from the insufficient supply of native workers in some professional fields (Sheldon, 2008).

To explore the role of subjective and objective exposures to competition, we add the occupational unemployment rate (calculated at the 4-digit level) to equation (2):

$$y_i^* = \alpha^e S_{j(i)}^e + \alpha^r S_{j(i)}^r + \gamma U_{j(i)} + \mathbf{X}_i \boldsymbol{\beta} + \epsilon_i. \quad (2')$$

We can determine the rate of unemployment by ISCO-88 occupational group  $j$  since unemployed respondents were asked to provide their last occupation.

We further add a vector of job characteristics,  $Q_{j(i)}$ , incorporating occupational means of the control variables (calculated at the 4-digit level), dummies for 1-digit ISCO-88 code and working conditions (stress, noise/dirtiness, tiring posture, computer use):

$$y_i^* = \alpha^e S_{j(i)}^e + \alpha^r S_{j(i)}^r + \gamma U_{j(i)} + \mathbf{Q}_{j(i)} \boldsymbol{\delta} + \mathbf{X}_i \boldsymbol{\beta} + \epsilon_i. \quad (2'')$$

Controlling for occupation heterogeneity allows us to compare workers within occupations and thus to examine the relevance of the quality sorting hypothesis.

To account for the ordinal nature of the observed outcome variable  $y_i$ , we use ordered probit estimations where

$$\epsilon_i | \text{covariates} \sim \text{Normal}(0, 1).$$

The continuous latent variable  $y_i^*$  can be thought of as the *propensity* to exhibit positive attitudes toward foreigners. Respondents were asked ‘Are you in favour of Switzerland offering foreigners the same opportunities as those offered to Swiss citizens, or in favour of Switzerland offering Swiss

citizens better opportunities?'. The observed response categories are tied to the latent variable as follows (where  $\mu_1$  and  $\mu_2$  are two cut points):

$$y_i = \begin{cases} 1 & \text{In favour of better opportunities for Swiss citizens} & \text{if } y_i^* \leq \mu_1 \\ 2 & \text{Neither of them} & \text{if } \mu_1 < y_i^* \leq \mu_2 \\ 3 & \text{In favour of equal opportunities for foreigners} & \text{if } \mu_2 < y_i^* \end{cases}$$

### 4.3 Early and Recent Foreigners in Occupations

Table 11 in the appendix shows that the share of immigrants in an occupation is associated with differences in the workforce and working conditions, and these associations vary considerably between early and recent foreigners. To show this, we use OLS regression models with the share of foreigners in an occupation as the outcome variable and characteristics of the occupation as predictor variables. For instance, the first row shows that occupations with a higher rate of unemployment have a higher share of foreign workers. The magnitude of this positive relationship is lower in the case of recent foreigners. Put differently, occupations with a higher risk of unemployment tend to have a higher share of early foreigners relative to recent foreigners. Similarly, occupations with a higher share of workers with only compulsory education tend to have a higher share of early foreigners relative to recent foreigners. The reverse applies for occupations with a higher percentage of tertiary-educated workers: Occupations requiring more education have a higher share of foreigners, in particular those recently arrived in Switzerland. These results confirm that the nature of migration flows, initially based on a low-educated labour force, has in recent years evolved in favour of highly qualified labour (Pecoraro, 2005).

With regard to working conditions, Swiss workers with stressful work conditions tend to be employed in occupations with a lower percentage of recent foreigners. Working in a noisy or dirty environment is negatively related to the share of foreigners in an occupation, in particular early foreigners. Tiring posture at work is associated with a higher concentration of early foreigners relative to recent foreigners. Moreover, the share of foreigners tends to be lower in occupations where Swiss workers use a computer.

## 5 Results

### 5.1 Negative Attitudes with More Foreigners

Working in occupations with a higher share of foreigners ( $S_j$ ) is associated with more negative attitudes towards foreigners (Table 1). A ten percentage points higher share of foreigners in an occupation is associated with a lower

probability of reporting positive attitudes towards equal opportunity for foreigners (i.e.  $y = 3$ , at the right of Table 1) by at least 1 percentage point. At the same time, such a ten percent increase leads to a rise in the probability of reporting attitudes towards better opportunities for the Swiss (i.e.  $y = 1$ ) by 1 percentage point. This finding is in line with labour-market competition: Swiss workers who are more exposed to competition with foreigners in their occupation are more likely to express negative sentiments towards foreigners. In line with most existing studies, we find a positive relationship between education and positive attitudes towards foreigners (coefficient not shown), but in the present paper education is used as a control variable.

Table 1: Baseline model: Ordered probit results

	Coefficients	Marginal Effects		
		$y = 1$	$y = 2$	$y = 3$
$S_j$ : Share of foreigners	-0.345** (0.100)	0.101** (0.029)	0.009** (0.003)	-0.110** (0.032)
Control variables	yes			
Canton, sample and year dummies	yes			
Proxies for values and beliefs	yes			
$U_j$ : Occ. unemployment rate	no			
$Q_j$ : Job (skill) indicators	no			
Observations	23,104			
Percentage correctly predicted	68.83%			
Test for joint significance of values and beliefs > $F$ statistic	2123.02**			

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable  $y$ : positive attitudes towards equal opportunities for foreigners. Robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . See Table 7 in the appendix for a list of variables included. Proxies for values and beliefs are *general trust in people* and *political position left-right* (see Subsection 4.2 for details).

## 5.2 Positive Attitudes with a Higher Share of *Recent* Foreigners

Attitudes towards foreigners tend to be positive where the share of *recent* foreigners is higher. Table 2 presents the ordered probit estimates of the extended model (equation (2)), in which the occupational share of foreigners is decomposed into the shares of early and recent foreigners. Shown in the table are results where recent foreigners are those arrived in the past 5 years, but equivalent results can be obtained with different definitions of what ‘recent’ stands for (having a short-term ‘B’- or temporary ‘L’-permit) as outlined in the appendix.

