

# The Fiscal Effects of the New Immigration in Switzerland

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## Abstract

Our research investigates the long-term fiscal effects of the so-called *new immigration* of high-skilled workers in Switzerland for the first time. We develop a new approach, which combines the strengths of the two methods that are known in the literature. In line with the dynamic approach, we project the future composition of the foreign population in Switzerland, using the current propensities of immigrants with different characteristics to settle in Switzerland, and then link this structure based on the static approach with current tax, contribution, transfer and benefit flows of foreigners with the same characteristics. It is therefore a *ceteris paribus* comparison that shows what effect the new immigration in Switzerland has on the fiscal balance of foreigners in the long run due to changes in the composition of the immigrant flow and the varying tendencies of immigrants to settle in Switzerland under otherwise identical conditions. The results indicate that the fiscal incidence of the new immigration has a negative long-term trend. In doing so, this investigation provides evidence that the future improvement of the skill level of foreigners, which should influence the fiscal balance positively, is too weak to compensate the expected negative fiscal effects of the trend towards an aging society.

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# Chapter 1

## Introduction

Immigration policy is one of the dominating political issues in Switzerland. A main aspect in this discussion is the fiscal impact of immigration, i.e., the question as to whether immigrants contribute more to the tax and social security systems of their host countries than they draw in transfers and benefits. One speaks of a positive fiscal balance of immigration when the income from the former outweighs the expense of the latter from the government's viewpoint. The fiscal balance of immigration in Switzerland was last quantified in 1990 and was found to be slightly positive. Since then, however, the skill level of workers immigrating to Switzerland has greatly increased. Today over half of the foreign workers recruited abroad are college-educated and only a fifth are low-skilled, whereas the opposite was true up until the mid-1990s (Sheldon and Cueni, 2011a, p. 6). This change has been termed the "new immigration" in Switzerland. Previous findings in other countries suggest that the increased skill level of immigrants should improve the fiscal balance of immigration in Switzerland.

However, a recent study by de Wild (2010) shows that the tendency of immigrants to settle in Switzerland depends, *inter alia*, on their nationality, gender, marital status and age. The high-skilled foreign workers are mainly recruited from the northern EU-17/EFTA countries. Hence, a relatively low tendency of immigrants from these countries to settle in Switzerland could lead to a lower future share of high-skilled foreign residents in Switzerland than the current skill mix of immigrants would suggest, thus detracting from the expected improvement in the fiscal balance of immigration. Moreover, this trend could be (over-)compensated by parallel developments that negatively influence the fiscal contribution of immigrants. In this regard, the demographic change towards an aging society needs to be stressed. According to the existing empirical evidence, this change (mainly through the increased entitlement to old-age pensions) has a negative impact on the fiscal balance of immigrants.

Our research focuses on the long-term effect that these countervailing trends will have on the immigrant composition and thereby on the fiscal balance of immigration in Switzerland. There are basically two approaches in the literature to estimate the fiscal effects of immigration. The static approach assesses the fiscal contribution of immigrants in a given year, typically based on cross-sectional data. However, cross-sectional studies can only indicate the future fiscal contribution of immigrants if their composition remains constant. In contrast, dynamic models compute the lifetime fiscal contribution. However, this forward-looking approach rests on strong assumptions regarding the future behavior of fertility, employment, productivity, tax rates and government spending, which contrasts with the simplicity of the backward-looking static approach.

Our approach combines the strengths of dynamic and static models while avoiding the backward-looking character of the static model and the heroic assumptions of dynamic models. In so doing, it provides a major contribution to the existing literature. However, unlike some dynamic models, possible indirect effects of immigration such as, for example, additional costs of the unemployment insurance for natives due to their displacement from the labor market or an increasing tax revenue from natives due to an economic growth triggered by immigration are ignored. Moreover, changes in fiscal policy over time due to structural deficits or surpluses cannot be considered.

In a first step, in line with the dynamic approach, we project the future composition of the foreign population in Switzerland, using the current propensities of immigrants with different characteristics to settle in Switzerland, and then link this structure based on the static approach with current tax, contribution, transfer and benefit flows of foreigners with the same characteristics. The future composition of the foreign population is computed using a social accounting matrix framework [SAM] and a Markov chain model. The research draws on data from the Income and Consumer Expenditure Survey [EVE], the Swiss Labor Force Survey [SAKE] and the foreign resident population statistics [PETRA] for the period covering the 2000s.

The comparison of the current and long-term fiscal balance of immigrants indicates whether the fiscal incidence of foreigners improves or deteriorates in the long run. It is therefore a *ceteris paribus* comparison that shows what effect the new immigration in Switzerland has on the fiscal balance of foreigners in the long run due to changes in the composition of the immigrant flow and the varying tendencies of immigrants to settle in Switzerland under otherwise identical conditions.

The rest of the paper is structured as follows:

Chapter 2 gives an overview of the literature on the fiscal effects of immigration. The influencing factors of the immigration's fiscal contribution are identified in chapter 3. The composition of foreigners in the long-term equilibrium is calculated in chapter 4. The long-term fiscal effects of the new immigration are quantified in chapter 5. Chapter 6 summarizes the main results and draws a conclusion.



## Chapter 2

# Literature overview

There are basically two approaches in the literature to estimate the fiscal effects of immigration. The static approach assesses the fiscal contribution of immigrants in a given year, typically based on cross-sectional data, whereas dynamic models compute the life-time fiscal contribution. In the following, the empirical evidence is presented by these two approaches.

### 2.1 Static approach

To date, three empirical cross-sectional fiscal balance studies have been conducted for Switzerland. Leu et al. (1988) use cross-sectional data from 1980 and analyze the incidence on government revenue and spending. Although they do not distinguish between native and immigrant households, their results suggest that the fiscal effects of immigration depend on the socio-economic attributes of the immigrants.

Based on this research, Weber (1993) conducted the first estimation of the fiscal balance of both native and immigrant households using cross-sectional data from 1990. He finds a positive fiscal contribution of CHF 2'073 for an average immigrant household and a negative contribution of CHF 193 for an average native household for that year. However, Weber and Straubhaar (1996) note in a later publication that these findings are substantially due to different sample structures.

In a study limited to the social security transfers between government and households based on data from 1998, Künzi and Schärer (2004) find that an average immigrant household paid CHF 4'391 more into the social security system than it received from it in 1998.

Various international cross-sectional studies have also addressed our research question. For the USA, Simon (1984) finds a positive, Blau (1984) a neutral, and Borjas (1994) a negative fiscal contribution of immigrants, whereas the results of Tienda and Jensen (1986), Jensen and Tienda (1988) and Jensen (1988) are not clear with regard to the fiscal effects of immigration to the United States. The results of Kakwani (1986) for Australia, Akbari (1989) for Canada and Gott and Johnston (2002) for Great Britain suggest that immigrants are net payers of transfers. According to Ulrich (1992), it is not possible to make a general statement about the fiscal effects of immigration to Germany, but Miegel (1984) estimates a negative fiscal contribution of immigrants. Biffi (2004) considers the fiscal costs and benefits of immigration to Austria to be balanced. The author states that cross-sectional studies can only indicate the future fiscal contribution of immigrants if their structure remains constant. Accordingly, only dynamic models, which consider the transfers paid and the benefits received over a lifetime, are able to compute the actual fiscal effect of immigration. However, this forward-looking approach needs strong assumptions regarding the future behavior of fertility, employment, productivity, tax rates and government spending, which contrasts with the simplicity of the backward-looking static approach. Thus, the static approach may still be useful in practice.

## 2.2 Dynamic approach

Sinn et al. (2001) assess the net present values of the benefits received and the transfers paid to estimate the discounted fiscal contribution of immigrants in Germany based on data from 1997. The authors find that immigrants turn from being net receivers to net payers when the duration of stay in Germany increases.

Bonin (2002) uses a method known as generational accounting with base year 1996 for Germany, which in contrast to Sinn et al. (2001) investigates the fiscal impact of the descendants of immigrants as well. This approach was developed by Auerbach et al. (1991, 1992) and considers all future government revenue and spending associated with immigration. These transfers are discounted back to the base year and summed to the net present value of the future fiscal contribution of immigrants and their descendants. The results of Bonin (2002) show that immigrants who are older than 10 and younger than 50 at the time of immigration make a positive fiscal contribution.

This concept is applied to Switzerland by Raffelhüschen and Borgmann (2001) with base years 1995 and 1997. But the authors present no results differentiated by natives and immigrants. However, simulations show that compared to the benchmark scenario, higher annual immigration affects the public debt positively.

More indirect effects of immigration, which are not measured by the generational accounting method, can be assessed using a general equilibrium model. Under the assump-

tion that immigration does not affect the capital stock, the labor-capital ratio changes due to immigration leading to decreasing wages, associated tax deficits and higher interest rates to service the public debt. Storesletten (2000) considers these effects by computing a calibrated general equilibrium overlapping generations model for the USA. He finds that an increased inflow of immigrants with the same age- and skills-composition of average immigrants who immigrated during the period 1988-1990 does not lead to a fiscal balance in the long run without changing the status quo tax and spending policies. Only a selective immigration policy, which leads to a higher inflow of working-age medium- and high-skilled immigrants can remove the imbalance between government revenue and spending.

Similar findings are achieved by Rowthorn (2008) who summarizes the international literature on the fiscal effects of immigration in advanced economies. While high-skilled immigrants usually make a significantly positive fiscal contribution using both static and dynamic approaches for the assessment, low-skilled immigrants tend to be a fiscal burden for natives. The evidence therefore suggests that the relative increase in high-skilled immigrants to Switzerland will affect the fiscal balance of immigration positively. At the same time, the results indicate that the development of the age composition of foreigners is a second main determinant of the future fiscal incidence of immigration.

In the next chapters, a method to quantify the long-term change of the fiscal contribution of foreigners will be developed. This method combines the strengths of both dynamic and static models and allows a forecast of the future fiscal balance, while avoiding the heroic assumptions of dynamic models. However, it remains to be stated that this method, like pure cross-sectional studies, is not able to consider possible indirect effects of immigration<sup>1</sup>.

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<sup>1</sup>Examples are additional costs of the unemployment insurance for natives due to their displacement from the labor market or an increasing tax revenue from natives due to an economic growth triggered by immigration. Moreover, changes in fiscal policy over time due to structural deficits or surpluses cannot be considered.

## Chapter 3

# Influencing factors of the immigration's fiscal contribution

### 3.1 Methodology

The effect of a changing composition of foreigners on the fiscal contribution of immigrants is measured based on regressions, which estimate the transfers between government and foreigners depending on their attribute profiles.

Thus, the transfers between government and foreigners are quantified first. Therefore, a dataset that surveys these transfers to some extent is used. Where the data set does not allow for the incidence of the particular transfers to be gained directly, additional calculations are employed to allocate the transfers to the respective foreigners.

It needs to be considered that the fiscal revenue of the government is not only composed of taxes levied on persons living in Switzerland but also of taxes on domestic companies and income earned abroad. However, companies try to pass on their taxes to consumers via higher prices. Under the assumption of perfectly elastic long-run supply, consumers bear the complete burden of the company taxes. Thus, the computation of the fiscal incidence of the new immigration to Switzerland also includes the company taxes paid by foreigners in Switzerland. In this context, attention needs to be paid to the fact that the taxes on Swiss companies can partially be passed on to foreign countries via exports. This share of the company taxes is not allocated to the foreigners in Switzerland.

Moreover, also the employer contributions to social insurance schemes can be allocated to the foreigners as transfers in favor of the government. The employer contributions to social insurance schemes make the factor labor more expensive for companies, which

**Table 3.1:** Classification of public expenditure by function

<b>Public goods (independent of population)</b>
General administration
Justice, police, fire service
Defence
Foreign relations
Basic research
Culture and recreation
Water and avalanche control
<b>Remaining real transfers (dependent on population)</b>
Education (without basic research)
Health
Traffic
Environmental protection and spatial planning
Economic affairs

react under a profit-maximizing behavior either by passing on the additional costs or by adjusting the employment or by a combination of both<sup>1</sup>. However, a recent study by Sheldon and Cueni (2011b) shows that higher employer contributions for pension funds do not affect employment. This result indicates that Swiss companies are able to completely pass on their social security payments to the wages of employees and to product prices. A study on behalf of the Federal Social Insurance Office estimates that 60 per cent of any rise in contributions to social insurance schemes are passed on to the wages of employees in the short run (Federal Social Insurance Office, 1998, S. 86ff.). This estimation is used for the present study, whereby 60 per cent of the cost of employer contributions are accordingly allocated to employees and 40 per cent to consumers.

Eventually, the incidence of real (non-monetary) transfers needs to be examined. These non-monetary governmental benefits for the population can be classified into two groups. Some expenditures rise with population growth, whereas others are only insignificantly dependent on the population size. Accordingly, the second group represents the fixed costs of the government, which are known as public goods. Immigration causes (almost) no marginal costs for public goods. Instead, fixed costs can be distributed among more persons and native tax payers are thus relieved. Public goods are therefore not considered in this study. However, the remaining real transfers are allocated to foreigners. The classification of the real transfers used in this study is adopted from Weber (1993) and is illustrated in table 3.1.

The functions *Social welfare* and *Finances and taxes* are not listed in table 3.1. Expenditures for social welfare are monetary transfers and are directly surveyed in the mentioned dataset<sup>2</sup>. The public expenditures for finances and taxes are not considered as these ex-

<sup>1</sup>See e.g. Borjas (2010).

<sup>2</sup>See table 3.2 in chapter 3.2.2.

penditures are not linked to real benefits.

The *health services received from government* and these *educational services* that can be allocated to the different school levels are approximated using appropriate criteria. Thus, the amount of these transfers varies among foreigners. However, the other public expenditures for the remaining real transfers are allocated per capita to the permanent resident population, as the per capita allocation of real public expenditure is the international standard and an appropriate allocation criterion that measures the actual consumption of these goods more exactly could not be found.

After quantifying the transfers between government and foreigners, these transfers are regressed on the attributes of the foreigners, except for the real transfers with a uniform amount per capita. Therefore, single transfers are aggregated to  $K$  transfer groups.

Due to the left-censoring of the transfers at zero, a Tobit model is estimated with maximum likelihood. The underlying regression relationship, which models the latent aggregated transfer  $y_{ik}^*$  that a foreigner  $i$  receives or pays depending on the foreigner's attribute profile  $\mathbf{x}_i$ , is:

$$y_{ik}^* = \alpha_k + \beta_k' \mathbf{x}_i + \varepsilon_{ik},$$

where

$$\varepsilon_{ik} | \mathbf{x}_i \sim \mathcal{N}(0, \sigma_k^2). \quad (3.1)$$

However,  $y_{ik}^*$  is unobservable. Only the variable  $y_{ik}$ , which is characterized as follows, is observed:

$$y_{ik} = \begin{cases} 0 & \text{if } y_{ik}^* \leq 0, \\ y_{ik}^* & \text{if } y_{ik}^* > 0. \end{cases} \quad (3.2)$$

If  $y_{ik}^* \sim \mathcal{N}(\mu_k, \sigma_k^2)$ , the ex-post forecast of the average fiscal contribution of foreigners depending on their attribute profile results from the following equation:

$$E[y_{ik} | \mathbf{x}_i] = \Phi\left(\frac{\beta_k' \mathbf{x}_i}{\sigma_k}\right) (\beta_k' \mathbf{x}_i + \sigma_k \lambda_{ik}),$$

where

$$\lambda_{ik} = \frac{\phi(\beta_k' \mathbf{x}_i / \sigma_k)}{\Phi(\beta_k' \mathbf{x}_i / \sigma_k)}. \quad (3.3)$$

$\Phi(\cdot)$  denotes the cumulative distribution function and  $\phi(\cdot)$  the density function of the standard normal distribution, whereas  $\sigma_k$  denotes the standard deviation of the residuals.

## 3.2 Data

### 3.2.1 Dataset

The quantification of the transfers between government and foreigners is based on the Income and Consumer Expenditure Survey [EVE]. EVE is a sample survey that uses the permanent resident population of Switzerland as its statistical basis<sup>3</sup>. Thus, frontier workers, foreign tourists, short-term residents with a residence permit for less than 12 months and persons seeking asylum are not comprised. The survey unit is the private household. In addition, information on the household composition and on the attributes of the reference person of the household are assessed. The reference person is defined as the person with the highest income within the household. The sample is spread out across the seven major regions of Switzerland and chosen at random from the register of private telephone numbers. The response rate is approximately 30 per cent. The information is gained by means of telephone interviews and written questionnaires. During one of the twelve waves (months), into which the survey year is divided, the households document all their earnings and expenses. The earnings and expenses are assessed at the household level, and the individual transfer incomes and transfer payments cannot be identified, partly due to the fact that many transfers are not assigned to a single person, instead, to a family or a married couple. Thus, the left-hand variables of the regression estimations are always household transfers (per month), which are explained by the attribute profile of the reference person.

The survey was first conducted in 1990 with a sample size of approximately 10'000 households. In 1998, the second survey was conducted with a sample size of approximately 9'000 households. From 2000 to 2005, for which the most recent data were available at the time of investigation, around 3'500 households participated each year. Approximately 10 per cent of these households had a foreign reference person. The dataset consists of the six EVEs from 2000 to 2005 and includes 2'390 observations before data cleaning.

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<sup>3</sup>The resident population comprises all persons whose place of residence is Switzerland at a given point in time, whereas the permanent resident population only comprises persons whose place of residence is Switzerland *all-the-year*.

### 3.2.2 Quantification of the transfers between government and foreigners

The dataset is complemented by those transfers between government and foreign households that are not directly surveyed in EVE. Table 3.2 illustrates all transfers that are considered for the calculation of the fiscal contribution of immigrants in Switzerland. The transfer groups, to which the single transfers, listed below, were aggregated for the Tobit estimations, respectively for the per capita allocation among the households, are highlighted. The old age insurance [AHV], the invalidity insurance [IV], the income compensation scheme [EO], the unemployment insurance [ALV], the accident insurance [UV], and the occupational benefit plan [BV] are listed with their abbreviations.

**Table 3.2:** Transfers for the calculation of the fiscal incidence of the new immigration in Switzerland

Public revenue	Public expenditure
<b>Social insurance contributions</b>	<b>Pensions and helplessness allowances</b>
AHV/IV/EO contributions	Ordinary AHV/IV pensions
ALV contributions	Extraordinary AHV/IV pensions
UV contributions	Helplessness allowances AHV/IV
BV contributions	Benefits from BV
Other social insurance contributions	<b>Daily allowances</b>
<b>Health insurance premium basic insurance</b>	Unemployment benefits
<b>Income and wealth taxes</b>	D. a. from Suva (accidents and occupational disease)
Direct federal tax	D. a. from health and accident insurance companies
Cantonal income and wealth taxes	Compensations from EO (military and civil service)
Communal and other income and wealth taxes	<b>Maternity and family allowances</b>
Tax at source	Federal family allowance in the agricultural sector
<b>Consumption-based transfer payments</b>	Cantonal maternity birth and child allowances
Value added tax*	<b>Means-tested social benefits</b>
Spirits, beer and tobacco tax*	(Cantonal) unemployment assistance
Petroleum tax on engine fuels incl. surtax*	Premium reductions (health insurances)
Stamp duty on insurance premiums*	AHV/IV supplementary benefits
Company taxes passed on to consumption*	Scholarships
Employer contributions to social insurance schemes passed on to consumption*	Housing allowances
<b>Other taxes and fees</b>	Other cantonal/communal benefits: social welfare benefits, victims assistance, AHV/IV supp. benefits
Real estate tax primary residence	<b>Other monetary transfer income</b>
Real estate tax second residence	Payments from the military insurance
Vehicle taxes	Reimbursements from health insurances
Military service exemption tax	Reimbursements of taxes by authorities
Other taxes and fees	<b>Health services received from government*</b>
<b>Employer contributions to social insurance schemes passed on to wages</b>	<b>Educational services received from government*</b>
AHV/IV/EO contributions passed on to wages*	<b>Other real transfers</b>
BV contributions passed on to wages*	Educational expenditure not allocable to school levels*
ALV contributions passed on to wages*	Traffic*
UV contributions passed on to wages*	Environmental protection and spatial planning*
	Economic affairs*

\*Own calculations

Transfers that are not marked by an asterik (\*) are directly surveyed in EVE. The amount



of the transfers marked by an asterik was gained from other sources and allocated to the foreign households in EVE, respectively, by determining attributes surveyed in EVE<sup>4</sup> and in case of the other real transfers per capita.

### 3.2.3 Selection of the dependent variables

After the computation of the left-hand variables, the regressors of the estimation model and hence the potential factors influencing the fiscal contribution of immigration are defined. Table 3.3 gives the right-hand variables of the regression equation. The person-specific regressors thereby refer to the attribute profile of the household's reference person. The income variables refer to the respective earnings of the total household.

Since the reference person is defined as the person with the highest income within the household, observations of persons aged below 18 are de facto excluded. Thus, the variable *age* has no level for this age group, and this study is limited to the permanent foreign resident population aged 18 and older. This variable is measured in levels with regard to the differentiation of the foreigners by nationality, gender, marital status and age for the calculations of the future composition of foreigners<sup>5</sup>.

The variable *nationality* refers to the time of introduction of the Free Movement of Persons Agreement [FZA] with the particular Member states of the EU, on the one hand, and with regard to the limited number of observations in the EVE dataset, on the other hand. During the observation period 2000-2005, the FZA was introduced for the EU-15/EFTA plus de facto for Cyprus and Malta. These countries make up the EU-17/EFTA. The EU-17/EFTA countries mainly reflect the trend towards high-skilled immigrants, which has continued to persist since the mid-1990s and has intensified since the introduction of the FZA (Sheldon and Cueni, 2011a, p. 22). However, Sheldon and Cueni (2011a) show for the period 2003-2009 that there are significant differences in the skill mix between foreigners from the northern and southern EU-17/EFTA countries<sup>6</sup>. 67.5 per cent of the foreigners from the northern EU-17/EFTA countries were high-skilled during this period and only 2.4 per cent were low-skilled. In contrast, the stock of foreigners from the southern EU-17/EFTA countries was composed of 36.4 per cent high-skilled and 34.7 per cent low-skilled persons (Sheldon and Cueni, 2011a, p. 19). Thus, separate levels were made for foreigners from northern and southern EU-17/EFTA countries. The remaining foreigners are summarized in the heterogeneous levels Rest of Europe and Rest of

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<sup>4</sup>E.g. consumption expenditure for the consumption-based transfer payments, age and gender for the health services received from government or educational level for the educational services received from government

<sup>5</sup>See chapter 4.

<sup>6</sup>EU-17/EFTA North: Belgium, Denmark, Germany, Finland, France, United Kingdom, Ireland, Netherlands, Luxemburg, Austria, Sweden  
EU-17/EFTA South: Greece, Italy, Malta, Portugal, Spain, Cyprus

**Table 3.3:** Overview of the independent variables of the regression model

Regressors	Levels
<b>Age</b>	18 to 35 years*
	36 to 50 years
	51 to 65 years
	Over 65 years
<b>Gender</b>	Male*
	Female
<b>Marital status</b>	Married*
	Not married
<b>Region</b>	Lake Geneva*
	Espace midland
	Northwest Switzerland
	Zurich
	Eastern Switzerland
	Central Switzerland
<b>Nationality</b>	Ticino
	EU-17/EFTA North
	EU-17/EFTA South*
	Rest of Europe
<b>Skill level</b>	Rest of the world
	Low-skilled
	Medium-skilled*
<b>Household size</b>	High-skilled
	Numer of persons
<b>Household with child(ren)</b>	Yes*
	No
<b>Employment status</b>	Employee*
	Self-employed
	Unemployed
	Inactive
<b>Labor income</b>	CHF per month
<b>Income from rent and investments</b>	CHF per month

\*Reference level

the world. The data do not allow a greater differentiation of the levels by nationality, or therefore by skill mix, to be made.

The variable *skill level* distinguishes between the three levels low-, medium- and high-skilled and refers to the highest completed education of the reference person<sup>7</sup>.

<sup>7</sup>Low: No post-compulsory education, basic vocational training, training in housekeeping, trade certificate (1-2 years)

Medium: Intermediate school certificate, vocational education, professional baccalaureate, academic baccalaureate, teacher's certificates (primary school)

The variable *region* measures the place of residence in major regions <sup>8</sup>.

The transfer *employer contributions to social insurance schemes passed on to wages* is by definition only paid by employees. Thus, the regressor *employment status* is excluded in the respective regression estimation and only observations with a reference person who is encoded as an employee are considered. After data cleaning, the EVE dataset consists of, respectively, 2'209 observations and 1'790 observations for the coefficient estimation of the *employer contributions to social insurance schemes passed on to wages*.

### 3.3 Results

The ex-post forecast of the average monthly fiscal balance of immigrants with different attribute profiles are based on the regression results of the estimation of the transfer variables depending on the attribute profiles of foreigners. The ex-post forecast of the *other real transfers* with a uniform amount per capita only depends on the household size.

The Tobit regressions were run using the Software R (R Development Core Team, 2012)<sup>9</sup> and heteroskedasticity-robust standard errors<sup>10</sup>. The results provide evidence that different transfers are influenced by different attributes, or by the same attribute in different directions.

The potential effects that the inclusion of year and quarter dummy variables have on the Tobit coefficient estimations were tested. The comparison of the two regression models shows that the coefficients and their statistical significance are robust. Thus, the decision not to consider these control variables is supported.

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High: Higher vocational education, university

<sup>8</sup>Lake Geneva: Vaud, Valais, Geneva

Espace midland: Berne, Fribourg, Solothurn, Neuchâtel, Jura

Northwest Switzerland: Basel-Stadt, Basel-Land, Aargau

Zurich: Zurich

Eastern Switzerland: Glarus, Schaffhausen, Appenzell Ausser Rhoden, Appenzell Inner Rhoden, St Gallen, Grisons, Thurgau

Central Switzerland: Lucerne, Uri, Schwyz, Obwalden, Nidwalden, Zug

Ticino: Ticino

<sup>9</sup>The function `tobit` in the package `AER` was used (Kleiberg and Zeileis, 2008).

<sup>10</sup>The Eicker-White-standard errors in the package `sandwich` were used (Zeileis, 2004, 2006).

## Chapter 4

# Composition of foreigners in the long-term equilibrium

In this chapter, the future composition of the foreign population in Switzerland, which is implied in the long run by the current migration pattern of the foreigners, is computed. This composition is used to quantify the long-term change in the fiscal contribution of foreigners. At the same time, the different average attribute profiles of foreigners, which are used for the ex-post forecast of the average fiscal contribution based on equation 3.3 presented in the previous chapter, are calculated.

### 4.1 Methodology

The future composition of the foreign population is calculated based on the social accounting matrix framework [SAM], which was developed by Stone (1970, 1972, 1973)<sup>1</sup>. The basis of the SAM is the following equation:

$$S_{t+1} = S_t + I_{t,t+1} - O_{t,t+1}. \quad (4.1)$$

$S_t$  denotes the stock at the beginning of a period, the opening stock, while  $S_{t+1}$  describes the stock at the end of this period, the closing stock.  $S_{t+1}$  equals  $S_t$  plus the inflow  $I_{t,t+1}$  and the outflow  $O_{t,t+1}$  during this period. The stocks can refer to any state of a

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<sup>1</sup>The following explanations of the methodology used to calculate the future composition of the foreign population based on the social accounting matrix framework are closely related to Sheldon and Cueni (2011a).

person. According to the states in focus, the stock of persons (e.g. the foreign population in Switzerland) is disaggregated into sub-stocks, which are connected by the flows of persons within.

For the period 1984-1994, de Wild (2010) investigated the mobility of the foreign workforce in Switzerland. He found that the socio-economic attributes gender, age, marital status, nationality and the immigration canton influence the tendency of immigrants to settle in Switzerland and thereby the volume and composition of the stock of foreigners. In the investigation, the attributes *gender, age, marital status, language, skill level, nationality, immigration canton* und *immigration industry* were included (de Wild, 2010, p. 188ff.).

Based on these results, the future composition of the foreign population is calculated by differentiating the stock of persons by the states *nationality, gender, marital status* and *age*. The particular attributes have the same levels as the respective right-hand variables in the Tobit regressions of the different transfers<sup>2</sup>. We do not differentiate the stock of persons by region with regard to empirical feasibility. Thus, the future composition of the foreign population, and therefore the different average attribute profiles, according to which the foreigners are differentiated for the respective ex-post forecast of the average fiscal balance, is assumed to be determined only by these four attributes. Accordingly, 64 different categories of foreigners can be derived. By definition, the distribution of the remaining attributes that influence the incidence of transfers and determine the attribute profiles does not change over time at the disaggregated level.

Under the assumption that the nationality and gender of a person are constant over time, the SAM basic structure illustrated in figure 4.1 results.

According to this model, a SAM is constructed for each nation group and gender. Therefore, SAMs for eight different categories of foreigners are constructed in total.

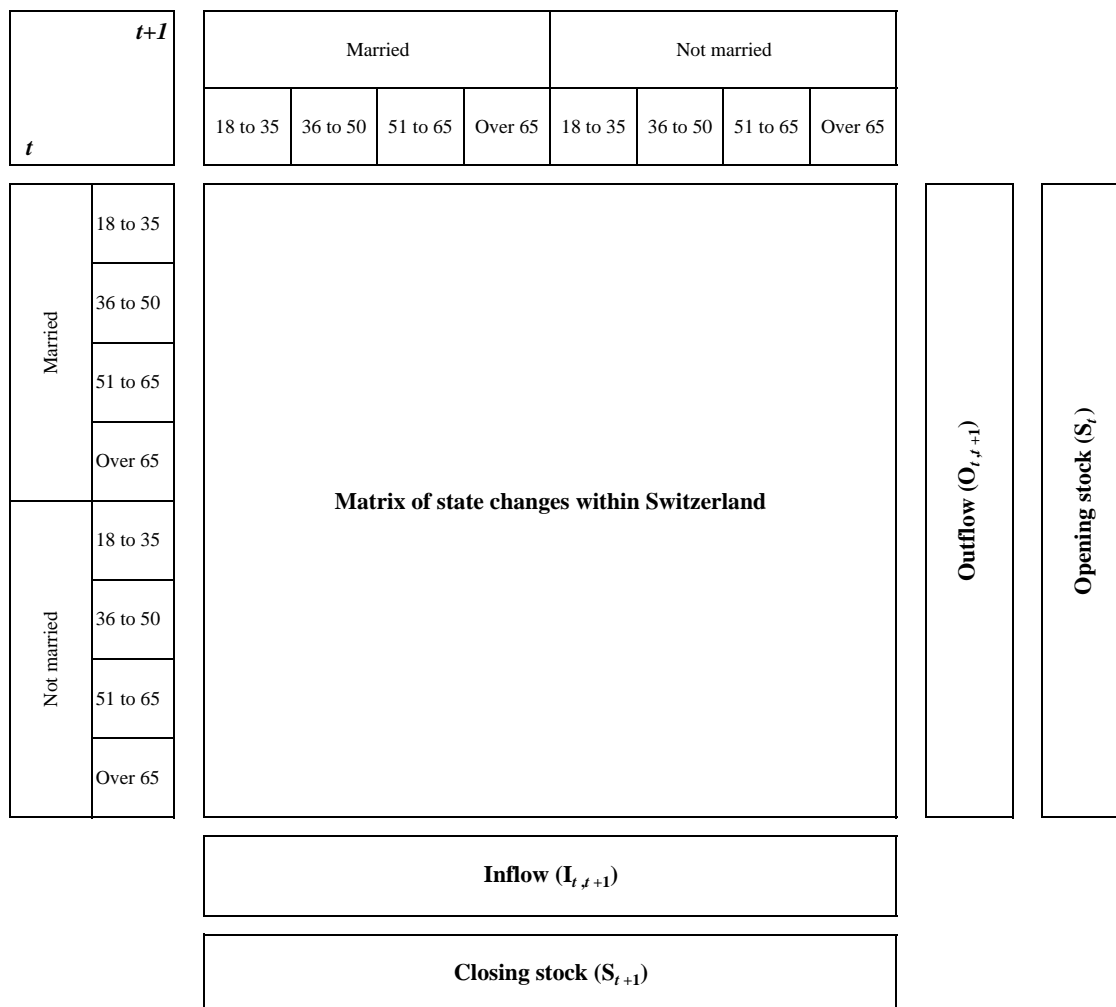
The SAM refers to the period  $[t, t + 1]$  and consists of a core area, two stock vectors and two flow vectors. The vector inflow includes all persons of a category who joined the permanent foreign resident population during the period  $[t, t + 1]$  or who have been part of it before and have turned 18 during this period. The single elements of this vector indicate how many persons of the inflow during the period (here: one year) were in a given state at the time  $t + 1$ . The dimension of the vector is  $1 \times N$  with  $N =$  number of states.

The flows of persons of a category between the predefined states during their stay in Switzerland are measured in the matrix of state changes. The matrix has as many columns as rows. A cell in row  $i$  and column  $j$  contains the number of persons who were in state  $i$  at the time  $t$  (e.g. not married and between 18 and 35 years old) and in state  $j$  at the time  $t + 1$  (e.g. married and between 18 and 35 years old).

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<sup>2</sup>See chapter 3.2.3.

Figure 4.1: SAM basic structure



A cell of the vector outflow contains all persons of a category who were in a given state at the time  $t$  and left the respective sub-stock of foreigners in Switzerland during the period  $[t, t + 1]$ . The sum of the vector elements corresponds to the total outflow. We construct two different outflow vectors. In the first case, the calculations are based on the number of outflow that results when emigrations, deaths and naturalizations are considered as outflow. This corresponds to the definition of a foreigner by the Federal Statistical Office of Switzerland [FSO]. Thus, the calculations are congruent with the FSO data on the stock of foreigners in this case.

In the second case, the outflow vector ignores persons who acquire Swiss citizenship during the period  $[t, t + 1]$ . They continue to be considered as foreigners. In other words, only persons who actually leave Switzerland or die, are considered as outflow. The resulting

closing stock is therefore higher than in the FSO data.

The opening stock of foreigners of a particular category in state  $i$  corresponds to the row total  $i$  of the matrix and the outflow vector. If the sum in a column  $j$  is calculated over all rows of the matrix and the inflow vector, the closing stock results. This follows from equation 4.1.

However, not the SAM itself, but the transition probabilities  $p_{ij}$  that can be derived from it are the basis for the computation of the future composition of foreigners. The transition probabilities indicate the probability of a person who is in state  $i$  in year  $t$  (row view) to be in state  $j$  in year  $t+1$  (column view). The matrix of transition probabilities is calculated by dividing the values of a SAM row by the corresponding row totals or opening stock.