The results for the share of early foreigners in an occupation in the first row of Table 2 are similar to those presented in Table 1: the larger the share of early foreigners in the occupation, the more likely individuals are to express negative attitudes towards foreigners. The second row shows that in occupations with a higher share of recent foreign workers, attitudes towards foreigners are relatively more positive. We argue that these are occupations with labour shortages where new workers are recruited to overcome these shortages. A ten percentage points increase in the share of recent foreigners raises the probability of positive attitudes by about 4.2 percentage points.

Our results are consistent with a model of competitive labour markets: where individuals are exposed to increased competition with foreign workers, their attitudes are relatively more negative as a result of downward pressure on wages; where there are labour shortages and native workers benefit from immigrant workers, attitudes are relatively more positive.

Table 2: Extended model: Ordered probit results

	Coefficients	Marginal Effects		
		$y = 1$	$y = 2$	$y = 3$
$S_j^e$ : Share of early foreigners	-0.891** (0.143)	0.260** (0.042)	0.024** (0.004)	-0.284** (0.045)
$S_j^r$ : Share of recent foreigners	1.310** (0.276)	-0.382** (0.081)	-0.035** (0.008)	0.418** (0.088)
Control variables	yes			
Canton, sample and year dummies	yes			
Proxies for values and beliefs	yes			
$U_j$ : Occ. unemployment rate	no			
$Q_j$ : Job (skill) indicators	no			
Observations	23,104			
Percentage correctly predicted	68.93%			
Test for joint significance of values and beliefs > $F$ statistic	2036.52**			

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable  $y$ : positive attitudes towards equal opportunities for foreigners. Robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Recent foreigners are defined as those arrived in the past 5 years; results are qualitatively similar when recent foreigners are defined as those holding a B- or L-permit (see the first column, upper panel, of Table 12 in the appendix). See Table 7 in the appendix for a list of variables included. Proxies for values and beliefs are *general trust in people* and *political position left-right* (see Subsection 4.2 for details).

### 5.3 Negative Attitudes with More Exposure to Unemployment

Objective competition with foreigners is associated with negative attitudes towards foreigners. According to the results displayed in Table 3, a higher rate of unemployment at the occupational level lowers the propensity to exhibit positive attitudes towards foreigners. At the same time, the results reported in the previous sections are still valid, indicating that perceptions of competition seems to be as relevant as objective competition (Quillian, 1995; Polavieja, 2016).

Table 3: Adding occupational unemployment rate: Ordered probit results

	<i>Previous estimates</i>		<i>With unemployment</i>	
	Coeff	ME	Coeff	ME
	for $y = 3$		for $y = 3$	
$S_j^e$ : Share of early foreigners	-0.891**	-0.284**	-0.751**	-0.239**
	(0.143)	(0.045)	(0.143)	(0.045)
$S_j^r$ : Share of recent foreigners	1.310**	0.418**	1.322**	0.421**
	(0.276)	(0.088)	(0.274)	(0.087)
$U_j$ : Occ. unemployment rate			-1.332**	-0.424**
			(0.473)	(0.150)
Control variables	yes		yes	
Canton, sample and year dummies	yes		yes	
Proxies for values and beliefs	yes		yes	
$Q_j$ : Job (skill) indicators	no		no	
Observations	23,104		23,104	
Percentage correctly predicted	68.93%		68.93%	
Test for joint significance of values and beliefs				
> $F$ statistic	2036.52**		2038.18**	

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable  $y$ : positive attitudes towards equal opportunities for foreigners. Robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Recent foreigners are defined as those arrived in the past 5 years; results are qualitatively similar when recent foreigners are defined as those holding a B- or L-permit (see the first column, upper and middle panels, of Table 12 in the appendix). The occupational unemployment rate is calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. Proxies for values and beliefs are *general trust in people* and *political position left-right* (see Subsection 4.2 for details).

## 5.4 Sorting on Occupational Quality Accounts for Competition

We find support for quality sorting as an explanation: When job indicators are added to the extended model to capture potential sorting on occupational skills, the statistical effects of foreigners' occupational concentration on attitudes towards foreigners outlined in Table 2 are not statistically significant and the marginal effects are reduced in size (see Table 4). The same applies to the negative effect of occupational unemployment rate on positive attitudes. In other words, differences in attitudes towards foreigners seem to be caused by a sorting of Swiss workers in low-quality jobs (i.e. jobs for which skills are in low demand or where labour supply is high) or high-quality jobs (i.e. jobs with shortage of professionals).



Table 4: Adding unemployment and job indicators: Ordered probit results

	<i>Previous estimates</i>		<i>With job indicators</i>	
	Coeff	ME for $y = 3$	Coeff	ME for $y = 3$
$S_j^e$ : Share of early foreigners	-0.751** (0.143)	-0.239** (0.045)	-0.150 (0.206)	-0.047 (0.065)
$S_j^r$ : Share of recent foreigners	1.322** (0.274)	0.421** (0.087)	-0.464 (0.293)	-0.147 (0.093)
$U_j$ : Occ. unemployment rate	-1.332** (0.473)	-0.424** (0.150)	-0.345 (0.477)	-0.109 (0.151)
Control variables	yes		yes	
Canton, sample and year dummies	yes		yes	
Proxies for values and beliefs	yes		yes	
$Q_j$ : Job (skill) indicators	no		yes	
Observations	23,104		23,104	
Percentage correctly predicted	68.93%		69.10%	
Test for joint significance of values and beliefs > $F$ statistic	2038.18**		1805.56**	
Test for joint significance of job indicators > $F$ statistic			255.48**	

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable  $y$ : positive attitudes towards equal opportunities for foreigners. Robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Recent foreigners are defined as those arrived in the past 5 years; results are qualitatively similar when recent foreigners are defined as those holding a B- or L-permit (see the first column, middle and lower panels, of Table 12 in the appendix). The occupational unemployment rate is calculated at the 4-digit ISCO level. *Job indicators*: occupational means of the control variables, dummies for 1-digit ISCO-88 code and working conditions (stress, noise/dirtiness, tiring posture, computer use). Occupational means are calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. Proxies for values and beliefs are *general trust in people* and *political position left-right* (see Subsection 4.2 for details).