The future composition of foreigners can now be computed using the Markov chain model. It refers to the composition of foreigners in the long-term equilibrium given that migration patterns remain constant compared to the observation period. In the following, the steps for computing the equilibrium stock are illustrated.

On the basis of the matrix of transition probabilities  $\mathbf{P}_t$ , the composition of the stock  $\mathbf{S}_t$  of a category in year  $t$  can be derived from the composition of the stock  $\mathbf{S}_{t-1}$  in the previous year plus the inflow  $\mathbf{I}_{t-1,t}$  into this category during the period  $[t-1, t]$  using the following equation:

$$\mathbf{S}_t = \mathbf{P}_t \mathbf{S}_{t-1} + \mathbf{I}_{t-1,t}. \quad (4.2)$$

This equation corresponds to the equation 4.1, which says that a stock  $\mathbf{S}_t$  at the time  $t$  can be derived from the remaining stock  $\mathbf{P}_t \mathbf{S}_{t-1}$  of the previous period  $t-1$  plus the possible inflow  $\mathbf{I}_{t-1,t}$ .  $\mathbf{S}_{t-1}$  from equation 4.2 can be noted in the same way:

$$\mathbf{S}_{t-1} = \mathbf{P}_{t-1} \mathbf{S}_{t-2} + \mathbf{I}_{t-2,t-1}. \quad (4.3)$$

By inserting equation 4.3 into equation 4.2, the following equation follows:

$$\mathbf{S}_t = \mathbf{I}_{t-1,t} + \mathbf{P}_t \mathbf{I}_{t-2,t-1} + \mathbf{P}_t \mathbf{P}_{t-1} \mathbf{S}_{t-2}. \quad (4.4)$$

The repeated substitution by this procedure gives the following equation:

$$\mathbf{S}_t = \mathbf{I}_{t-1,t} + \mathbf{P}_t \mathbf{I}_{t-2,t-1} + \mathbf{P}_t \mathbf{P}_{t-1} \mathbf{I}_{t-3,t-2} + \mathbf{P}_t \mathbf{P}_{t-1} \mathbf{P}_{t-2} \mathbf{I}_{t-4,t-3} + \dots \quad (4.5)$$

Under the assumption that the composition of inflow  $\mathbf{I}$  and the matrix of transition probabilities  $\mathbf{P}$  remain constant over time, the composition of the SAM stock converges to the stock composition in a long-term equilibrium over time. The stock composition in a long-term equilibrium can be derived as follows:

$$\mathbf{S}^* = \mathbf{I}'[\mathbf{E} - \mathbf{P}]^{-1}. \quad (4.6)$$

$\mathbf{E}$  symbolizes an identity matrix and  $[\mathbf{E} - \mathbf{P}]^{-1}$  is termed the fundamental matrix of an absorbing Markov chain. A cell value  $f_{ij}$  of the matrix corresponds to the average duration of stay in column state  $j$  that a person can expect for the future at the time of entry into row state  $i$ . Accordingly, the row totals of the fundamental matrix give the expected duration of stay in Switzerland of a person at the time of entry into the row state  $i$ <sup>3</sup>. From equation 4.6 it follows that  $\mathbf{S}^*$  is the result of the multiplication of  $\mathbf{I}$  by the fundamental matrix  $[\mathbf{E} - \mathbf{P}]^{-1}$ .

## 4.2 Data

The SAMs are based on data from the foreign resident population statistics [PETRA] plus the first and the second wave of the the Swiss Labor Force Survey [SAKE].

PETRA is a synthesis statistic, which is based on official register data or administrative data. The statistic comprises the stock and the flow (births, deaths, immigration, emigration, naturalizations) of the foreign resident population, inter alia, differentiated by *nationality, gender, marital status* and *age* during the period 1991-2009. Since this study assesses the fiscal incidence of the *permanent* foreign resident population<sup>4</sup>, the PETRA-data are filtered accordingly. The population inflow, according to PETRA, into the permanent foreign resident population (immigration from abroad, changes in status and transfers resulting from the process of asylum seeking) in the age category *18 to 35 years* was adjusted for persons who turned 18 during the observation period but who had previously been part of the permanent foreign resident population and who had therefore only been recorded in the closing stock.

In contrast to PETRA, SAKE is a sample survey, for which a random sample of the permanent resident population aged 15 and older is interviewed on the telephone between April and June of each year. The survey is designed as a panel rotating over five years. Participants are only released from the panel after they have participated in one initial and four follow-up interviews. However, panel attrition amounts to 20 per cent per year.

<sup>3</sup>See also Sheldon and Theiss (1995) and de Wild (2010).

<sup>4</sup>See chapter 3.2.1.



Thus, the SAKE data of a given year usually consist to one-third of first interviews and to two-thirds of follow-up interviews.

SAKE was conducted for the first time in 1991. Until 2001, the sample size varied between 16'000 and 18'000 persons with one exception. As a consequence, reliable analyses of smaller groups of persons, such as foreigners, could not be made. Thus, the sample size has been increased to approximately 40'000 persons since 2002. Moreover, parallel to the standard SAKE, the so-called foreigners-SAKE, in which approximately 15'000 persons belonging to the permanent foreign resident population of Switzerland are interviewed in addition, was introduced one year later. The availability of these additional data allow us to gain reliable information on the permanent foreign resident population differentiated by nationality, gender, marital status and age. Thus, the observation period begins in 2003 and ends in 2009, for which the most recent data were available at the time of investigation. After data cleaning, the dataset consists of 129'000 observations.

The period  $[t, t + 1]$ , for which the SAMs are constructed, is one year. The used data are annual averages related to the period 2003-2009. This procedure is intended to ensure the elimination of cyclical effects.

Information on the average state changes within Switzerland between 2003 and 2009 is gained from SAKE. The statistical analysis only considers observations of persons who were interviewed in year  $t$  for the first time and in year  $t + 1$  for the second time. In total, information gained from approximately 61'000 observations or almost 31'000 persons, respectively, on the state changes within Switzerland can be evaluated. To harmonize the resulting row and column totals and the corresponding PETRA data, the iterative RAS procedure<sup>5</sup> is used.

Figure 4.2 exemplarily shows the SAM, which should be representative for the period 2003-2009, for men from the southern EU-17/EFTA countries without adjustment of the outflow reported in PETRA for naturalizations. Thus, this SAM refers to the permanent foreign resident population aged 18 and older according to the FSO definition of foreigners.

A horizontal reading of the statistic shows, for example, that, at the beginning of one year during the period from 2003 to 2009, most men (68'091) from the southern EU-17/EFTA countries belonging to the permanent foreign resident population aged 18 and older were married and were between 36 and 50 years old. Up until the end of that year, 2'819 persons had flowed out of the stock and 60'339 persons were still in the same state on average. The remainder had moved to another state within Switzerland. The aggregated stock amounted to 253'736 persons at the beginning of the period and had increased to 256'702 persons during one year, which corresponds to a growth of 1.2 per cent. However, if the naturalizations are neglected for the calculation of the outflow and the newly

<sup>5</sup>See e.g. Bacharach (1970) for an overview.

**Figure 4.2:** SAM for men aged 18 and older from the southern EU-17/EFTA countries without adjustment of the outflow for naturalizations, 2003-2009 (annual averages)

$t+1$		Married				Not married				Outflow	Opening stock
		18 to 35	36 to 50	51 to 65	Over 65	18 to 35	36 to 50	51 to 65	Over 65		
$t$											
		Married	18 to 35	22'998	3'870	0	0	418	105	0	0
36 to 50	0		60'339	3'625	0	0	1'206	102	0	2'819	68'091
51 to 65	0		0	40'287	2'571	0	0	593	0	2'141	45'592
Over 65	0		0	0	19'028	0	0	0	644	1'124	20'796
Not married	18 to 35	1'733	140	0	0	48'613	2'140	0	0	2'439	55'064
	36 to 50	0	1'280	53	0	0	18'731	724	0	815	21'603
	51 to 65	0	0	501	38	0	0	7'817	364	427	9'147
	Over 65	0	0	0	282	0	0	0	4'371	435	5'089
<b>Inflow</b>		2'707	2'511	600	103	6'928	1'094	153	36		253'736
<b>Closing stock</b>		27'437	68'139	45'065	22'022	55'959	23'275	9'389	5'415	256'702	

naturalized citizens are instead considered as part of the permanent foreign resident population aged 18 and older, a closing stock of 259'447 persons or an annual growth of 2.3 per cent results.

From the SAM, the transition probabilities can now be derived. Figure 4.3 illustrates the matrix of transition probabilities resulting from the SAM in figure 4.2.

From this figure it follows that there is a 3.1 per cent probability that a man from the southern EU-17/EFTA countries who was not married and was between 18 and 35 years old in a given year during the period 2003-2009 would have been in the same age group but married in the following year. With a probability of 4.4 per cent, he would have left

**Figure 4.3:** Matrix of transition probabilities for men aged 18 and older from the southern EU-17/EFTA countries without adjustment of the outflow for naturalizations, 2003-2009 (annual averages)

		Married				Not married				Outflow
		18 to 35	36 to 50	51 to 65	Over 65	18 to 35	36 to 50	51 to 65	Over 65	
$t$	$t+1$									
	Married	18 to 35	<b>0.811</b>	0.136	0.000	0.000	0.015	0.004	0.000	0.000
36 to 50		0.000	<b>0.886</b>	0.053	0.000	0.000	0.018	0.001	0.000	0.041
51 to 65		0.000	0.000	<b>0.884</b>	0.056	0.000	0.000	0.013	0.000	0.047
Over 65		0.000	0.000	0.000	<b>0.915</b>	0.000	0.000	0.000	0.031	0.054
Not married	18 to 35	0.031	0.003	0.000	0.000	<b>0.883</b>	0.039	0.000	0.000	0.044
	36 to 50	0.000	0.059	0.002	0.000	0.000	<b>0.867</b>	0.034	0.000	0.038
	51 to 65	0.000	0.000	0.055	0.004	0.000	0.000	<b>0.855</b>	0.040	0.047
	Over 65	0.000	0.000	0.000	0.056	0.000	0.000	0.000	<b>0.859</b>	0.086

the stock of foreigners in Switzerland, and with a probability of 88.3 per cent, he would still be in the same state one year later. The transition probabilities on the main diagonal of the matrix, which are highlighted in figure 4.3, can be interpreted as stay probabilities, since these matrix cells contain the probability that one person remains in the particular state for one year. From the reciprocal value of the complementary probability ( $1 - p_{ij}$ ) of the stay probability  $p_{ij}$ , a person's average duration of stay in a particular state can be gained. On average, married men from the southern EU-17/EFTA countries aged between 18 and 35 remain 8.7 years in this state.

Assumedly, the distribution of the remaining attributes that determine the different average attribute profiles of the foreigners do not change over time differentiated by nationality, gender, marital status and age. Hence, as mentioned before, the distribution of these attributes remains the same in the long-term equilibrium as in the observation

period and can therefore be gained from SAKE and EVE.

### 4.3 Results

Based on equation 4.6, the stock of the permanent foreign resident population of Switzerland aged 18 and older in the long-term equilibrium can now be derived from the transition probabilities assuming a constant migration pattern. See appendix 1 for the results of these calculations in absolute values. The column *Stock 2003-2009* contains the average stock of the 64 categories of the permanent foreign resident population aged 18 and older (differentiated by nationality, gender, marital status and age) plus the resulting total during this period. In total, the stock of the permanent foreign resident population of Switzerland aged 18 and older amounted to 1'257'534 persons during this period if naturalizations are considered as outflow. If newly naturalized citizens are instead considered as foreigners, a stock of 1'285'054 persons results. From the column *Equilibrium* it follows that this amount increases to, respectively, 1'715'428 persons (without adjustment for naturalizations) and 2'604'761 persons (with adjustment for naturalizations) in the long run.

The equilibrium stock in case of no adjustment for the newly naturalized citizens corresponds to the FSO mid-scenario until 2060, which describes the most plausible population development for the next decades (Federal Statistical Office, 2010, p. 17). According to this scenario, the permanent foreign resident population of Switzerland aged 18 and older amounts to 1'725'568 persons in 2060 (Federal Statistical Office, 2012c). Hence, its population forecast exceeds that of this study by only 0.6 per cent. The high accordance emphasizes the plausibility of our forecasting model.

Figures 4.4 to 4.7 show the composition of the average stock and the average inflow from 2003 to 2009 plus the stock composition in the long-term equilibrium, each aggregated by one of the four attributes, by which the foreigners were differentiated<sup>6</sup>. The composition of the inflow  $\mathbf{Z}$ , which determines the equilibrium together with the matrix of transition probabilities  $\mathbf{P}$  is the same with or without adjustment of the outflow for the naturalizations. Only the composition of the stock during the period 2003-2009 and in the long-term equilibrium may change. Looking at the stock composition in the observation period, these changes are relatively small. However, significant differences may arise in the equilibrium. The respective composition remains unchanged if no naturalizations take place.

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<sup>6</sup>See appendix 2 for the composition of the permanent foreign resident population of Switzerland aged 18 and older during the period 2003-2009 and in the long-term equilibrium in percentages, and appendix 3 for the composition of the inflow into the permanent foreign resident population of Switzerland aged 18 and older during the period 2003-2009 in absolute values and percentages.

**Figure 4.4:** Composition of the permanent foreign resident population aged 18 and older by nationality

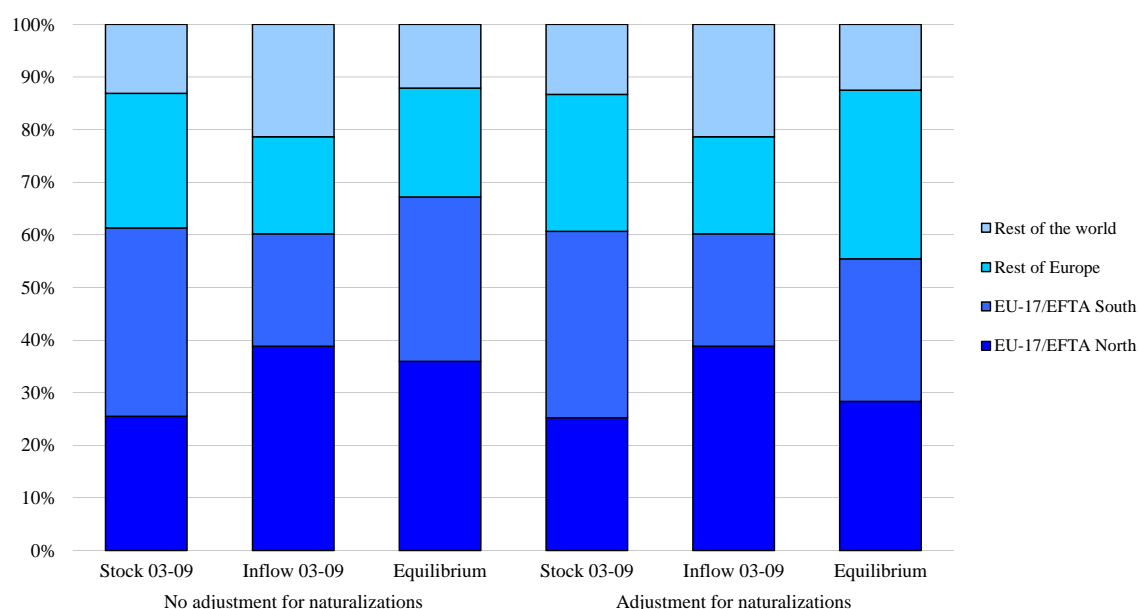


Figure 4.4 illustrates that the share of northern EU-17/EFTA citizens increases and that the share of permanent foreign residents from southern EU-17/EFTA countries decreases in the long-term equilibrium compared to the observation period with and without adjustment for the naturalizations. Without adjustment for naturalizations, the cumulated share of foreigners from the EU-17/EFTA countries increases in the equilibrium compared to the observation period, but this share decreases when the newly naturalized citizens are considered as foreigners. It can be derived from this observation that the average duration of stay for this group of persons increases less than proportionately when the newly naturalized citizens are taken into consideration. The duration of stay in Switzerland indicates the average number of years that foreigners are expected to remain as settled residents in Switzerland at the time of entry into the respective category, given the migration pattern during the period 2003-2009. The average duration of stay by nationality and in total follows from the linkage with the composition of the average inflow during the period 2003-2009<sup>7</sup>. The duration of stay of foreigners without adjustment of the outflow for naturalizations, which ranges from 5.6 to 23.7 years, can be interpreted as the average duration of stay in the permanent foreign resident population of Switzerland aged 18 and older according to the FSO definition of foreigners. However, the duration of stay with adjustment for naturalizations, which ranges from 8.0 to 43.6 years, can be considered the actual average duration of stay in Switzerland. Accordingly, married women aged 18 to 35 from the rest of Europe are the most settled category on average. The foreigners who immigrated during the period 2003-2009 have an average

<sup>7</sup>See appendix 4.

duration of stay of approximately 15 years without adjustment for the naturalizations. With adjustment for the naturalizations, the average duration of stay increases to almost 23 years. At present, immigrants from the southern EU-17/EFTA countries (of whom 57 per cent originate from Portugal and 32 per cent from Italy) and, particularly with adjustment for the naturalizations, immigrants from the rest of Europe (of whom 44 per cent come from countries of former Yugoslavia, 13 per cent from Turkey, and 9 per cent each from Poland and Russia) are above-average in assuming permanent residence. These statistics evidence the significantly above-average tendency of immigrants from the rest of Europe to be naturalized. However, the tendency of immigrants from the northern EU-17/EFTA countries (of whom 60 per cent originate from Germany) and from the rest of the world (of whom 42 per cent come from Asia, 15 per cent from North America, and approximately 20 per cent each from Africa and South America) to settle in Switzerland is below-average.

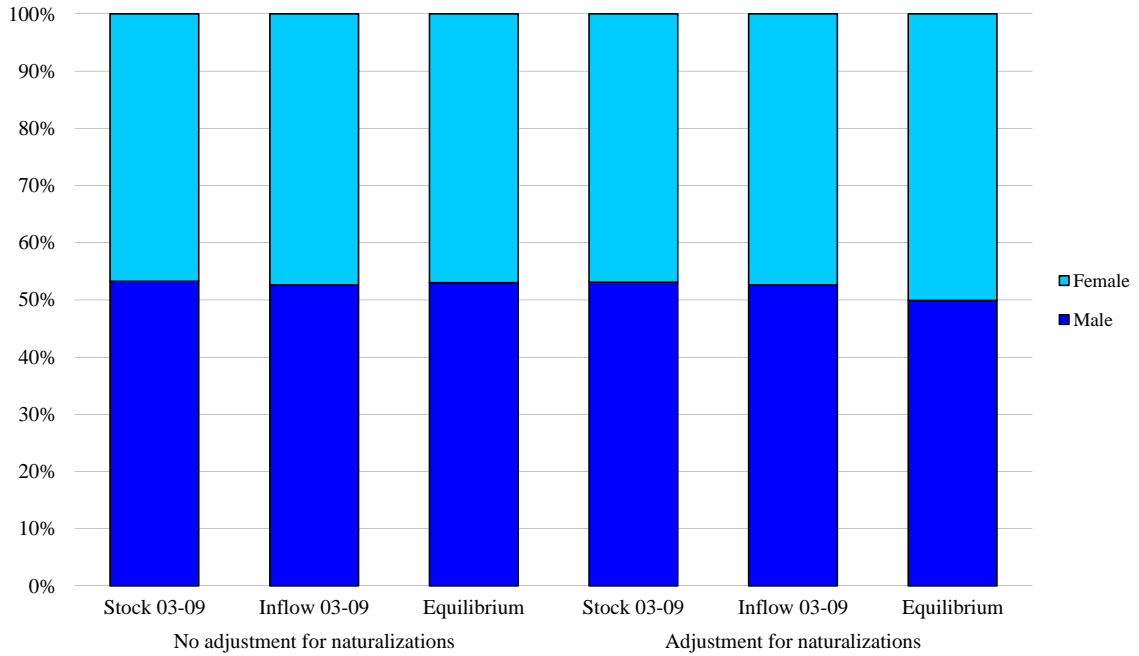
As a consequence, as displayed in figure 4.4, the equilibrium composition without adjustment for the naturalizations indicates that the share of persons from the rest of Europe decreases compared to the stock in the period 2003-2009. However, the equilibrium composition that also contains newly naturalized citizens shows that persons from these countries have a larger share in the future permanent foreign resident population aged 18 and older.

Moreover, figure 4.4 shows that the applicability of the composition of the inflow during the period 2003-2009 as an indicator for the equilibrium composition of foreigners by nationality is limited. While, for example, approximately 39 per cent of the immigrants come from the northern EU-17/EFTA countries, the share of this group is significantly lower in the equilibrium and amounts to, respectively, 36 per cent (without adjustment for the naturalizations) and 28 per cent (with adjustment for the naturalizations) due to the relatively low average duration of stay. At the same time and in spite of their relatively low share among the immigrants with 18 per cent, the share of persons from the rest of Europe is in the equilibrium, respectively, 21 per cent (without adjustment for the naturalizations) and 32 per cent (with adjustment for the naturalizations) due to their relatively high average duration of stay.

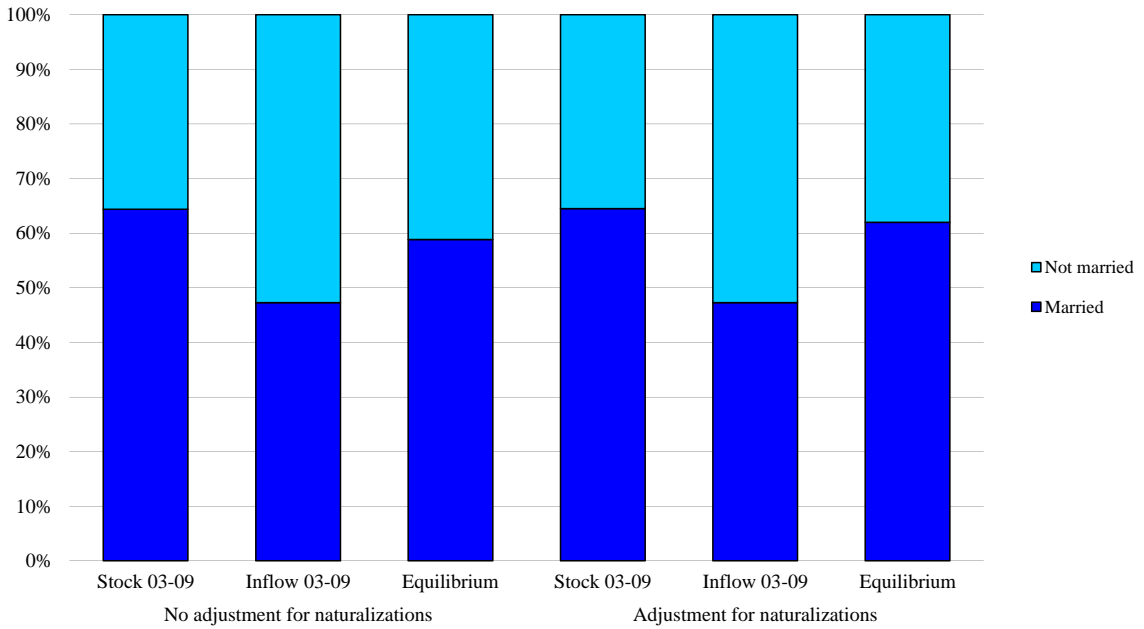
Figure 4.5 illustrates that the gender composition of the foreigners remains almost unchanged in the long-term equilibrium, which the current migration pattern of the foreigners implies, compared both to the stock and to the inflow during the period 2003-2009, if newly naturalized citizens are not considered as foreigners. However, the inclusion of the naturalizations during the period 2003-2009 indicates that the share of women increases. This result is probably caused by the fact that female foreigners have a higher tendency to marry Swiss men than male foreigners have to marry Swiss women.

Figure 4.6 shows that the majority of foreigners in Switzerland were married during the period 2003-2009. However, among the persons who immigrated to Switzerland during this period, the share of unmarried foreigners was higher. The inflow composition by

**Figure 4.5:** Composition of the permanent foreign resident population aged 18 and older by gender

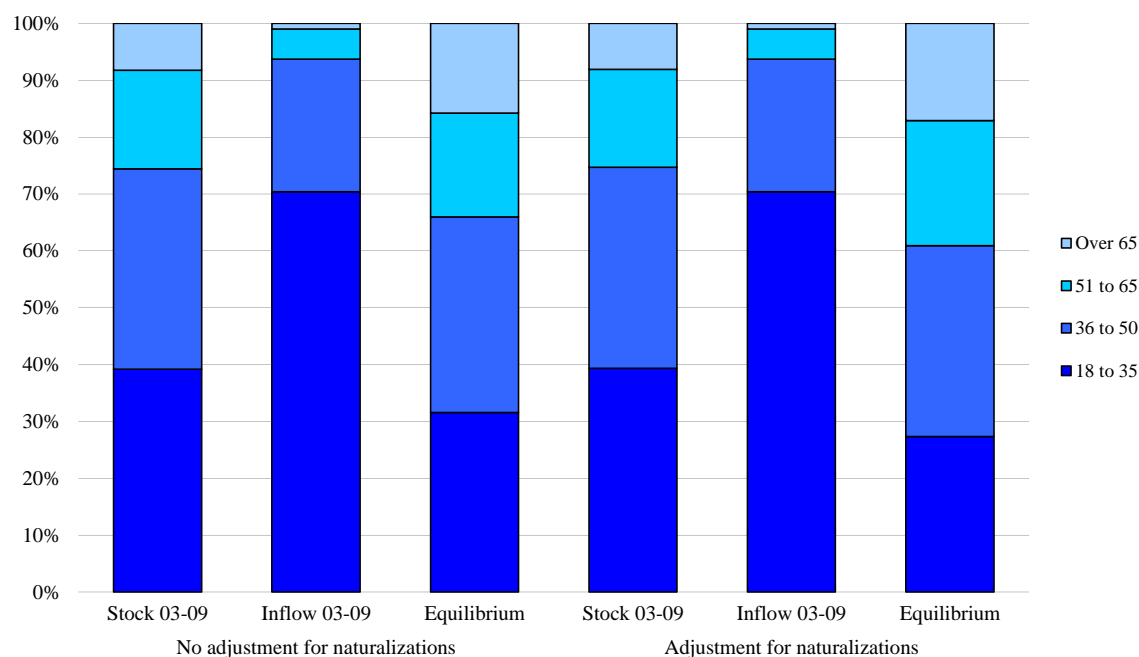


**Figure 4.6:** Composition of the permanent foreign resident population aged 18 and older by marital status



marital status is only reflected to a limited extent in the equilibrium composition, as the share of the married foreigners decreases only slightly with and without adjustment for the naturalizations compared to the stock and still lies around 60 per cent.

**Figure 4.7:** Composition of the permanent foreign resident population aged 18 and older by age



The in some cases high average durations of stay in Switzerland indicate that foreigners are relatively young at the time of immigration to Switzerland. This finding is confirmed in figure 4.7. During the period 2003-2009, 70 per cent of the immigrants to Switzerland were aged 18 to 35. However, their share decreases, respectively, by 8 percentage points to 32 per cent (without adjustment for naturalizations) and by 12 percentage points to 27 per cent (with adjustment for naturalizations) in the long-term equilibrium compared to the stock. At the same time, the share of the persons aged older than 65 increases from 8 per cent to 16 per cent<sup>8</sup> (permanent foreign resident population excluding newly naturalized) and to 17 per cent (permanent foreign resident population including newly naturalized), respectively, according to the demographic trend<sup>9</sup>, even though the share of this age group among the inflow is only approximately 1 per cent. Moreover, the shares of the age groups 36 to 50 years and 51 to 65 years differ significantly between the inflow and the long-term equilibrium. This difference again provides evidence that the inflow composition during the period from 2003 to 2009 is only to a limited extent an indicator for the composition of foreigners in the long-term equilibrium resulting from the current

<sup>8</sup>The comparison with the FSO mid-scenario shows that this value still rather underestimates the development (Federal Statistical Office, 2012c).

<sup>9</sup>See e.g. Federal Statistical Office (2010).



migration pattern due to the large differences in the average durations of stay. The inflow composition is only a good predictor of the equilibrium composition of foreigners if the average durations of stay are similar among the different groups that are differentiated.

Appendices 5 and 6 contain the distribution of the remaining attributes that determine the average attribute profiles of the foreigners among the permanent foreign resident population and among the foreign employees aged 18 and older. Looking at the columns for the income variables, it is evident that the OLS estimation of the income is negative for some categories of foreigners. These values were changed to zero for the further calculations. It was tested whether the differences between the respective categories are statistically significant at a significance level of 5 per cent. The results are satisfactory, which supports the application of different attribute profiles for different categories of foreigners.

The relatively small average duration of stay of foreigners from the northern EU-17/EFTA countries, from which the high-skilled foreign workers are mainly recruited, indicates that the skill mix of immigrants is only to a limited extent a predictor of the skill level of the future stock of foreigners. Under the assumption of this study that the skill mix of foreigners is constant over time at a disaggregated level, the development of the skill level of the permanent foreign resident population aged 18 and older can be computed via linkage with the current and future composition of foreigners. Accordingly, without adjustment for the naturalizations, the share of high-skilled foreigners increases from 25.9 per cent during the observation period 2003-2009 to 29.4 per cent in the long-term equilibrium. At the same time, the share of low-skilled foreigners decreases from 36.9 per cent to 33.8 per cent in the long run. With adjustment for the naturalizations, the share of high-skilled foreigners increases only slightly from 25.8 per cent in the observation period to 26.5 per cent in the long-term equilibrium. At the same time, the share of the low-skilled foreigners increases from 37.0 per cent to 38.0 per cent over time. Compared to the skill mix of the permanent foreign resident population aged 18 and older according to the FSO definition, a disproportionately high number of low-skilled rather than high-skilled persons are observed to acquire Swiss citizenship through naturalization.

Thus, the high share of high-skilled persons among the immigrants is only to a limited extent reflected in the future skill mix of the stock of foreigners. As expected, there is indeed a development towards a higher skill level, but this development is only weak, whereas the trend towards an aging foreign population is at the same time very pronounced.

## Chapter 5

# Long-term fiscal effects of the new immigration

### 5.1 Estimations

For the measurement of the long-term development of the new immigration's fiscal incidence, the average attribute profiles of the 64 categories of foreigners, the respective parameters of the 13 Tobit estimations and the respective  $\sigma_k$  are first inserted into equation 3.3. This procedure allows the ex-post forecast of the average monthly incidence of the respective transfer between government and foreigners in the correspondent category of foreigners to be estimated. This ex-post forecast refers to the price level in 2005 if the fiscal policy during 2000 and 2005 is maintained. The average monthly incidence of the transfer *Employer contributions to social insurance schemes passed on to wages* in the particular categories is calculated by multiplying the values of the ex-post forecasts, which solely refer to the employees in the respective category, by the share of the employees in the correspondent category of foreigners<sup>1</sup>. The average monthly incidence of the *other real transfers* results from the multiplication of the average household size in the respective category of foreigners<sup>2</sup> by the average monthly per capita expenditure of approximately CHF 300 during the period from 2000 to 2005. Appendix 7 comprises the results of these calculations.

By netting the transfer payments and transfer incomes, the average fiscal contribution by category of foreigners can be computed. Figure 5.1 illustrates the average monthly fiscal balance with the corresponding 95 per cent confidence interval for the different categories of the permanent foreign resident population aged 18 and older. Using the bootstrap-

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<sup>1</sup>See appendix 5.

<sup>2</sup>See appendix 5.

confidence intervals<sup>3</sup>, the goodness of the ex-post forecast fiscal balances can be tested. These confidence intervals are distribution-free and indicate the range, within which the true values spread with 95 per cent certainty. The average monthly fiscal contributions whose signs are not statistically significant at this level are marked in italics.

In spite of the partly wide ranges, the goodness of the estimated fiscal contributions can be considered satisfactory, as in most cases a statement can be made as to whether the average fiscal contribution of the respective category of foreigners is positive, which is statistically significant at the 95 per cent level. From figure 5.1 it follows that a majority of categories of foreigners make on average a positive fiscal contribution each month and therefore relieve the public budget. The positive average monthly contributions accumulate in the categories attributed to the northern EU-17/EFTA countries. Moreover, it is evident from the figure that the average monthly fiscal balance of the foreigners aged over 65 is strongly negative and also that women from the rest of Europe have on average a negative fiscal balance independent of marital status and age.

If the fiscal contribution of the different categories of foreigners is linked with the composition of the permanent foreign resident population aged 18 and older during the period 2003-2009 and in the long-term equilibrium computed in chapter 4<sup>4</sup>, the average monthly fiscal contribution of foreigners can be computed at higher aggregation levels. The average monthly fiscal contributions during the period 2003-2009 and in the long-term equilibrium at different aggregation levels are illustrated in table 5.1. Again, the values whose signs are not statistically significant at a 95 per cent level are marked in italics. Comparing two values, their difference is statistically significant if their confidence intervals do not overlap.

Looking at the bottom row of the table ("Total"), it can be stated that the average monthly fiscal contribution of a foreign household during the period 2003-2009 tends to be slightly positive with and without adjustment for the naturalizations. However, the positive sign is not statistically significant at the 95 per cent level in both cases. Thus, it cannot be ruled out at this probability level that the true value is zero or that the average fiscal balance of a foreign household is balanced during this period. Given a balanced public budget there tends to be a redistribution from foreigners to native Swiss, but it cannot be ruled out that both fiscal balances are balanced, and that they are therefore not different from each other.