## 5.5 Causality and Robustness

In this final subsection, we carry out additional tests to ascertain the robustness of the findings reported. Standard ordered probit results are likely to be biased if Swiss citizens who oppose foreigners choose to work in occupations with few foreigners. As shown by Dustmann and Preston (2001) in terms of location choice, ignoring this simultaneity problem may lead to biased estimates of the attitudinal effects associated with the concentration of foreign citizens. Instrumental variables can account for such potential self-selection into occupations with few foreigners. We assume that occupational mobility is limited within a specific job; in other words, foreigner concentrations of more aggregated occupation levels are considered to be beyond the control of individuals – i.e. Swiss citizens do not sort into more aggregated levels of occupation based on their attitudes towards foreigners. For example, an insulation worker (ISCO 7134) is likely to have some possibility to move to a related job like plasterer (ISCO 7133) or painter (ISCO 7141), but is unlikely to be able to leave the building sector (ISCO 71) altogether. At the same time, the share of foreigners at more aggregated levels of occupation are expected to be a significant predictor of the share of foreigners in a specific occupation and can be regarded as a valid instrument.

Another source of bias may come from the endogenous allocation of foreigners into particular segmented labour markets. To estimate the causal effects of immigration on the labour market outcomes of low-skilled natives, Altonji and Card (1991) have proposed an instrumental variables strategy in which the settlement pattern of previous immigrants is used as an instrument for the location choice of current immigrants. This kind of instrument has been widely adopted in the literature on the effect of immigration on wages (see, e.g., Dustmann et al. (2013) for a recent application). This literature has generally found that settlement patterns of previous immigrants are a major determinant of immigrants' location choices. We also follow this approach in this paper and use as instruments the share of previous foreigners in occupations at the 4-, 3- or 2-digit level.

The estimates from instrumental variables ordered probit regressions (see Table 5) are substantively the same as those obtained on the basis of the standard ordered probit model above (Table 1 to Table 4). As can be generally expected when using instrumental variables, some of the standard errors are larger for all instruments. Both 3-digit and 2-digit codes were used to cater for different potentials to move within sectors. Taken together, the additional analyses in this section support the findings outlined above and suggest that they are robust.

Table 5: Extended model: Standard and IV ordered probit results

	Standard	IV 3-digit at $t$	IV 2-digit at $t$	IV 4-digit at $t-1$	IV 3-digit at $t-1$	IV 2-digit at $t-1$
<b>Without both unemployment and job indicators</b>						
$S_j^e$ : Share of early foreigners	-0.891** (0.143)	-1.042** (0.165)	-1.446** (0.221)	-1.023** (0.152)	-1.167** (0.168)	-1.462** (0.225)
$S_j^r$ : Share of recent foreigners	1.310** (0.276)	1.801** (0.330)	3.253** (0.421)	1.660** (0.318)	2.188** (0.363)	3.356** (0.457)
Observations	23,104	23,104	23,104	22,973	22,973	22,973
Percentage correctly predicted	68.93%	69.00%	68.84%	68.98%	68.98%	68.87%
Test for joint significance of the excluded instruments in the first stage						
> $F$ statistic (dep. var. = $S_j^e$ )		2512.26**	229.41**	3332.11**	1704.34**	222.02**
> $F$ statistic (dep. var. = $S_j^r$ )		753.05**	241.69**	806.49**	466.39**	174.92**
<b>With unemployment only</b>						
$S_j^e$ : Share of early foreigners	-0.751** (0.143)	-0.906** (0.170)	-1.351** (0.241)	-0.884** (0.153)	-1.029** (0.172)	-1.356** (0.247)
$S_j^r$ : Share of recent foreigners	1.322** (0.274)	1.805** (0.327)	3.159** (0.416)	1.669** (0.317)	2.184** (0.360)	3.257** (0.449)
$U_j$ : Occ. unemployment rate	-1.332** (0.473)	-1.228** (0.482)	-0.929* (0.550)	-1.263** (0.484)	-1.189** (0.490)	-1.000* (0.560)
Observations	23,104	23,104	23,104	22,973	22,973	22,973
Percentage correctly predicted	68.93%	68.92%	68.93%	68.99%	69.01%	68.9%
Test for joint significance of the excluded instruments in the first stage						
> $F$ statistic (dep. var. = $S_j^e$ )		1785.16**	172.59**	2721.21**	1285.79**	163.08**
> $F$ statistic (dep. var. = $S_j^r$ )		729.26**	257.21**	775.90**	441.72**	191.82**
<b>With both unemployment and job indicators</b>						
$S_j^e$ : Share of early foreigners	-0.150 (0.206)	0.217 (0.329)	0.020 (0.676)	-0.299 (0.253)	-0.096 (0.387)	-0.074 (0.851)
$S_j^r$ : Share of recent foreigners	-0.464 (0.293)	-0.607 (0.399)	0.658 (0.763)	-0.362 (0.379)	-0.244 (0.448)	0.519 (0.952)
$U_j$ : Occ. unemployment rate	-0.345 (0.477)	-0.499 (0.488)	-0.698 (0.584)	-0.283 (0.486)	-0.420 (0.499)	-0.619 (0.619)
Observations	23,104	23,104	23,104	22,973	22,973	22,973
Percentage correctly predicted	69.10%	69.03%	69.08%	69.08%	69.05%	69.11%
Test for joint significance of the excluded instruments in the first stage						
> $F$ statistic (dep. var. = $S_j^e$ )		207.53**	50.01**	673.33**	150.54**	28.86**
> $F$ statistic (dep. var. = $S_j^r$ )		313.81**	112.75**	427.04**	167.25**	64.91**