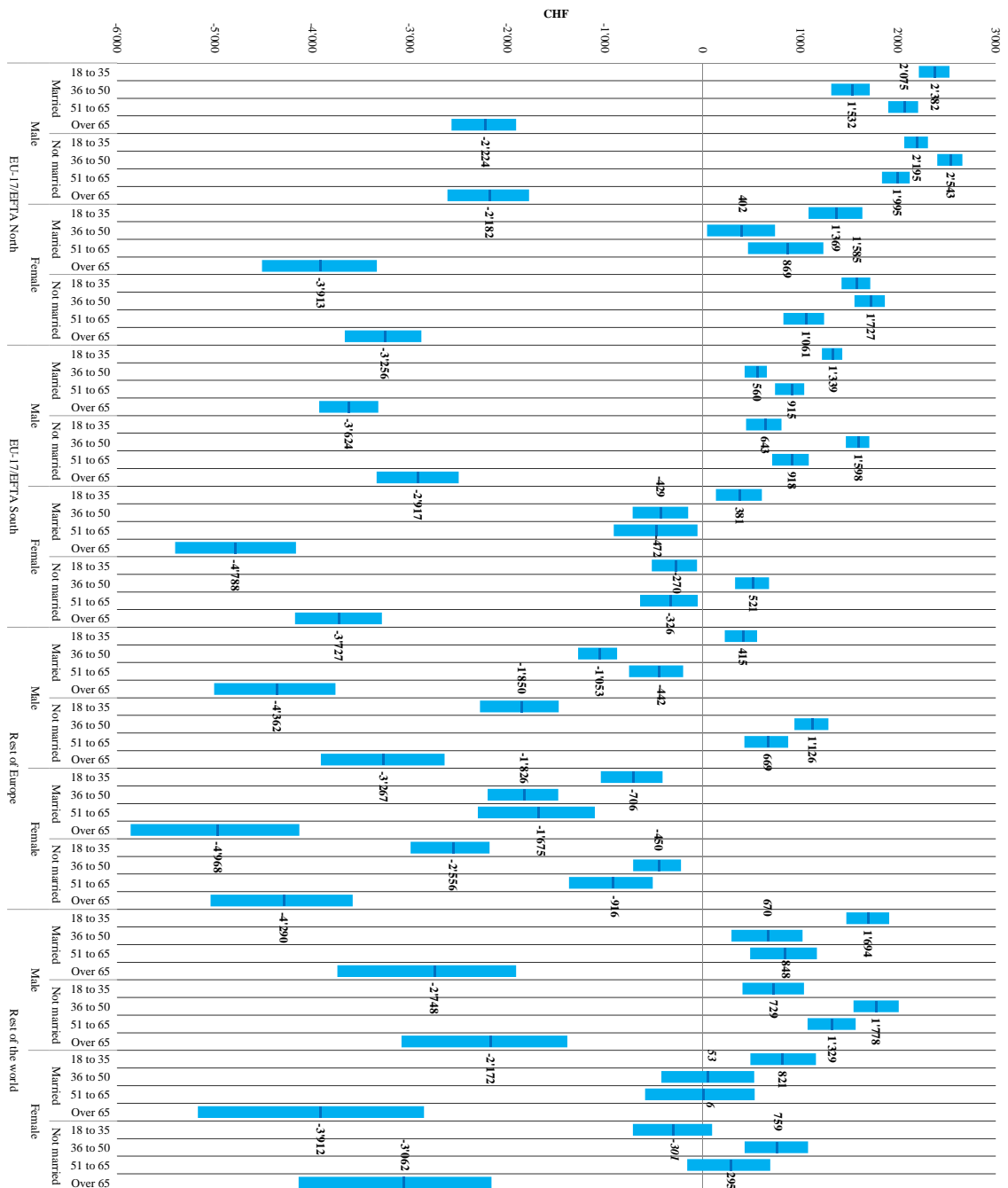
Moreover, table 5.1 provides evidence that the average monthly fiscal balance of a foreign household tends to be negative without adjustment for the naturalizations and that it is statistically significantly negative at a 95 per cent level with adjustment for the naturalizations, given that the migration patterns remain constant compared to the observation

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<sup>3</sup>The function `boot.ci` in the package `boot` (Canty and Ripley, 2012; Davison and Hinkley, 1997) was used with 1'000 iterations.

<sup>4</sup>See appendix 2.

**Figure 5.1:** Average monthly fiscal contribution and corresponding 95 per cent confidence interval for the different categories of the permanent foreign resident population aged 18 and older



**Table 5.1:** Comparison of the average monthly fiscal contribution of the permanent foreign resident population aged 18 and older during the period 2003-2009 and in the long-term equilibrium at different aggregation levels (in CHF)

Nationality	Gender	Marital status	No adjustment for naturalizations					
			Stock 2003-2009			Equilibrium		
			Min	Mean	Max	Min	Mean	Max
EU-17/EFTA North	Male	Married	1'018	1'184	1'313	608	781	917
		Not married	1'895	2'015	2'110	1'525	1'651	1'751
		Total	1'458	1'585	1'681	1'074	1'206	1'306
	Female	Married	-36	267	546	-476	-161	128
		Not married	726	881	1'000	205	376	510
		Total	382	588	764	-80	133	314
Total		990	1'135	1'250	578	725	840	
EU-17/EFTA South	Male	Married	113	223	300	-299	-180	-90
		Not married	545	702	827	426	578	699
		Total	295	398	469	22	130	207
	Female	Married	-963	-683	-419	-1'391	-1'092	-806
		Not married	-972	-758	-577	-1'366	-1'136	-936
		Total	-940	-709	-500	-1'351	-1'111	-891
Total		-209	-77	26	-530	-393	-283	
Rest of Europe	Male	Married	-669	-486	-356	-754	-566	-431
		Not married	-1'711	-1'349	-1'040	-1'788	-1'432	-1'127
		Total	-890	-698	-559	-1'010	-811	-666
	Female	Married	-1'674	-1'327	-1'023	-1'856	-1'489	-1'167
		Not married	-2'480	-2'129	-1'835	-2'627	-2'273	-1'974
		Total	-1'820	-1'501	-1'228	-2'036	-1'702	-1'416
Total		-1'319	-1'099	-929	-1'523	-1'286	-1'099	
Rest of the world	Male	Married	653	949	1'220	552	855	1'130
		Not married	672	955	1'223	664	938	1'193
		Total	671	951	1'209	604	885	1'142
	Female	Married	14	400	779	-93	305	692
		Not married	-530	-157	186	-526	-156	177
		Total	-123	246	602	-206	170	529
Total		255	570	868	172	493	792	
Total		-71	56	150	-194	-69	23	

Nationality	Gender	Marital status	Adjustment for naturalizations					
			Stock 2003-2009			Equilibrium		
			Min	Mean	Max	Min	Mean	Max
EU-17/EFTA North	Male	Married	1'020	1'186	1'315	472	649	788
		Not married	1'895	2'015	2'110	1'388	1'519	1'624
		Total	1'457	1'584	1'681	915	1'051	1'154
	Female	Married	-32	271	550	-587	-267	27
		Not married	729	884	1'003	-8	173	316
		Total	383	590	766	-261	-38	152
Total		990	1'135	1'250	390	544	666	
EU-17/EFTA South	Male	Married	117	227	303	-406	-282	-187
		Not married	546	703	828	364	515	637
		Total	298	401	471	-83	26	105
	Female	Married	-958	-678	-414	-1'504	-1'196	-901
		Not married	-962	-748	-568	-1'445	-1'210	-1'004
		Total	-933	-703	-494	-1'448	-1'202	-975
Total		-206	-74	30	-665	-521	-402	
Rest of Europe	Male	Married	-671	-488	-358	-1'007	-797	-643
		Not married	-1'723	-1'359	-1'048	-1'775	-1'430	-1'136
		Total	-896	-703	-563	-1'178	-970	-817
	Female	Married	-1'673	-1'326	-1'022	-2'110	-1'708	-1'352
		Not married	-2'486	-2'134	-1'839	-2'627	-2'261	-1'948
		Total	-1'823	-1'505	-1'232	-2'240	-1'878	-1'565
Total		-1'324	-1'105	-934	-1'733	-1'471	-1'259	
Rest of the world	Male	Married	650	947	1'219	416	732	1'016
		Not married	673	955	1'223	638	906	1'153
		Total	670	950	1'208	500	790	1'051
	Female	Married	12	399	778	-207	207	606
		Not married	-528	-155	188	-570	-190	144
		Total	-122	247	604	-293	97	463
Total		253	569	867	60	394	702	
Total		-78	49	143	-554	-408	-299	

period 2003-2009. It is evident that the future monthly fiscal contribution of a foreign household is statistically significantly lower with adjustment for the naturalizations than without this adjustment, which points to a negative selection effect in this regard.

Given the price level for 2005 and given that the fiscal policy of 2000-2005 is maintained, a foreign household slightly burdens the public budget in the equilibrium without adjustment for the naturalizations with CHF 800 per annum, but it cannot be ruled out that the actual burden is zero. With adjustment for the naturalizations, this average burden increases to approximately CHF 4'900 per household and per year.

The longitudinal comparison of the average monthly fiscal balance of a foreign household during the period 2003-2009 and in the long-term equilibrium provides evidence that the long-term improvement of the skill level of foreigners<sup>5</sup> is too weak to compensate the negative effects of the higher share of persons aged over 65 in the future stock of foreigners<sup>6</sup> on the fiscal balance of foreigners. However, the negative development of the average monthly fiscal contribution of a foreign household is only statistically significant with adjustment for the naturalizations. At each lower aggregation level in table 5.1, with the exception of the category "Married women from the rest of the world" without adjustment for the naturalizations, there is also, however, strong evidence that the average monthly fiscal contribution deteriorates in the long-term equilibrium compared to the observation period given a constant migration pattern compared to this period.

In contrast, if the average monthly fiscal contribution per category is linked with the composition of the inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009<sup>7</sup>, a positive fiscal contribution of approximately CHF 730 per month can be drawn per foreign household from the immigration flow, which is statistically significant at the 95 per cent level<sup>8</sup>. Thus, a foreign household which immigrated during the period 2003-2009 has a statistically significantly higher monthly fiscal balance than a household of the stock of foreigners during the same period. Disregarding the different average durations of stay of the different categories of foreigners in Switzerland, a positive development of the fiscal balance of foreigners is therefore indicated over time. The comparison of the average monthly fiscal contributions of the inflow and the stock (with and without adjustment for the naturalizations) at lower aggregation levels provides further evidence (with four exceptions each) that the foreigners who immigrated during the period from 2003 to 2009 have a higher fiscal balance than the stock of foreigners during the same period. Thus, the average fiscal balance of the inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009 is no predictor of the long-term development of the fiscal balance of the stock of foreigners in Switzerland.

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<sup>5</sup>See chapter 4.3.

<sup>6</sup>See figure 4.7.

<sup>7</sup>See appendix 3.

<sup>8</sup>See appendix 8.

Differentiated by nationality, only persons who have immigrated recently from the rest of Europe have a negative fiscal balance of CHF 937 per household and per month. However, the fiscal contribution of the other nationality groups is statistically significantly positive at a 95 per cent level.

As table 5.1 shows, the immigrants from the rest of Europe are also both in the stock of the period 2003-2009 and in the long-term equilibrium statistically significantly the most unattractive foreigners in fiscal terms. In contrast, the persons from the northern EU-17/EFTA countries contribute in the inflow and in the stock of the period 2003-2009 as well as in the long-term equilibrium the most beneficial fiscal balance from a Swiss standpoint.

## 5.2 Sensitivity tests

The validity of the restrictive assumptions of the Tobit model is tested by additionally calculating the ex-post forecasts of the  $K$  transfer groups depending on the attribute profiles of the foreigners using selection model estimations.

Selection models are structured as follows in the standard case:

$$\begin{aligned} y_{1ik}^* &= \alpha_{1k} + \beta'_{1k} \mathbf{x}_{1i} + \varepsilon_{1ik}, \\ y_{2ik}^* &= \alpha_{2k} + \beta'_{2k} \mathbf{x}_{2i} + \varepsilon_{2ik}. \end{aligned} \quad (5.1)$$

In contrast to the Tobit model, the process that determines whether the latent variable of the second stage  $y_{2ik}^*$  is left-censored is modeled in a separate equation. Thus, the Tobit assumption is abandoned and replaced by a selection equation whose left-hand variable  $y_{1ik}^*$  is also latent. In the Tobit case is  $y_{1ik}^* = y_{2ik}^*$ .

The left-censoring of  $y_{2ik}^*$  now depends on whether the left-hand variable of the selection equation  $y_{1ik}^*$  exceeds the critical value 0. The observed variable  $y_{1ik}$  is characterized as follows:

$$y_{1ik} = \begin{cases} 1 & \text{if } y_{1ik}^* > 0, \\ 0 & \text{otherwise.} \end{cases} \quad (5.2)$$

For the observed variable  $y_{2ik}$ , it follows:

$$y_{2ik} = \begin{cases} y_{2ik}^* & \text{if } y_{1ik}^* > 0, \\ 0 & \text{otherwise.} \end{cases} \quad (5.3)$$

The error terms are characterized as follows:

$$\begin{pmatrix} \varepsilon_{1ik} \\ \varepsilon_{2ik} \end{pmatrix} \sim \mathcal{N} \left( \begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & \sigma_{12k} \\ \sigma_{12k} & \sigma_{2k}^2 \end{pmatrix} \right). \quad (5.4)$$

The parameters of the estimation models are estimated with maximum likelihood. The regressors  $x_{1i}$  and  $x_{2i}$  may differ, but are identical in this study and remain constant compared to the Tobit estimations. The ex-post forecasts of the average fiscal contribution of foreigners depending on their attribute profiles are calculated according to the following equation:

$$E[y_{2ik} | x_i] = \Phi(\beta'_{1k} x_i) \beta'_{2k} x_i + \sigma_{12k} \phi(\beta'_{1k} x_i). \quad (5.5)$$

Appendix 9 illustrates the resulting ex-post forecasts of the fiscal balance in the different categories of foreigners. The comparison with the results from the Tobit estimations<sup>9</sup> shows that the results are similar. The respective confidence intervals overlap in 56 of 64 cases, and the values of the average monthly fiscal balance of the particular category of foreigners do therefore not differ statistically significantly from each other.

The same holds true for the higher aggregation levels<sup>10</sup>. In most cases, the values of the two estimation methods are not statistically significantly different from each other.

At the highest aggregation level, the selection model estimations confirm that the average fiscal balance of a foreign household is slightly positive during the observation period 2003-2009 and negative in the long-term equilibrium, independent of whether it is adjusted for naturalizations. In contrast to the Tobit estimations, all results are statistically significant. The average fiscal balance of a foreign household in the long-term equilibrium with adjustment for the naturalizations is again statistically significantly lower than without this adjustment, which provides further evidence for a negative selection effect from a fiscal standpoint.

Moreover, the selection model estimations confirm the result according to which the average monthly fiscal balance of a foreign household deteriorates in the long run. This

<sup>9</sup>See figure 5.1.

<sup>10</sup>See table 5.1 for the values according to the Tobit estimations and appendix 10 for the values according to the selection model estimations.



development is statistically significant with and without adjustment for the naturalizations.

With one exception (Unmarried women from the northern EU-17/EFTA countries), the average monthly fiscal balance of the inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009 also does not differ statistically significantly from the original results at higher aggregation levels<sup>11</sup>. Additionally, the original result that an average foreign household of the immigrant flow during the period 2003-2009 makes a statistically significantly higher monthly fiscal contribution than an average household from the stock of foreigners during this period is robust.

Thus, the selection model estimations confirm the main results of the original calculations. It can be concluded that the Tobit assumption and thereby the choice of this model is valid in this study.

Further assumptions of this study, based on which the transfers between government and foreigners were quantified<sup>12</sup>, concern the incidence of the public revenue and public expenditure. The validity of these assumptions is tested by computing a fiscal balance for natives.

The original calculations show that the average monthly fiscal balance of a foreign household during the period 2003-2009 tends to be slightly positive given that the fiscal policy of 2000-2005 remains constant. However, it cannot be ruled out that it is only balanced. Since the budget of the government sector during the years 2000-2005 can be considered balanced<sup>13</sup>, it is expected that the average fiscal balance of a Swiss household will range from being balanced to slightly negative.

For the calculation of the average fiscal balance of a Swiss household, Tobit estimations of the regression model from equations 3.1 and 3.2 are first run based on EVE 2000-2005. The uncleaned dataset consists of 18'549 observations. After data cleaning, the dataset is reduced to, respectively, 18'018 observations and 12'277 observations for the coefficient estimations of the *employer contributions to social insurance schemes passed on to wages*. The regressors of the estimation model remain constant compared to the specification for the foreigners<sup>14</sup>, except for the variable *nationality*, which is now redundant.

The average attribute profiles are calculated by differentiating the permanent Swiss resident population aged 18 and older by gender, marital status and age. 16 categories of natives result from this differentiation. The distribution of the remaining right-hand vari-

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<sup>11</sup>See appendix 8 for the values according to the Tobit estimations and appendix 11 for the values according to the selection model estimations.

<sup>12</sup>See chapter 3.

<sup>13</sup>The deficit ratio or surplus ratio of the government sector (confederation, cantons and municipalities) varied between -1.4 per cent and 2.3 per cent (See appendix 12).

<sup>14</sup>See table 3.3.

ables within these categories is gained from EVE 2000-2005 and from SAKE 2003-2009. After data cleaning, the SAKE dataset consists of, respectively, approximately 215'000 observations and approximately 110'000 observations for the calculation of the distribution of the attributes among the Swiss employees.

Given the price level for 2005 and given that the fiscal policy of 2000-2005 is maintained, in line with the approach for the calculation of the average fiscal contribution per category of foreigners<sup>15</sup>, the average monthly fiscal balance and the corresponding 95 per cent confidence interval can be calculated for the different categories of the permanent Swiss resident population aged 18 and older, illustrated in appendix 13.

From this table, it follows that only the natives aged over 65 have a statistically significantly negative monthly fiscal balance at the 95 per cent level. The average fiscal contribution of the other categories of natives is positive. This result is statistically significant except for unmarried women aged 18 to 35. The highest positive average fiscal contribution per household and per month is made by unmarried men aged 36 to 50.

By linkage with the composition of the permanent Swiss resident population aged 18 and older during the period 2003-2009<sup>16</sup>, the monthly fiscal balance of a Swiss household, which is illustrated in appendix 15, can be computed. As expected, a slightly negative fiscal balance of CHF 50 per household and per month results for a Swiss household during the period 2003-2009, which is statistically significant at the 95 per cent level. This result confirms the validity of the calculations for the foreigners. The average monthly fiscal balances of a Swiss and a foreign household (with and without adjustment for the naturalizations) do not, therefore, differ statistically significantly from each other.

By linking the skill mix in the different categories of the permanent Swiss resident population aged 18 and older gained from SAKE with its composition during the period 2003-2009, the skill mix of the native population can be derived. Accordingly, the share of high-skilled persons within the permanent Swiss resident population aged 18 and older during the period 2003-2009 is 25 per cent, whereas the share of the low-skilled persons is 20 per cent. Thus, the share of high-skilled natives is similar to the share within the permanent foreign resident population aged 18 and older during the same period, where approximately 26 per cent of the stock of foreigners (with and without adjustment for the naturalizations) are high-skilled. However, the share of low-skilled natives is only 20 per cent compared to that of 37 per cent for foreigners, which indicates that natives clearly possess a more advantageous set of skills<sup>17</sup>. As a consequence, there tends to be a redistribution from foreigners to natives despite the more advantageous skill level of natives, which should influence the fiscal contribution positively<sup>18</sup>. However, the share of old-age

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<sup>15</sup>See chapter 5.1.

<sup>16</sup>See appendix 14.

<sup>17</sup>See chapter 4.3 for the skill composition of the stock of foreigners during the period 2003-2009.

<sup>18</sup>See also chapter 2.

pension beneficiaries, which is expected to have a negative effect on the fiscal balance<sup>19</sup>, is significantly lower among the foreigners<sup>20</sup>. The results of this cross-comparison of natives and foreigners indicate that foreigners are able to overcompensate the negative fiscal effects of having a relatively disadvantageous skill composition with a relatively advantageous age composition.

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<sup>19</sup>See also chapter 2.

<sup>20</sup>Looking at the average age composition of the permanent Swiss resident population aged 18 and older during the period 2003-2009, the share of persons aged over 65 lies at almost 22 per cent and is approximately 14 percentage points higher than the respective share among the stock of foreigners with and without adjustment for the naturalizations (See figure 4.7 for the average age composition of foreigners and appendix 14 for the average age composition of the natives during the period 2003-2009).

## Chapter 6

# Conclusion

This study provides a major contribution to the existing literature on the fiscal effects of immigration in Switzerland. It is the first study to analyze the long-term fiscal effects of the new immigration of high-skilled workers. In doing so, it develops a new analytical approach, which combines the strengths of the two methods known in the literature. Under the assumption that the migration patterns of foreigners remain constant compared to the observation period, which covers the years from 2003 to 2009, our model quantifies the long-term development of the fiscal contribution of foreigners in Switzerland based on cross-sectional data. The long-term fiscal balance indicates the values that are implied by the current migration pattern of the new immigration under the assumption that the future permanent foreign resident population aged 18 and older receives and finances public benefits to the same extent that similar foreigners do today.

Two cases have been distinguished for the calculation of the fiscal balance of foreigners. In the first case, persons who acquired Swiss citizenship in the observation period 2003-2009 were considered as outflow from the stock of foreigners. In the second case, persons who were naturalized during this period were still counted as foreigners. During the period 2003-2009, the average monthly fiscal balance of a foreign household tends to be slightly positive with and without adjustment for the naturalizations. The comparison with the fiscal balance in the observation period shows that there is at least strong evidence that the fiscal contribution of immigration in Switzerland deteriorates in the long run. However, this negative development is only statistically significant if naturalizations are not considered.

Under the current fiscal and migration policies, the average monthly fiscal balance of a foreign household tends to be negative when including the naturalizations and is statistically significantly negative at a 95 per cent level when excluding the naturalizations. The future monthly fiscal contribution of a foreign household is statistically significantly

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lower when ignoring naturalizations than otherwise.

Additionally, a fiscal balance was calculated for just those foreigners who immigrated to Switzerland during the observation period 2003-2009. A foreign household of the immigration flow has a significantly higher monthly fiscal balance statistically than a household of the stock of foreigners during the same period. Thus, the average fiscal balance of the inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009 as an indicator for the long-term development of the fiscal balance of the stock of foreigners in Switzerland is misleading.

The main results of this study were confirmed by a sensitivity test, which estimated the fiscal incidence of the new immigration with a more flexible model, and can thus be considered robust.

The validity of the assumptions regarding the incidence of the public revenue and public expenditure has been tested by calculating a fiscal balance for natives during the period 2003-2009. Given a balanced public budget, it was expected that the average fiscal balance of a Swiss household ranges from being balanced to slightly negative if the average fiscal balance of a foreign household tends actually to be slightly positive. From the calculations, a slightly negative average fiscal balance can be attributed to a Swiss household during the period 2003-2009, which is statistically significant at the 95 per cent level. This result provides further support for the validity of the results for the foreigners.

The results for the period 2003-2009 are similar to the results of Weber (1993) who quantified a slightly positive fiscal contribution of immigration and a slightly negative fiscal balance for the natives in 1990. As in the study by Weber (1993), the restriction to the *permanent* foreign resident population may lead to an underestimate of the true fiscal contribution of foreigners, as short-term residents are neglected for the quantification of the fiscal incidence.

The results of this study provide evidence that the future improvement of the skill level of foreigners, which should influence the fiscal balance positively, is too weak to compensate the expected negative fiscal effects of the trend towards an aging society. Subject to the assumptions of this study, the estimated share of high-skilled persons in the stock of foreigners increases, respectively, from 25.9 per cent in the observation period to 29.4 per cent in the long-term equilibrium without adjustment for the naturalizations and from 25.8 per cent to 26.5 per cent with adjustment for the naturalizations. The comparison with the corresponding share among immigrant foreign workers, which currently lies at over 50 per cent, shows that this value is relatively low. This can be explained by the varying tendencies of foreigners of different nationalities, skills and age to remain in Switzerland. The high-skilled workers are mainly recruited from the northern EU-17/EFTA countries and the average duration of stay of foreigners from these countries is relatively low. As a consequence, the future improvement of the skill level of foreigners is relatively weak. At the same time, the share of persons aged 18 to 35 among the stock

of foreigners decreases in the long run from 39 per cent during the period 2003-2009 to, respectively, 32 per cent (permanent foreign resident population aged 18 and older without adjustment for the naturalizations) and 27 per cent (permanent foreign resident population aged 18 and older with adjustment for the naturalizations), even though this age group's share of inflow migration is 70 per cent for this period. These results clearly show that the composition of the inflow is only reflected to a limited extent in the equilibrium composition of foreigners due to differences in the average duration of stay of foreigners.

As expected, the combination of a lower share of high-skilled persons and a higher share of persons aged over 65 leads to a statistically significantly worse average monthly fiscal balance of a foreign household in the long-term equilibrium if newly naturalized persons are further counted as foreigners instead of Swiss. This result points to a negative selection effect from a fiscal standpoint.

In summary, it can be stated that this study provides evidence that the fiscal incidence of the new immigration in Switzerland has a negative long-term trend.

However, it can be assumed that Switzerland's public budget has to be balanced in the long run and Swiss fiscal policy possibly needs to be adjusted due to demographic aging. A future change in fiscal policy owing to structural deficits can in fact lead to a positive fiscal contribution of foreigners in the long run.

Moreover, the actual development of the fiscal balance of foreigners depends on a multitude of other parameters. One would have to consider the indirect effects of migration to quantify the long-term fiscal incidence of the new immigration more precisely. Due to the lack of data, this study cannot, for example, predict what the effects of the new immigration on the future economic development of Switzerland will be. A consideration of the potential economic growth that might be triggered by immigration is neglected in this study. Furthermore, attention should be paid to the fact that the categories of foreigners who currently strain the public budget may change in this regard in the long run. This possibility is also not accounted for in this study. Moreover, it is not taken into consideration that foreigners' educational costs are incurred abroad, while the return on education is received by Switzerland.

In contrast, it needs to be born in mind that return-migrants can be eligible for a pension in Switzerland, even though they no longer reside in Switzerland. This fact is also not accounted for in this study.

However, on the other hand, our study does show that one cannot directly conclude from a higher skill level of immigrants to Switzerland that the fiscal balance of foreigners will improve in the long run.

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# Appendix

**Table 1:** Comparison of the permanent foreign resident population aged 18 and older during the period 2003-2009 and in the long-term equilibrium, absolute values

Nationality	Gender	Marital status	Age	No adjustment for naturalizations		Adjustment for naturalizations	
				Stock 2003-2009	Equilibrium	Stock 2003-2009	Equilibrium
EU-17/EFTA North	Male	Married	18 to 35	11'386	14'320	11'478	14'956
			36 to 50	40'010	72'995	40'582	84'287
			51 to 65	25'107	42'451	25'456	52'408
		Over 65	14'658	44'149	14'779	60'946	
		Not married	18 to 35	43'216	61'049	43'400	62'498
			36 to 50	26'879	58'797	26'980	62'644
	51 to 65		9'767	21'954	9'822	25'179	
			Over 65	5'199	24'335	5'218	31'979
	Female	Married	18 to 35	16'376	19'158	16'603	20'768
			36 to 50	31'091	58'761	31'747	77'111
			51 to 65	14'241	24'147	14'442	33'337
		Over 65	7'375	23'269	7'418	33'870	
Not married		18 to 35	36'386	49'828	36'653	51'827	
		36 to 50	19'315	44'483	19'446	51'202	
	51 to 65	9'510	19'933	9'591	24'827		
		Over 65	10'542	36'874	10'569	50'970	
EU-17/EFTA South	Male	Married	18 to 35	27'437	24'693	27'745	27'379
			36 to 50	68'139	72'152	69'169	91'961
			51 to 65	45'065	45'691	45'497	62'042
		Over 65	22'022	40'879	22'114	58'618	
		Not married	18 to 35	55'959	62'247	56'545	68'814
			36 to 50	23'275	36'718	23'495	44'709
	51 to 65		9'389	14'347	9'450	18'683	
			Over 65	5'415	13'278	5'432	18'864
	Female	Married	18 to 35	30'996	25'321	31'449	29'410
			36 to 50	51'511	50'505	52'372	69'406
			51 to 65	30'258	29'462	30'518	43'263
		Over 65	12'773	24'076	12'808	36'435	
Not married		18 to 35	32'585	33'968	33'485	43'094	
		36 to 50	14'472	22'630	14'679	32'189	
	51 to 65	7'957	10'925	8'023	16'203		
		Over 65	12'746	29'247	12'763	43'909	
Rest of Europe	Male	Married	18 to 35	43'639	44'389	44'987	68'731
			36 to 50	48'638	34'773	50'927	79'408
			51 to 65	25'796	31'592	26'346	96'606
		Over 65	3'324	8'024	3'361	27'268	
		Not married	18 to 35	31'157	36'489	32'756	75'755
			36 to 50	4'913	4'782	5'037	10'235
	51 to 65		2'548	3'441	2'594	9'083	
			Over 65	885	2'280	892	7'293
	Female	Married	18 to 35	58'593	56'419	60'713	88'169
			36 to 50	47'057	42'943	49'186	105'181
			51 to 65	18'313	31'585	18'655	100'799
		Over 65	1'798	6'853	1'814	24'288	
Not married		18 to 35	21'876	25'311	23'576	54'202	
		36 to 50	6'042	7'816	6'307	22'785	
	51 to 65	4'227	8'832	4'327	31'355		
		Over 65	2'740	9'447	2'753	33'209	
Rest of the world	Male	Married	18 to 35	17'246	17'706	17'750	20'858
			36 to 50	23'507	28'175	24'656	45'877
			51 to 65	7'066	11'191	7'299	20'924
		Over 65	1'500	2'643	1'535	5'628	
		Not married	18 to 35	17'793	19'777	18'229	22'353
			36 to 50	6'228	8'751	6'374	12'994
	51 to 65		1'800	3'935	1'843	7'778	
			Over 65	568	1'534	578	3'464
	Female	Married	18 to 35	33'004	34'076	34'265	43'847
			36 to 50	26'015	36'547	27'448	69'203
			51 to 65	4'897	8'786	5'082	18'846
		Over 65	688	1'373	701	3'045	
Not married		18 to 35	15'361	16'748	15'852	19'693	
		36 to 50	5'795	9'091	5'942	14'773	
	51 to 65	2'073	4'717	2'137	11'292		
		Over 65	1'388	2'757	1'404	6'034	
<b>Total</b>				<b>1'257'534</b>	<b>1'715'428</b>	<b>1'285'054</b>	<b>2'604'761</b>

**Table 2:** Comparison of the composition of the permanent foreign resident population aged 18 and older during the period 2003-2009 and in the long-term equilibrium, percentages

Nationality	Gender	Marital status	Age	No adjustment for naturalizations		Adjustment for naturalizations	
				Stock 2003-2009	Equilibrium	Stock 2003-2009	Equilibrium
EU-17/EFTA North	Male	Married	18 to 35	0.9%	0.8%	0.9%	0.6%
			36 to 50	3.2%	4.3%	3.2%	3.2%
			51 to 65	2.0%	2.5%	2.0%	2.0%
			Over 65	1.2%	2.6%	1.2%	2.3%
		Not married	18 to 35	3.4%	3.6%	3.4%	2.4%
			36 to 50	2.1%	3.4%	2.1%	2.4%
	Female	Married	51 to 65	0.8%	1.3%	0.8%	1.0%
			Over 65	0.4%	1.4%	0.4%	1.2%
			18 to 35	1.3%	1.1%	1.3%	0.8%
			36 to 50	2.5%	3.4%	2.5%	3.0%
		Not married	51 to 65	1.1%	1.4%	1.1%	1.3%
			Over 65	0.6%	1.4%	0.6%	1.3%
EU-17/EFTA South	Male	Married	18 to 35	2.2%	1.4%	2.2%	1.1%
			36 to 50	5.4%	4.2%	5.4%	3.5%
			51 to 65	3.6%	2.7%	3.5%	2.4%
			Over 65	1.8%	2.4%	1.7%	2.3%
		Not married	18 to 35	4.4%	3.6%	4.4%	2.6%
			36 to 50	1.9%	2.1%	1.8%	1.7%
	Female	Married	51 to 65	0.7%	0.8%	0.7%	0.7%
			Over 65	0.4%	0.8%	0.4%	0.7%
			18 to 35	2.5%	1.5%	2.4%	1.1%
			36 to 50	4.1%	2.9%	4.1%	2.7%
		Not married	51 to 65	2.4%	1.7%	2.4%	1.7%
			Over 65	1.0%	1.4%	1.0%	1.4%
Rest of Europe	Male	Married	18 to 35	2.6%	2.0%	2.6%	1.7%
			36 to 50	1.2%	1.3%	1.1%	1.2%
			51 to 65	0.6%	0.6%	0.6%	0.6%
			Over 65	1.0%	1.7%	1.0%	1.7%
		Not married	18 to 35	3.5%	2.6%	3.5%	2.6%
			36 to 50	3.9%	2.0%	4.0%	3.0%
	Female	Married	51 to 65	2.1%	1.8%	2.1%	3.7%
			Over 65	0.3%	0.5%	0.3%	1.0%
			18 to 35	2.5%	2.1%	2.5%	2.9%
			36 to 50	0.4%	0.3%	0.4%	0.4%
		Not married	51 to 65	0.2%	0.2%	0.2%	0.3%
			Over 65	0.1%	0.1%	0.1%	0.3%
Rest of the world	Male	Married	18 to 35	4.7%	3.3%	4.7%	3.4%
			36 to 50	3.7%	2.5%	3.8%	4.0%
			51 to 65	1.5%	1.8%	1.5%	3.9%
			Over 65	0.1%	0.4%	0.1%	0.9%
		Not married	18 to 35	1.7%	1.5%	1.8%	2.1%
			36 to 50	0.5%	0.5%	0.5%	0.9%
	Female	Married	51 to 65	0.3%	0.5%	0.3%	1.2%
			Over 65	0.2%	0.6%	0.2%	1.3%
			18 to 35	1.4%	1.0%	1.4%	0.8%
			36 to 50	1.9%	1.6%	1.9%	1.8%
		Not married	51 to 65	0.6%	0.7%	0.6%	0.8%
			Over 65	0.1%	0.2%	0.1%	0.2%
Total	Male	Married	18 to 35	1.4%	1.2%	1.4%	0.9%
			36 to 50	0.5%	0.5%	0.5%	0.5%
			51 to 65	0.1%	0.2%	0.1%	0.3%
			Over 65	0.0%	0.1%	0.0%	0.1%
		Not married	18 to 35	2.6%	2.0%	2.7%	1.7%
			36 to 50	2.1%	2.1%	2.1%	2.7%
	Female	Married	51 to 65	0.4%	0.5%	0.4%	0.7%
			Over 65	0.1%	0.1%	0.1%	0.1%
			18 to 35	1.2%	1.0%	1.2%	0.8%
			36 to 50	0.5%	0.5%	0.5%	0.6%
		Not married	51 to 65	0.2%	0.3%	0.2%	0.4%
			Over 65	0.1%	0.2%	0.1%	0.2%
Total				100%	100%	100%	100%