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable  $y$ : positive attitudes towards equal opportunities for foreigners. Coefficient estimates, robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Recent foreigners are defined as those arrived in the past 5 years; results are qualitatively similar when recent foreigners are defined as those holding a B- or L-permit (see Table 12 in the appendix). All specifications include control variables and proxies for values/beliefs together with canton, sample and year dummies. The occupational unemployment rate is calculated at the 4-digit ISCO level. *Job indicators:* occupational means, working conditions and 1-digit ISCO-88 code. Occupational means are calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. *Instruments:* share of current foreigners in more aggregated levels of occupation (at the 3- or 2-digit level) and share of previous foreigners in occupations at the 4-, 3- or 2-digit level. The null hypothesis of weak instruments is always rejected using the  $F$  test on excluded instruments.

Most earlier research neglects the problem of omitted variables (one exception is Lancee and Pardos-Prado, 2013). For instance, unmeasured worker skills are likely to be correlated with the propensity to work in an occupation with an important share of foreigners – early or recent. Omitting these worker attributes would lead to biased estimates of  $\alpha^e$  and  $\alpha^r$ , both derived from the pooled ordered probit model. This type of endogeneity can be addressed by using the panel structure of the data. As an additional robustness check we estimate a random effects (RE) ordered probit model in which we add the individual group means of time-variant control variables to filter out the correlation between the error term and the predictor variables (Greene, 2010; Mundlak, 1978). By doing so, we are able to control for unobserved individual heterogeneity as in a fixed effects analysis.

Table 6: Pooled ordered probit and Correlated RE ordered probit

	Main model		With unemployment		With unemployment and job indicators	
	POP	Mundlak REOP	POP	Mundlak REOP	POP	Mundlak REOP
$S_j^e$ : Share of early foreigners	-0.891** (0.143)	0.360 (0.396)	-0.751** (0.143)	0.298 (0.402)	-0.150 (0.206)	0.296 (0.401)
$S_j^r$ : Share of recent foreigners	1.310** (0.276)	-0.072 (0.709)	1.322** (0.274)	-0.092 (0.712)	-0.464 (0.293)	-0.090 (0.707)
$U_j$ : Occ. unemployment rate			-1.332** (0.473)	0.927 (0.854)	-0.345 (0.477)	0.930 (0.852)
Job (skill) indicators	no	no	no	no	yes	yes
Number of $i$	7,445	7,445	7,445	7,445	7,445	7,445
Observations	23,104	23,104	23,104	23,104	23,104	23,104
Percentage correctly predicted	68.93%	69.53%	68.93%	69.38%	69.10%	69.37%
Test for joint significance of the means of the time-variant predictor variables						
> $F$ statistic		533.32**		538.39**		588.38**

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable: positive attitudes towards equal opportunities for foreigners. Coefficient estimates, robust SE in parentheses (clustered by individual id), \*\*  $p < 0.05$ . Recent foreigners are defined as those arrived in the past 5 years; results are qualitatively similar when recent foreigners are defined as those holding a B- or L-permit (see Table 13 in the appendix). All specifications include control variables, controls for values and beliefs, canton, sample and year dummies. The occupational unemployment rate is calculated at the 4-digit ISCO level. *Job indicators:* occupational means, working conditions and 1-digit ISCO-88 code. Occupational means are calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. POP: Pooled Ordered Probit. Mundlak REOP: Random Effects Ordered Probit with the Mundlak correction.

The first, third and fifth columns of Table 6 display the coefficient estimates from pooled ordered probit that have been already presented in Table 2 and Table 4 (columns 'POP'). The results shown in the second, fourth and sixth columns rely on the Mundlak form of the RE ordered probit model, which includes the individual means of time-variant variables (columns 'RE-POP'). Applying the Mundlak approach gives further support to the quality sorting hypothesis, as the estimates associated with the occupational shares

of either early or recent foreigners are not statistically significant and reduced in size. Following Greene (2010), we test the null hypothesis of the random effects model in which the means of the time-variant predictor variables do not add any explanatory power. According to the  $F$  statistic, this hypothesis is rejected and thus the random effects model without the Mundlak correction is not consistent.<sup>1</sup>

As a final check, we follow Hirsch and Macpherson (2004) by directly estimating the relationship between earnings and the share of foreigners in an occupation. In this way we further verify the relevance of the quality sorting explanation – that is, whether the absolute value of the coefficient associated with the occupational share of foreigners decreases as job (skill) indicators are introduced into the wage equation. Table 14 in the appendix presents the regression results where the outcome variable is the log of the yearly gross earnings (adjusted to full-time equivalent basis). The signs of the coefficients are similar to those obtained from models with attitudes as the outcome variable. Moreover, consistent with quality sorting, the occupational shares of early or recent foreigners are not statistically significant and their coefficients reduced in size once job (skill) indicators are accounted for.

## 6 Discussion and Conclusion

This paper examined individual attitudes towards (equal opportunities for) foreigners, focusing on the occupational composition of foreigners. Contrary to most of the literature, we took into consideration the segmented nature of the labour market to adequately capture labour market competition. We could demonstrate that reactions to immigrants in the Swiss labour market vary depending on the share of early and recent immigrants in one’s occupation. We interpreted these nuanced reactions as support for threat theories that highlight competition, but add that workers seem to appreciate foreign colleagues if they help overcome a labour shortage. These associations may reflect sorting based on worker and job skills.