**Table 3:** Inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009

Nationality	Gender	Marital status	Age	Inflow 2003-2009		
				Absolute values	Percentages	
EU-17/EFTA	Male	Married	18 to 35	1'938	1.7	
			36 to 50	4'545	4.0	
			51 to 65	1'444	1.3	
			Over 65	211	0.2	
		Not married	18 to 35	12'829	11.2	
			36 to 50	3'943	3.4	
	North	Female	Married	51 to 65	606	0.5
				Over 65	74	0.1
				18 to 35	2'411	2.1
				36 to 50	2'585	2.3
		Not married	51 to 65	736	0.6	
			Over 65	108	0.1	
EU-17/EFTA	Male	Married	18 to 35	10'695	9.3	
			36 to 50	1'934	1.7	
			51 to 65	392	0.3	
			Over 65	129	0.1	
		Not married	18 to 35	2'707	2.4	
			36 to 50	2'511	2.2	
	South	Female	Married	51 to 65	600	0.5
				Over 65	103	0.1
				18 to 35	6'928	6.0
				36 to 50	1'094	1.0
		Not married	51 to 65	153	0.1	
			Over 65	36	0.0	
Rest of Europe	Male	Married	18 to 35	3'489	3.0	
			36 to 50	1'485	1.3	
			51 to 65	285	0.2	
			Over 65	59	0.1	
		Not married	18 to 35	4'196	3.7	
			36 to 50	582	0.5	
	Rest of the world	Female	Married	51 to 65	138	0.1
				Over 65	126	0.1
				18 to 35	5'339	4.7
				36 to 50	975	0.8
		Not married	51 to 65	235	0.2	
			Over 65	30	0.0	
Rest of the world	Male	Married	18 to 35	2'839	2.5	
			36 to 50	182	0.2	
			51 to 65	28	0.0	
			Over 65	14	0.0	
		Not married	18 to 35	6'663	5.8	
			36 to 50	1'184	1.0	
	Rest of the world	Female	Married	51 to 65	222	0.2
				Over 65	21	0.0
				18 to 35	3'095	2.7
				36 to 50	224	0.2
		Not married	51 to 65	81	0.1	
			Over 65	76	0.1	
Rest of the world	Male	Married	18 to 35	3'171	2.8	
			36 to 50	2'029	1.8	
			51 to 65	535	0.5	
			Over 65	66	0.1	
		Not married	18 to 35	4'606	4.0	
			36 to 50	514	0.4	
	Rest of the world	Female	Married	51 to 65	79	0.1
				Over 65	16	0.0
				18 to 35	5'665	4.9
				36 to 50	2'463	2.1
		Not married	51 to 65	403	0.4	
			Over 65	32	0.0	
Rest of the world	Female	Married	18 to 35	4'214	3.7	
			36 to 50	515	0.4	
			51 to 65	144	0.1	
			Over 65	63	0.1	
	Not married	18 to 35	114'797	100		
		Over 65				
<b>Total</b>				<b>114'797</b>	<b>100</b>	

**Table 4:** Average duration of stay of the inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009, years

Nationality	Gender	Marital status	Age	Duration of stay in Switzerland	
				No adjustment for naturalizations	Adjustment for naturalizations
EU-17/EFTA North	Male	Married	18 to 35	14.4	17.3
			36 to 50	15.3	18.9
			51 to 65	17.2	20.6
			Over 65	16.8	19.3
		Not married	18 to 35	11.0	12.4
			36 to 50	15.6	17.8
	Female	Married	51 to 65	17.0	19.3
			Over 65	13.3	14.2
			18 to 35	16.5	22.0
			36 to 50	17.3	23.5
		Not married	51 to 65	19.8	23.5
			Over 65	20.4	22.4
Total			13.8	16.6	
EU-17/EFTA South	Male	Married	18 to 35	22.8	29.1
			36 to 50	21.2	26.8
			51 to 65	18.7	21.3
			Over 65	16.7	18.0
		Not married	18 to 35	22.4	28.5
			36 to 50	21.9	27.1
	Female	Married	51 to 65	18.2	20.3
			Over 65	13.7	14.5
			18 to 35	23.6	32.1
			36 to 50	23.7	31.0
		Not married	51 to 65	23.1	26.0
			Over 65	22.5	23.7
Total			21.9	28.8	
Rest of Europe	Male	Married	18 to 35	18.6	40.9
			36 to 50	17.3	34.4
			51 to 65	16.9	24.7
			Over 65	11.7	13.5
		Not married	18 to 35	14.7	38.9
			36 to 50	16.9	28.5
	Female	Married	51 to 65	15.8	22.4
			Over 65	9.0	9.7
			18 to 35	18.3	43.6
			36 to 50	18.6	38.8
		Not married	51 to 65	19.1	27.8
			Over 65	14.8	16.8
Total			16.7	39.3	
Rest of the world	Male	Married	18 to 35	10.2	15.7
			36 to 50	9.6	15.9
			51 to 65	9.0	12.6
			Over 65	9.1	11.5
		Not married	18 to 35	6.5	8.8
			36 to 50	10.7	16.1
	Female	Married	51 to 65	11.4	15.5
			Over 65	10.0	12.2
			18 to 35	10.2	17.3
			36 to 50	9.1	16.3
		Not married	51 to 65	8.5	12.1
			Over 65	10.3	12.2
Total			8.5	13.3	
Total			14.9	22.7	





**Table 6: Distribution of attributes among the employees in the permanent foreign resident population aged 18 and older**

Nationality	Gender	Marital status	Age	Region						Skill level				Household size	Household with (children)		Labor income	Income from rent and investments	
				Lake Geneva midland	Emmentaler Switzer- land	Zürich	Eastern Switzer- land	Central Ticino	Low- skilled	Medium- skilled	High- skilled	Yes	No						
EU17/EFTA North	Male	Married	18 to 35	28.6%	16.0%	14.0%	10.9%	12.3%	7.0%	1.7%	3.8%	25.0%	70.5%	2.9	56.0%	44.0%	10944	61	
			36 to 50	22.4%	13.7%	15.0%	21.9%	14.3%	10.2%	2.4%	2.6%	24.9%	72.5%	3.4	75.0%	25.0%	11434	83	
			51 to 65	22.1%	14.9%	14.9%	18.5%	16.4%	11.2%	2.1%	3.8%	34.4%	61.8%	1.9	30.0%	61.0%	11296	130	
		Over 65	17.2%	13.8%	17.6%	19.9%	14.9%	10.9%	3.6%	4.5%	31.4%	64.1%	2.2	11.1%	88.9%	4435	394		
		Net married	18 to 35	19.9%	14.1%	16.2%	24.3%	14.1%	10.0%	1.5%	7.6%	33.7%	58.7%	1.6	12.3%	84.2%	9166	71	
			36 to 50	17.7%	13.5%	19.0%	24.8%	12.9%	10.5%	1.7%	3.3%	31.3%	65.4%	1.8	15.8%	87.7%	9656	95	
	51 to 65		26.3%	14.7%	17.3%	16.9%	14.7%	7.6%	2.5%	7.2%	42.2%	50.6%	1.4	9.6%	90.4%	9517	140		
	Female	Married	18 to 35	22.2%	18.0%	12.5%	20.6%	14.6%	9.9%	2.2%	5.0%	41.2%	53.8%	2.9	60.8%	39.2%	9645	37	
			36 to 50	18.3%	16.5%	16.4%	18.2%	17.2%	11.3%	4.2%	4.2%	42.0%	53.8%	3.4	75.3%	24.7%	10135	58	
			51 to 65	26.6%	9.3%	15.2%	21.8%	15.6%	8.1%	3.7%	12.7%	46.8%	40.5%	2.5	32.1%	67.9%	9996	105	
		Net married	18 to 35	17.2%	10.3%	10.3%	14.8%	6.9%	10.3%	0.0%	3.7%	37.9%	34.9%	2.7	3.4%	96.6%	9966	369	
			36 to 50	20.2%	17.2%	18.0%	22.4%	11.9%	7.9%	1.8%	6.8%	37.9%	55.3%	1.8	16.7%	83.3%	7867	47	
51 to 65			31.4%	14.1%	14.5%	19.4%	11.5%	5.6%	3.5%	14.2%	45.0%	40.8%	1.4	14.8%	85.2%	8718	115		
EU17/EFTA South	Male	Married	18 to 35	25.1%	15.2%	10.2%	14.5%	12.0%	6.7%	16.3%	16.3%	37.0%	48.0%	14.9%	1.7	25.5%	74.5%	8757	24
			36 to 50	29.1%	17.1%	10.4%	12.8%	8.6%	5.6%	16.4%	43.0%	40.1%	16.9%	3.1	86.5%	13.5%	9254	46	
			51 to 65	23.0%	13.0%	11.5%	14.7%	10.7%	5.9%	21.2%	56.7%	35.0%	8.2%	2.8	56.4%	43.6%	9116	93	
		Net married	18 to 35	21.4%	14.1%	14.5%	19.4%	11.5%	5.6%	3.5%	13.1%	66.7%	20.2%	1.0	0.0%	100.0%	1378	380	
			36 to 50	21.4%	21.4%	10.7%	29.8%	6.0%	3.6%	7.1%	37.0%	48.0%	14.8%	1.7	72.7%	27.3%	8764	24	
			51 to 65	18.3%	12.9%	11.5%	14.7%	10.7%	5.9%	21.2%	56.7%	35.0%	8.2%	2.8	56.4%	43.6%	9254	46	
	Female	Married	18 to 35	26.2%	15.2%	13.1%	15.7%	10.8%	6.3%	12.7%	31.2%	51.7%	17.1%	2.7	57.9%	42.1%	6986	35	
			36 to 50	25.2%	15.4%	11.1%	14.7%	7.0%	6.1%	20.5%	25.7%	50.3%	23.9%	1.7	22.6%	77.4%	7476	56	
			51 to 65	25.5%	15.6%	8.5%	14.6%	9.8%	6.7%	19.3%	49.3%	39.6%	11.1%	1.6	16.8%	83.2%	7337	103	
		Net married	18 to 35	31.0%	23.8%	7.1%	21.4%	0.0%	7.1%	9.5%	33.3%	33.3%	33.3%	1.1	0.0%	100.0%	497	357	
			36 to 50	29.3%	18.3%	9.4%	12.2%	10.1%	6.9%	13.7%	42.6%	45.3%	12.1%	3.2	74.3%	25.7%	7465	69	
			51 to 65	26.3%	14.2%	12.2%	12.2%	8.9%	6.7%	16.0%	57.3%	35.0%	7.7%	3.6	87.7%	12.3%	7955	22	
Rest of Europe	Male	Married	18 to 35	22.5%	16.1%	11.3%	16.1%	8.1%	4.8%	4.8%	29.0%	75.8%	24.2%	2.2	11.3%	88.7%	976	333	
			36 to 50	21.8%	11.6%	10.3%	13.7%	8.3%	4.6%	19.5%	38.2%	48.2%	13.6%	2.1	50.0%	50.0%	6177	10	
			51 to 65	29.8%	9.3%	10.1%	15.0%	10.4%	4.1%	25.7%	72.0%	22.1%	5.9%	1.5	23.6%	76.4%	8028	79	
		Net married	18 to 35	14.6%	0.0%	4.2%	18.8%	10.4%	4.2%	47.9%	54.2%	43.8%	2.1%	1.2	4.7%	95.3%	802	343	
			36 to 50	8.0%	14.2%	18.7%	20.1%	18.4%	14.8%	5.8%	37.5%	53.0%	9.5%	3.5	72.5%	27.5%	8713	9	
			51 to 65	11.6%	15.3%	17.1%	17.4%	17.0%	14.3%	7.2%	57.6%	46.8%	14.9%	4.2	91.2%	8.8%	8703	30	
	Female	Married	18 to 35	9.3%	12.9%	16.6%	19.4%	20.6%	14.4%	7.1%	57.6%	33.3%	9.1%	3.5	65.8%	34.2%	8565	77	
			36 to 50	10.8%	10.5%	10.2%	21.4%	16.1%	13.0%	10.5%	64.5%	22.7%	13.0%	2.7	71.8%	97.9%	1721	342	
			51 to 65	40.9%	0.0%	0.0%	30.6%	0.9%	50.0%	0.0%	90.8%	7.9%	50.0%	2.0	0.0%	100.0%	435	83	
		Net married	18 to 35	11.3%	15.3%	20.7%	13.0%	18.3%	14.1%	5.0%	56.2%	32.5%	10.7%	3.8	78.9%	21.1%	5138	5	
			36 to 50	16.7%	19.0%	14.0%	18.2%	16.7%	14.8%	5.5%	34.7%	43.2%	22.1%	4.0	60.6%	39.4%	5058	16	
			51 to 65	17.2%	7.9%	15.9%	28.2%	18.9%	8.4%	5.3%	42.7%	32.6%	24.7%	1.7	51.7%	68.3%	5487	63	
Rest of Africa world	Male	Married	18 to 35	28.7%	15.3%	12.0%	23.1%	6.7%	10.2%	4.0%	28.1%	28.3%	45.7%	2.7	47.8%	52.2%	9275	57	
			36 to 50	20.6%	14.6%	15.6%	22.4%	6.0%	9.7%	5.1%	15.2%	25.6%	46.7%	3.6	77.4%	22.6%	9765	78	
			51 to 65	36.4%	14.1%	10.8%	22.1%	5.0%	7.1%	4.5%	4.8%	24.5%	28.7%	3.1	60.3%	39.7%	9627	125	
		Net married	18 to 35	10.0%	0.0%	0.0%	10.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	1.0	0.0%	100.0%	1008	321	
			36 to 50	34.7%	15.3%	9.4%	21.0%	5.7%	7.4%	6.4%	36.6%	29.3%	34.1%	2.5	40.2%	59.8%	7497	389	
			51 to 65	36.0%	15.3%	12.1%	21.1%	4.4%	5.8%	5.3%	16.5%	28.6%	54.9%	1.3	14.2%	85.8%	7987	88	
	Female	Married	18 to 35	27.9%	16.5%	13.1%	20.6%	7.7%	7.6%	6.6%	31.9%	32.5%	35.6%	2.8	46.9%	53.1%	7976	40	
			36 to 50	34.7%	14.4%	12.6%	17.4%	3.7%	6.0%	4.5%	20.4%	34.0%	39.6%	3.3	66.2%	33.8%	8466	54	
			51 to 65	34.9%	13.3%	14.2%	14.2%	3.7%	11.9%	4.6%	17.9%	34.9%	47.2%	2.8	47.4%	52.6%	8327	101	
		Net married	18 to 35	40.7%	15.6%	10.8%	33.3%	33.3%	4.8%	0.8%	33.3%	33.3%	33.3%	1.7	0.0%	100.0%	1487	365	
			36 to 50	44.3%	13.8%	6.8%	33.8%	5.2%	4.1%	4.1%	36.5%	31.5%	32.0%	2.5	47.8%	52.2%	6198	42	
			51 to 65	54.0%	3.3%	10.7%	16.0%	4.6%	5.3%	4.4%	19.2%	25.3%	55.2%	1.8	33.9%	66.1%	6688	64	
Over 65	40.0%	0.0%	20.0%	0.0%	0.0%	0.0%	40.0%	40.0%	40.0%	20.0%	40.0%	1.0	0.0%	100.0%	-291	375			

**Table 7: Ex-post forecasts of the average monthly incidence of the transfers between government and foreigners for the different categories of the permanent foreign resident population aged 18 and older (in CHF)**