We consider the fact that the relationship between the share of foreigners and attitudes towards foreigners depends on whether an occupation is marked by labour shortages or not. Following standard controls, our results suggest that workers respond to labour force competition in a nuanced way. On the one hand, they are wary of competition with foreigners, and we ob-

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<sup>1</sup> It should be noted that enough variation over time in the occupational distribution of foreigners is needed for identifying the fixed effects estimates of the ethnic concentration. While the Mundlak approach yields consistent results (relative to a random effects approach), it should be kept in mind that it may produce inefficient estimates in case of little variation in the variables of interest.

serve more negative attitudes towards foreigners where the share of early foreigners is higher (compare Kunovich, 2013, 2016). On the other hand, in occupations where the share of recent foreigners is higher – we assume due to labour shortages – attitudes towards foreigners are more positive. These results remain valid even after taking into account the economic situation at the occupational level through the inclusion of the occupational unemployment rate. These findings tend to support the view that *perceptions* of labour force competition as well as actual competition influence attitudes towards foreigners. In both instances, competition with foreigners seems to shape attitudes, and the labour market may be a major channel for such fears (Polavieja, 2016). Studies using the share of immigrants in a geographical units are likely to miss these effects. It may be that geography captures a general unease with the presence of immigrants (Pottie-Sherman and Wilkes, 2017), while the labour market is more clearly about competition. Further research is necessary to understand how these effects of labour force competition interact with perceived cultural and symbolic threats.

The findings in this paper suggest that the level of analysis is important when examining attitudes towards foreigners and immigrants – and by extension inter-group relations. Just like research has demonstrated that the composition of the population at the local level is an important factor (Hopkins, 2011; Dancygier, 2010), here we consider the segmented nature of labour markets into occupations. Labour force competition as an explanation for attitudes towards foreigners indeed remains an important channel when the labour market is addressed in a realistic manner (see also Ortega and Polavieja, 2012; Lee and Lee, 2015; Polavieja, 2016). Rather than trying to identify a single influence to explain differences in attitudes towards foreigners, immigrants, or ethnic/racial minorities, in our view future research should focus on the different paths by which attitudes can be shaped, and especially on the interaction between paths (Berg, 2015).

Several recent contributions have suggested that concerns over the impact of immigration on society dominate over concerns over the individual situation (Hainmueller and Hopkins, 2014; Berg, 2015). While we do not doubt the importance of concerns over the impact of immigration on society, here we show that negative attitudes to foreigners are associated with individual competition with immigrants at the occupation level. This is in line with group-threat theory (compare Malhotra et al., 2013; Pecoraro and Ruedin, 2016): individuals who are (more) exposed to labour force competition with immigrants are more wary of immigrants. Both perceptions of competition and objective competition – approached with occupation-level unemployment rates – are associated with negative attitudes. The association between unemployment and attitudes suggests that for some workers

the presence of immigrants really constitutes competition. This means that political and media portraits of the threat posed by immigrants may be gross oversimplifications, but they are not entirely fabricated.

Taking a closer look at specific occupational segments allowed us to demonstrate that reactions to immigrants vary greatly between occupations. Employers often recruit foreign workers in occupations marked by labour shortages, which leads to a high share of recent foreigners (for an application to Switzerland, see Sheldon, 2008). We show that attitudes to foreigners are quite different for workers in occupations with many recent foreigners, who are both poorly and highly educated (Pecoraro and Ruedin, 2016). We suggest that this reflects nuanced reactions whereby workers appreciate the contribution of foreigners where there are labour shortages, but oppose them when they are competitors – as is the case with earlier migrants. Although they are completely in line with competitive threat theories, such nuanced reactions are missed in many aggregate studies because the two tendencies may be cancelling each other out.

Following Hirsch and Schumacher (1992) and Hirsch and Macpherson (2004), we showed that the share of foreigners in an occupation is a proxy for unmeasured job characteristics. This means that part of what may superficially look like labour force competition is actually a sorting of Swiss workers into jobs based on skills. As a result of this sorting, occupations with a high proportion of foreigners tend to be of low quality (where skills are in low demand or labour supply is high) while occupations with a high proportion of recent immigrants tend to be of high quality (where skills are in high demand or labour supply is low). Such quality sorting is or was partly a reflection of immigration policies in many Western countries, and negative attitudes to foreigners may be – at least partly – unintended consequences of such policies that encourage sorting. With contemporary immigration policies not differing radically (Ruedin et al., 2015), these unintended consequences may extend into the future. Future research may want to establish the relative importance of sorting vis-à-vis interpersonal contact and concerns over the impact of immigrants on society, and indeed test interactions between these different explanations.

While we highlight competition in the labour market, we fully acknowledge that there are other factors that influence attitudes towards foreigners, such as the society-level concerns and fears of fiscal threat well-established in the literature (e.g. Rustenbach, 2010; Hatton, 2014; Pettigrew, 2016). These other factors should not distract from the competition immigrants may pose – to some workers in specific occupations. The nuanced responses to immigrants we observed suggest that reactions by native workers take into consideration the economic costs and benefits for individual workers. With that,

the reasons why individuals oppose foreigners are likely to be multifaceted and interacting with one another, and in our view any attempt to reduce them to a single factor is bound to fail.

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## 8 Appendix

Table 7: Predictor variables included in the empirical analysis

Continuous variables	Dummy variables	Ref.
Baseline and extended models		
Age in years (at the time of the interview) Age squared	<b>Levels of education</b> Compulsory <i>Upper secondary</i> Tertiary	×
Share of foreign citizens by level of occupation ( $S_j = S_j^e + S_j^r$ )	<b>Gender</b> <i>Male</i> Female	×
Share of early foreigners by level of occupation ( $S_j^e$ ) Share of recent foreigners by level of occupation ( $S_j^r$ )	<b>Canton of residence</b> <i>1 (AG Argovia)</i> ... <i>26 (ZH Zurich)</i>	×
	<b>Sample</b> <i>SHP_I</i> <i>SHP_II</i>	×
	<b>Year</b> <i>2004</i> ... <i>2009</i>	×
Adding occupational unemployment		
Unemployment rate by level of occupation		
Adding job indicators		
Share of women by level of occupation	<b>Working conditions: stress</b> yes <i>no</i>	×
Average age by level of occupation	<b>Working conditions: noise/dirtiness</b> yes <i>no</i>	×
Average age squared by level of occupation	<b>Working conditions: tiring posture</b> yes <i>no</i>	×
Share of compulsory-educated by level of occupation	<b>Working conditions: computer use</b> yes <i>no</i>	×
Share of tertiary-educated by level of occupation	<b>1-digit ISCO-88 code</b> <i>1 (Legislators, senior officials, managers)</i> ... <i>9 (Elementary occupations)</i>	×

*Notes:* Control variables only include gender, education, age and its square. Levels of education are defined in Table 8. Occupation is disaggregated at the 4-digit level. Recent foreigners can be defined as those arrived in the past 5 years, alternatively holding a B- or L-permit.

Table 8: Definition for levels of education

Description	Values for the education variable
<b>Compulsory education</b>	
Incomplete compulsory school	0
Compulsory school, elementary vocational training	1
Domestic science course, 1 year school of commerce	2
<b>Upper secondary education</b>	
General training school	3
Apprenticeship	4
Full-time vocational school	5
Maturity (high school)	6
<b>Tertiary education</b>	
Vocational high school with master/federal certificate	7
Technical or vocational school	8
Higher vocational college	9
University, PhD	10

*Note:* EDUCAT is used as the education variable.

Table 9: Summary statistics for 2004-2009

Variables	Mean	S.E.	95% C.I.	
			Lower	Upper
<i>Attitudes towards foreigners</i>				
In favour of better opportunities for Swiss citizens	0.27	0.00	0.27	0.28
Neither of them	0.06	0.00	0.06	0.06
In favour of equal opportunities for foreigners	0.67	0.00	0.66	0.67
<i>Share of foreigners</i>				
$S_j$ : Share of all foreigners	0.20	0.00	0.19	0.20
$S_{1j}^r$ : Share of foreigners arrived in the past 5 years	0.05	0.00	0.05	0.05
$S_{2j}^r$ : Share of foreigners with a B- or L-permit	0.07	0.00	0.07	0.07
<i>Levels of education</i>				
Compulsory education	0.12	0.00	0.12	0.12
Upper secondary education	0.52	0.00	0.51	0.52
Tertiary education	0.36	0.00	0.36	0.37
Female	0.53	0.00	0.52	0.54
Age	43.04	0.08	42.87	43.20
Second sample (SHP_II)	0.62	0.00	0.61	0.62
<i>Year</i>				
2004	0.19	0.00	0.19	0.20
2005	0.16	0.00	0.15	0.16
2006	0.15	0.00	0.15	0.16
2007	0.16	0.00	0.16	0.17
2008	0.16	0.00	0.16	0.17
2009	0.17	0.00	0.16	0.17
Unemployment rate by 4-digit occupation	0.03	0.00	0.03	0.03
Share of women by 4-digit occupation	0.50	0.00	0.49	0.50
Average age by 4-digit occupation	41.45	0.02	41.42	41.49
Share of compulsory-educated by 4-digit occupation	0.12	0.00	0.11	0.12
Share of tertiary-educated by 4-digit occupation	0.35	0.00	0.34	0.35
Working conditions: Stress	0.35	0.00	0.34	0.35
Working conditions: Noise/dirtiness	0.21	0.00	0.20	0.21
Working conditions: Tiring posture	0.37	0.00	0.37	0.38
Working conditions: Computer use	0.73	0.00	0.73	0.74
<i>1-digit ISCO-88 code</i>				
1. Legislators, senior officials, managers	0.05	0.00	0.05	0.05
2. Professionals	0.23	0.00	0.22	0.23
3. Technicians and associate professionals	0.27	0.00	0.26	0.27
4. Clerks	0.13	0.00	0.13	0.13
5. Service workers, market sales workers	0.13	0.00	0.12	0.13
6. Skilled agricultural and fishery workers	0.04	0.00	0.03	0.04
7. Craft and related trades workers	0.10	0.00	0.09	0.10
8. Plant and machine operator assemblers	0.02	0.00	0.02	0.02
9. Elementary occupations	0.05	0.00	0.04	0.05

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* All mean values are calculated based on  $N = 23,104$ .



Table 10: Summary statistics for attitudes and foreigner shares over years

	2004	2005	2006	2007	2008	2009	Total
<i>Attitudes towards foreigners</i>							
> In favour of better opportunities for Swiss citizens ( $y = 1$ )	0.2777 (0.0067)	0.2708 (0.0074)	0.2710 (0.0074)	0.2614 (0.0071)	0.2555 (0.0071)	0.2934 (0.0073)	0.2720 (0.0029)
> Neither of them ( $y = 2$ )	0.0815 (0.0041)	0.0603 (0.0039)	0.0564 (0.0039)	0.0574 (0.0038)	0.0567 (0.0038)	0.0491 (0.0035)	0.0609 (0.0016)
> In favour of equal opportunities for foreigners ( $y = 3$ )	0.6408 (0.0072)	0.6689 (0.0078)	0.6726 (0.0079)	0.6812 (0.0076)	0.6878 (0.0076)	0.6575 (0.0076)	0.6672 (0.0031)
<i>Share of foreigners by occupation</i>							
> All foreigners	0.1923 (0.0018)	0.1883 (0.0019)	0.1896 (0.002)	0.1957 (0.002)	0.2000 (0.0019)	0.2065 (0.0018)	0.1955 (0.0008)
> Early foreigners	0.1457 (0.0015)	0.1398 (0.0015)	0.1400 (0.0016)	0.1460 (0.0016)	0.1458 (0.0015)	0.1449 (0.0014)	0.1438 (0.0006)
> Recent foreigners	0.0464 (0.0006)	0.0484 (0.0007)	0.0494 (0.0007)	0.0496 (0.0007)	0.0542 (0.0007)	0.0616 (0.0007)	0.0515 (0.0003)
Observations	4,476	3,648	3,564	3,783	3,741	3,892	23,104

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Mean values over years, standard errors in parentheses. Recent foreigners are defined as those arrived in the past 5 years.

Table 11: OLS models predicting the share of foreigners by occupation

	All Foreigners	Early Foreigners	Recent Foreigners
$U_j$ : Occ. unemployment rate	0.759** (0.131)	0.514** (0.094)	0.245** (0.065)
<i>Other occupational means</i>			
Share of women	-0.055** (0.011)	-0.045** (0.008)	-0.010* (0.005)
Average age	0.036** (0.012)	0.023** (0.009)	0.013** (0.005)
Average age squared	-0.001** (0.000)	-0.000** (0.000)	-0.000** (0.000)
Share with compulsory education	0.872** (0.030)	0.653** (0.025)	0.219** (0.015)
Share with tertiary education	0.155** (0.029)	0.027* (0.016)	0.128** (0.019)
<i>Working conditions</i>			
Stress	-0.003* (0.001)	-0.001 (0.001)	-0.001** (0.001)
Noise/dirtiness	-0.008** (0.002)	-0.006** (0.001)	-0.002*** (0.001)
Tiring posture	0.008** (0.002)	0.007** (0.001)	0.001 (0.001)
Computer use	-0.005** (0.002)	-0.004** (0.002)	-0.001 (0.001)
Occupation fixed effects	yes	yes	yes
Control variables	yes	yes	yes
Canton, sample and year dummies	yes	yes	yes
Proxies for values and beliefs	no	no	no
Observations	23,104	23,104	23,104
$R^2$	0.703	0.769	0.465

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable: share of foreigners in occupation. Coefficient estimates, Robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Recent foreigners are defined as those arrived in the past 5 years. The occupational unemployment rate and other occupational means are calculated at the 4-digit ISCO level. *Occupation fixed effects:* dummies for 1-digit ISCO-88 code. See Table 7 in the appendix for a list of variables included.

Table 12: Extended model: Standard and IV ordered probit results

	Standard	IV 3-digit at $t$	IV 2-digit at $t$	IV 4-digit at $t - 1$	IV 3-digit at $t - 1$	IV 2-digit at $t - 1$
<b>Without both unemployment and job indicators</b>						
$S_j^e$ : Share of early foreigners	-1.112** (0.163)	-1.346** (0.188)	-1.791** (0.237)	-1.202** (0.173)	-1.463** (0.194)	-1.812** (0.239)
$S_j^r$ : Share of recent foreigners	0.997** (0.212)	1.436** (0.257)	2.416** (0.346)	1.105** (0.233)	1.634** (0.275)	2.489** (0.370)
Observations	23,104	23,104	23,104	22,973	22,973	22,973
Percentage correctly predicted	68.99%	68.89%	68.74%	69.00%	68.91%	68.74%
Test for joint significance of the excluded instruments in the first stage						
> $F$ statistic (dep. var. = $S_j^e$ )		2777.56**	323.65**	3670.60**	1706.92**	302.16**
> $F$ statistic (dep. var. = $S_j^r$ )		474.13**	178.31**	1484.97**	385.99**	139.89**
<b>With unemployment only</b>						
$S_j^e$ : Share of early foreigners	-0.968** (0.160)	-1.208** (0.190)	-1.672** (0.254)	-1.061** (0.172)	-1.320** (0.197)	-1.681** (0.257)
$S_j^r$ : Share of recent foreigners	1.044** (0.211)	1.478** (0.253)	2.356** (0.337)	1.164** (0.233)	1.675** (0.271)	2.430** (0.358)
$U_j$ : Occ. unemployment rate	-1.347** (0.468)	-1.231** (0.476)	-1.047* (0.538)	-1.311** (0.475)	-1.215** (0.484)	-1.120** (0.548)
Observations	23,104	23,104	23,104	22,973	22,973	22,973
Percentage correctly predicted	68.93%	68.99%	68.72%	69.00%	68.92%	68.75%
Test for joint significance of the excluded instruments in the first stage						
> $F$ statistic (dep. var. = $S_j^e$ )		1696.26**	231.42**	2963.34**	1123.70**	210.38**
> $F$ statistic (dep. var. = $S_j^r$ )		457.44**	203.00**	1470.03**	363.19**	165.59**
<b>With both unemployment and job indicators</b>						
$S_j^e$ : Share of early foreigners	-0.341 (0.222)	-0.165 (0.349)	-0.392 (0.665)	-0.405 (0.266)	-0.401 (0.400)	-0.472 (0.775)
$S_j^r$ : Share of recent foreigner	-0.124 (0.240)	0.004 (0.314)	0.997* (0.602)	-0.157 (0.280)	0.169 (0.343)	0.938 (0.706)
$U_j$ : Occ. unemployment rate	-0.363 (0.478)	-0.477 (0.486)	-0.693 (0.569)	-0.317 (0.485)	-0.428 (0.495)	-0.646 (0.594)
Observations	23,104	23,104	23,104	22,973	22,973	22,973
Percentage correctly predicted	69.07%	69.01%	69.04%	69.11%	69.09%	69.11%
Test for joint significance of the excluded instruments in the first stage						
> $F$ statistic (dep. var. = $S_j^e$ )		279.67**	72.20**	679.17**	159.43**	43.53**
> $F$ statistic (dep. var. = $S_j^r$ )		209.71**	102.56**	694.30**	147.64**	67.12**

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable: positive attitudes towards equal opportunity for foreigners. Coefficient estimates, robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Recent foreigners are defined as those holding a B- or L-permit. All specifications include control variables and proxies for values/beliefs together with canton, sample and year dummies. The occupational unemployment rate are calculated at the 4-digit ISCO level. *Job indicators:* occupational means, working conditions and 1-digit ISCO-88 code. Occupational means is calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. *Instruments:* share of current foreigners in more aggregated levels of occupation (at the 3- or 2-digit level) and share of previous foreigners in occupations at the 4-, 3- or 2-digit level. The null hypothesis of weak instruments is always rejected using the  $F$  test on excluded instruments.

Table 13: Pooled ordered probit and Correlated RE ordered probit

	Main model		With unemployment		With unemployment and job indicators	
	POP	Mundlak REOP	POP	Mundlak REOP	POP	Mundlak REOP
$S_j^e$ : Share of early foreigners	-1.112** (0.163)	0.287 (0.457)	-0.968** (0.160)	0.216 (0.464)	-0.341 (0.222)	0.217 (0.463)
$S_j^r$ : Share of recent foreigners	0.997** (0.212)	0.223 (0.574)	1.044** (0.211)	0.201 (0.577)	-0.124 (0.240)	0.197 (0.573)
$U_j$ : Occ. unemployment rate			-1.347** (0.468)	0.934 (0.855)	-0.363 (0.478)	0.937 (0.853)
Job (skill) indicators	no	no	no	no	yes	yes
Number of $i$	7,445	7,445	7,445	7,445	7,445	7,445
Observations	23,104	23,104	23,104	23,104	23,104	23,104
Percentage correctly predicted	68.99%	69.49%	68.93%	69.40%	69.07%	69.45%
Test for joint significance of the means of the time-variant predictor variables						
> $F$ statistic		530.32**		535.61**		582.81**

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable: positive attitudes towards equal opportunity for foreigners. Coefficient estimates, robust SE in parentheses (clustered by individual id), \*\*  $p < 0.05$ . Recent foreigners are defined as those holding a B- or L-permit. All specifications include control variables, controls for values and beliefs, canton, sample and year dummies. The occupational unemployment rate is calculated at the 4-digit ISCO level. *Job indicators:* occupational means, working conditions and 1-digit ISCO-88 code. Occupational means are calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. POP: Pooled Ordered Probit. Mundlak REOP: Random Effects Ordered Probit with the Mundlak correction.

Table 14: Log (yearly gross) earnings equation: OLS results

	Baseline model	Extended models		
$S_j$ : Share of foreigners	-0.290** (0.079)			
$S_j^e$ : Share of early foreigners		-0.875** (0.099)	-0.798** (0.095)	-0.012 (0.138)
$S_j^r$ : Share of recent foreigners		1.352** (0.179)	1.347** (0.180)	0.002 (0.192)
$U_j$ : Occ. unemployment rate			-0.698** (0.324)	-0.245 (0.313)
Control variables	yes	yes	yes	yes
Canton, sample and year dummies	yes	yes	yes	yes
Proxies for values and beliefs	no	no	no	no
$Q_j$ : Job (skill) indicators	no	no	no	yes
Observations	20,645	20,645	20,645	20,645
Number of $i$	7,445	7,445	7,445	7,445
$R^2$	0.355	0.363	0.363	0.398

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Outcome variable: log yearly gross earnings. Coefficient estimates, Robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Yearly gross earnings are (a) deflated into 2000 Swiss francs and (b) adjusted to full-time equivalent basis. Recent foreigners are defined as those arrived in the past 5 years; results are qualitatively similar when recent foreigners are defined as those holding a B- or L-permit (see Table 15). All models include control variables plus canton, sample and year dummies. The occupational unemployment rate is calculated at the 4-digit ISCO level. *Job indicators*: occupational means, working conditions and 1-digit ISCO-88 code. Occupational means are calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. Specifications with variables for values and beliefs were also tested leading to quantitatively similar results.

Table 15: Log (yearly gross) earnings equation: Additional OLS results

	Baseline model	Extended models		
$S_j$ : Share of foreigners	-0.290** (0.079)			
$S_j^e$ : Share of early foreigners		-0.960** (0.112)	-0.870** (0.108)	-0.020 (0.149)
$S_j^r$ : Share of recent foreigners		0.783** (0.139)	0.801** (0.138)	-0.014 (0.144)
$U_j$ : Occ. unemployment rate			-0.791** (0.328)	-0.238 (0.312)
Control variables	yes	yes	yes	yes
Canton, sample and year dummies	yes	yes	yes	yes
Proxies for values and beliefs	no	no	no	no
$Q_j$ : Job (skill) indicators	no	no	no	yes
Observations	20,645	20,645	20,645	20,645
Number of $i$	7,445	7,445	7,445	7,445
$R^2$	0.355	0.361	0.362	0.398

*Source:* Swiss Household Panel 2004-2009, data are unweighted.

*Notes:* Coefficient estimates, Robust SE in parentheses (clustered by occupation and year), \*\*  $p < 0.05$ , \*  $p < 0.10$ . Yearly gross earnings are (a) deflated into 2000 Swiss francs and (b) adjusted to full-time equivalent basis. Recent foreigners are defined as those holding a B- or L-permit. All models include control variables plus canton, sample and year dummies. The occupational unemployment rate is calculated at the 4-digit ISCO level. *Job indicators:* occupational means, working conditions and 1-digit ISCO-88 code. Occupational means are calculated at the 4-digit ISCO level. See Table 7 in the appendix for a list of variables included. Specifications with variables for values and beliefs were also tested leading to quantitatively similar results.