Nationality	Gender	Marital status	Age	Social insurance contributions	Health insurance premium basic	Health insurance	Income and wealth taxes	Consumption-based tax payments	Other taxes and fees	Employer contributions to social insurance schemes passed on to wages	Pensions and allowances	Daily allowances	Maternity and family allowances	Means-tested social benefits	Other monetary benefits	Health services provided by government	Educational services provided by government	Other transfers
EU-7/ERTA	North	Married	18 to 35	1105	463	1039	806	56	618	10	36	101	19	55	316	322	865	
			36 to 50	1202	515	1114	871	64	666	26	213	40	213	25	64	387	1115	1031
			51 to 65	1004	531	1106	797	59	515	308	18	11	11	18	44	407	244	788
		Over 65	74	439	651	594	43	26	2,452	56	18	0	109	42	104	104	20	626
		Female	18 to 35	306	300	695	40	463	10	26	10	12	42	25	104	104	155	590
		36 to 50	1012	277	967	712	43	549	19	42	13	13	18	28	191	191	224	483
	51 to 65	822	351	888	665	43	456	244	50	19	19	19	19	19	338	103	434	
	Over 65	19	338	478	478	30	16	2,225	29	29	0	215	56	614	18	379		
	Female	18 to 35	893	486	1104	786	48	371	70	70	33	63	43	59	320	607	607	
	36 to 50	990	533	1140	850	55	403	156	68	78	33	78	63	33	62	435	1,901	1,107
	51 to 65	794	519	1136	794	47	294	1032	52	51	33	52	47	32	526	256	711	
	Over 65	19	486	599	529	33	5	3,848	28	28	0	149	133	789	21	607		
Female	18 to 35	740	306	802	688	36	467	76	66	66	66	47	40	216	488	532		
36 to 50	844	290	886	688	33	337	716	33	337	337	337	43	43	385	160	402		
51 to 65	638	352	873	603	33	33	3,206	54	54	0	241	241	241	630	335	939		
Over 65	7	337	489	427	23	4	4,272	23	23	4	3,206	54	54	72	23	336		
Female	18 to 35	888	530	672	672	45	475	45	475	4	61	68	68	51	34	408	1,155	
36 to 50	985	595	758	732	58	511	61	61	61	61	68	68	224	51	39	519	279	
51 to 65	784	603	729	656	52	398	533	716	66	66	66	47	47	339	21	519		
Over 65	13	553	586	488	37	5	3,318	54	54	0	190	190	190	21	21	784	18	
Male	18 to 35	704	429	506	602	40	342	34	34	69	69	140	140	57	57	255	503	
36 to 50	792	353	639	394	39	382	49	475	49	15	15	42	42	215	256	541		
51 to 65	597	420	584	536	37	297	475	91	91	1	1	59	59	360	94	466		
Over 65	7	401	308	385	27	2	2,710	35	35	0	254	254	254	632	10	1,004		
EU-7/ERTA	South	Married	18 to 35	691	560	695	652	42	286	139	111	53	95	95	391	391	842	
36 to 50			792	602	746	691	47	353	255	113	106	86	86	58	62	442	1,520	
51 to 65			579	420	752	604	40	247	1,992	94	94	1	58	30	542	299	770	
Over 65		5	551	776	420	29	2	4,117	42	42	0	178	178	178	20	20	808	
Female		18 to 35	626	384	572	626	33	257	155	123	18	18	85	21	248	666	633	
36 to 50		406	419	551	474	27	215	1,236	117	117	0	89	89	13	37	277	848	
51 to 65	406	409	366	366	22	1	3,516	30	30	0	253	253	253	30	30	654		
Over 65	5	409	366	366	22	1	3,516	30	30	0	253	253	253	30	30	654		
Female	18 to 35	785	514	529	654	41	402	17	147	110	110	110	110	361	361	1,047		
36 to 50	875	598	609	609	45	456	58	58	272	212	212	167	167	454	1,937	1,263		
51 to 65	670	613	597	600	45	316	571	174	174	31	157	14	14	570	779	1,046		
Over 65	6	538	202	483	32	6	3,307	79	79	3	427	41	41	826	137	889		
Male	18 to 35	601	486	332	605	35	282	31	31	194	194	92	92	333	333	1,186		
36 to 50	681	297	569	553	30	306	24	149	11	11	11	11	11	188	188	508		
51 to 65	494	348	499	500	27	280	318	173	173	0	112	112	112	331	331	407		
Over 65	296	403	296	412	22	1	2,620	63	63	0	459	459	459	20	20	602		
Rest of Europe		Married	18 to 35	572	539	583	645	34	207	123	260	44	27	27	415	415	1,081	
36 to 50			678	588	625	608	40	268	239	238	108	108	226	226	476	476	1,216	
51 to 65			461	588	637	608	33	163	1,516	225	225	1	185	185	20	582	696	
Over 65		5	531	315	452	21	1	4,091	94	94	0	309	309	309	841	100		
Female		18 to 35	427	477	311	427	28	205	427	101	101	501	501	501	333	333	1,869	
36 to 50		510	350	471	511	25	246	108	108	25	25	218	218	218	382	382	1,055	
51 to 65	320	381	419	459	21	213	1,067	206	206	0	188	188	188	349	349	529		
Over 65	4	416	306	412	18	1	3,900	70	70	0	468	468	468	29	29	702		
Female	18 to 35	869	452	764	670	37	47	5	39	68	68	68	68	311	311	1,122		
36 to 50	972	530	803	743	46	507	264	40	40	206	206	101	101	21	394	1,095		
51 to 65	795	581	745	692	45	484	264	19	19	61	61	106	106	43	528	543		
Over 65	13	532	442	485	30	10	2,332	19	19	32	32	47	47	764	764	43		
Male	18 to 35	673	391	584	602	29	293	97	97	266	266	79	79	327	327	997		
36 to 50	781	293	716	586	29	299	517	44	44	2	108	108	108	8	186	199		
51 to 65	603	360	621	581	29	299	192	192	192	11	11	79	79	105	105	464		
Over 65	7	372	309	421	22	4	1,858	17	17	0	469	469	469	24	24	318		
Rest of the world		Married	18 to 35	656	482	809	658	31	223	48	81	12	168	168	24	365	453	
36 to 50			758	529	879	716	37	270	113	113	46	46	177	177	30	423	1,046	
51 to 65			585	554	679	793	35	264	765	65	65	4	149	149	21	541	888	
Over 65		5	487	454	438	23	203	3513	144	144	18	303	303	303	34	782		
Female		18 to 35	493	412	548	565	23	203	23	203	18	18	16	16	282	282	783	
36 to 50		614	328	632	632	23	333	55	55	55	1	155	155	155	13	224		
51 to 65	430	377	565	493	22	22	2,635	65	65	0	164	164	164	103	361			
Over 65	5	389	435	397	18	1	2,635	20	20	0	494	494	494	30	651			

**Table 8:** Average monthly fiscal balance of the inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009 at different aggregation levels (in CHF)

Nationality	Gender	Marital status	Inflow 2003-2009		
			Min	Mean	Max
EU-17/EFTA North	Male	Married	1'559	1'733	1'873
		Not married	2'122	2'248	2'352
		Total	1'958	2'085	2'185
	Female	Married	482	780	1'056
		Not married	1'384	1'542	1'666
		Total	1'125	1'308	1'461
Total		1618	1754	1861	
EU-17/EFTA South	Male	Married	780	879	945
		Not married	578	760	908
		Total	681	810	904
	Female	Married	<i>-193</i>	52	278
		Not married	<i>-498</i>	<i>-266</i>	<i>-74</i>
		Total	<i>-313</i>	<i>-103</i>	78
Total		290	424	526	
Rest of Europe	Male	Married	<i>-33</i>	<i>144</i>	275
		Not married	<i>-2'065</i>	<i>-1'657</i>	<i>-1'304</i>
		Total	<i>-643</i>	<i>-428</i>	<i>-262</i>
	Female	Married	<i>-1'241</i>	<i>-908</i>	<i>-617</i>
		Not married	<i>-2'827</i>	<i>-2'420</i>	<i>-2'075</i>
		Total	<i>-1'677</i>	<i>-1'362</i>	<i>-1'096</i>
Total		<i>-1'172</i>	<i>-937</i>	<i>-752</i>	
Rest of the world	Male	Married	938	1'207	1'457
		Not married	524	832	1'127
		Total	756	1'030	1'287
	Female	Married	178	544	909
		Not married	<i>-604</i>	<i>-208</i>	<i>165</i>
		Total	<i>-92</i>	<i>269</i>	<i>621</i>
Total		303	611	907	
Total		594	729	834	

Italics: Sign not statistically significant at the 95 per cent level

**Table 9:** Average monthly fiscal balance for the different categories of the permanent foreign resident population aged 18 and older according to the selection model estimations (in CHF)

Nationality	Gender	Marital status	Age	Fiscal balance per month			
				Min	Mean	Max	
EU-17/EFTA	Male	Married	18 to 35	2'409	2'443	2'478	
			36 to 50	1'453	1'485	1'517	
			51 to 65	2'099	2'138	2'178	
		Over 65	-3'228	-3'165	-3'101		
		Not married	18 to 35	2'282	2'317	2'353	
			36 to 50	2'507	2'543	2'579	
	51 to 65		2'139	2'180	2'222		
	Over 65	-2'647	-2'582	-2'518			
	North	Female	Married	18 to 35	1'555	1'602	1'650
				36 to 50	400	445	490
				51 to 65	670	721	773
		Over 65	-3'760	-3'692	-3'624		
Not married		18 to 35	1'724	1'759	1'794		
		36 to 50	1'737	1'770	1'805		
	51 to 65	1'149	1'188	1'228			
Over 65	-2'797	-2'737	-2'677				
EU-17/EFTA	Male	Married	18 to 35	1'363	1'391	1'419	
			36 to 50	485	510	534	
			51 to 65	836	870	904	
		Over 65	-3'350	-3'290	-3'229		
		Not married	18 to 35	639	676	713	
			36 to 50	1'572	1'608	1'643	
	51 to 65		1'084	1'125	1'166		
	Over 65	-2'390	-2'329	-2'267			
	South	Female	Married	18 to 35	464	508	552
				36 to 50	-551	-511	-471
				51 to 65	-665	-618	-570
		Over 65	-3'604	-3'539	-3'475		
Not married		18 to 35	-274	-234	-195		
		36 to 50	532	567	602		
	51 to 65	-176	-134	-93			
Over 65	-2'437	-2'377	-2'316				
Rest of Europe	Male	Married	18 to 35	313	348	384	
			36 to 50	-1'293	-1'254	-1'213	
			51 to 65	-797	-751	-704	
		Over 65	-5'265	-5'194	-5'122		
		Not married	18 to 35	-2'333	-2'280	-2'227	
			36 to 50	1'059	1'109	1'162	
	51 to 65		750	803	858		
	Over 65	-3'677	-3'602	-3'525			
	Female	Married	18 to 35	-737	-690	-642	
			36 to 50	-2'107	-2'058	-2'008	
			51 to 65	-2'226	-2'171	-2'114	
		Over 65	-4'850	-4'778	-4'703		
Not married		18 to 35	-3'011	-2'959	-2'906		
		36 to 50	-507	-458	-407		
	51 to 65	-1'120	-1'068	-1'014			
Over 65	-4'080	-4'009	-3'935				
Rest of the world	Male	Married	18 to 35	1'849	1'908	1'967	
			36 to 50	674	730	788	
			51 to 65	831	896	960	
		Over 65	-3'757	-3'668	-3'578		
		Not married	18 to 35	734	799	864	
			36 to 50	1'897	1'962	2'028	
	51 to 65		1'526	1'595	1'665		
	Over 65	-2'910	-2'818	-2'724			
	Female	Married	18 to 35	1'094	1'160	1'228	
			36 to 50	106	170	236	
			51 to 65	-160	-91	-20	
		Over 65	-4'018	-3'930	-3'840		
Not married		18 to 35	-472	-407	-341		
		36 to 50	870	933	997		
	51 to 65	193	262	331			
Over 65	-3'165	-3'079	-2'991				

Italics: Sign not statistically significant at the 95 per cent level

**Table 10:** Comparison of the average monthly fiscal balance of the permanent foreign resident population aged 18 and older during the period 2003-2009 and in the long-term equilibrium at different aggregation levels according to the selection model estimations (in CHF)

Nationality	Gender	Marital status	No adjustment for naturalizations					
			Stock 2003-2009			Equilibrium		
			Min	Mean	Max	Min	Mean	Max
EU-17/EFTA North	Male	Married	1'007	1'037	1'068	511	543	575
		Not married	2'042	2'073	2'105	1'630	1'661	1'693
		Total	1'512	1'537	1'563	1'063	1'089	1'117
	Female	Married	292	334	377	-135	-93	-50
		Not married	1'035	1'064	1'094	560	590	620
		Total	685	716	748	249	280	312
Total		1'143	1'167	1'191	702	727	751	
EU-17/EFTA South	Male	Married	222	244	266	-153	-129	-105
		Not married	746	778	810	650	682	714
		Total	419	440	460	181	202	224
	Female	Married	-631	-594	-555	-938	-900	-861
		Not married	-488	-455	-421	-717	-683	-649
		Total	-577	-545	-512	-839	-807	-774
Total		-4	17	38	-245	-223	-202	
Rest of Europe	Male	Married	-713	-679	-643	-822	-788	-752
		Not married	-1'738	-1'689	-1'639	-1'823	-1'774	-1'724
		Total	-962	-927	-891	-1'103	-1'067	-1'030
	Female	Married	-1'521	-1'476	-1'429	-1'705	-1'659	-1'612
		Not married	-2'426	-2'379	-2'331	-2'494	-2'447	-2'399
		Total	-1'715	-1'672	-1'628	-1'916	-1'873	-1'829
Total		-1'335	-1'299	-1'262	-1'533	-1'497	-1'459	
Rest of the world	Male	Married	977	1'032	1'088	860	916	972
		Not married	987	1'050	1'113	964	1'027	1'091
		Total	982	1'038	1'095	900	956	1'013
	Female	Married	549	613	677	427	490	554
		Not married	-248	-186	-123	-229	-168	-105
		Total	332	392	455	237	298	360
Total		633	689	746	539	595	652	
Total		45	62	80	-64	-46	-28	

Nationality	Gender	Marital status	Adjustment for naturalizations					
			Stock 2003-2009			Equilibrium		
			Min	Mean	Max	Min	Mean	Max
EU-17/EFTA North	Male	Married	1'010	1'040	1'070	348	381	414
		Not married	2'042	2'074	2'105	1'485	1'516	1'548
		Total	1'511	1'537	1'563	877	905	933
	Female	Married	296	338	381	-245	-203	-159
		Not married	1'038	1'067	1'097	371	401	433
		Total	686	718	750	79	111	145
Total		1'143	1'167	1'191	510	536	561	
EU-17/EFTA South	Male	Married	225	247	269	-249	-225	-200
		Not married	747	779	811	601	632	664
		Total	421	442	462	84	106	128
	Female	Married	-628	-590	-552	-1'026	-987	-949
		Not married	-482	-449	-416	-761	-727	-692
		Total	-573	-540	-507	-907	-875	-842
Total		-2	19	40	-353	-331	-308	
Rest of Europe	Male	Married	-715	-680	-644	-1'102	-1'066	-1'028
		Not married	-1'751	-1'701	-1'651	-1'811	-1'762	-1'712
		Total	-968	-933	-896	-1'292	-1'256	-1'218
	Female	Married	-1'520	-1'475	-1'428	-1'969	-1'923	-1'875
		Not married	-2'436	-2'389	-2'341	-2'431	-2'384	-2'335
		Total	-1'720	-1'677	-1'632	-2'108	-2'065	-2'020
Total		-1'341	-1'305	-1'268	-1'739	-1'702	-1'663	
Rest of the world	Male	Married	975	1'030	1'086	709	765	822
		Not married	987	1'050	1'114	924	987	1'051
		Total	981	1'037	1'093	783	839	896
	Female	Married	547	611	675	300	363	427
		Not married	-246	-184	-121	-252	-190	-127
		Total	333	394	456	149	210	272
Total		632	688	745	423	479	537	
Total		36	53	71	-442	-423	-402	

Italics: Sign not statistically significant at the 95 per cent level

**Table 11:** Average monthly fiscal balance of the inflow into the permanent foreign resident population aged 18 and older during the period 2003-2009 at different aggregation levels according to the selection model estimations (in CHF)

Nationality	Gender	Marital status	Inflow 2003-2009		
			Min	Mean	Max
EU-17/EFTA North	Male	Married	1'680	1'709	1'738
		Not married	2'310	2'343	2'376
		Total	2'114	2'141	2'169
	Female	Married	838	881	924
		Not married	1'667	1'699	1'732
		Total	1'416	1'447	1'480
Total		1821	1846	1871	
EU-17/EFTA South	Male	Married	861	883	904
		Not married	761	795	830
		Total	807	832	857
	Female	Married	78	118	159
		Not married	-229	-193	-156
		Total	-67	-33	1
Total		442	466	490	
Rest of Europe	Male	Married	12	46	80
		Not married	-2'108	-2'057	-2'005
		Total	-657	-622	-586
	Female	Married	-988	-942	-894
		Not married	-2'827	-2'777	-2'726
		Total	-1'537	-1'493	-1'448
Total		-1'134	-1'097	-1'059	
Rest of the world	Male	Married	1'284	1'339	1'395
		Not married	850	914	979
		Total	1'081	1'138	1'196
	Female	Married	734	798	863
		Not married	-345	-281	-217
		Total	342	403	466
Total		677	733	791	
Total		750	770	791	

Italics: Sign not statistically significant at the 95 per cent level

**Table 12:** Deficit/surplus ratio government sector (in percentages of GDP)

2000	2001	2002	2003	2004	2005
2.3	0.6	-0.1	-1.4	-1.3	-0.6

Source: Federal Statistical Office (2012a)

**Table 13:** Average monthly fiscal balance for the different categories of the permanent Swiss resident population aged 18 and older (in CHF)

Gender	Marital status	Age	Fiscal balance per month		
			Min	Mean	Max
Male	Married	18 to 35	1'435	1'498	1'554
		36 to 50	1'063	1'110	1'153
		51 to 65	2'199	2'258	2'311
		Over 65	-4'460	-4'375	-4'285
	Not married	18 to 35	925	1'033	1'120
		36 to 50	2'532	2'588	2'633
		51 to 65	1'647	1'726	1'794
		Over 65	-3'495	-3'346	-3'190
Female	Married	18 to 35	883	1'030	1'149
		36 to 50	51	184	304
		51 to 65	676	792	899
		Over 65	-4'566	-4'388	-4'215
	Not married	18 to 35	-28	78	166
		36 to 50	805	861	909
		51 to 65	142	217	285
		Over 65	-3'394	-3'295	-3'198

Italics: Sign not statistically significant at the 95 per cent level

**Table 14:** Permanent Swiss resident population aged 18 and older during the period 2003-2009

Gender	Marital status	Age	Stock 2003-2009	
			Absolute values	Percentages
Male	Married	18 to 35	115'365	2.4
		36 to 50	440'316	9.1
		51 to 65	424'496	8.8
		Over 65	317'652	6.6
	Not married	18 to 35	511'183	10.6
		36 to 50	227'846	4.7
		51 to 65	139'614	2.9
		Over 65	105'371	2.2
Female	Married	18 to 35	172'077	3.6
		36 to 50	476'647	9.9
		51 to 65	412'386	8.5
		Over 65	260'947	5.4
	Not married	18 to 35	453'323	9.4
		36 to 50	218'998	4.5
		51 to 65	193'957	4.0
		Over 65	361'362	7.5
			4'831'540	100

Source: Federal Statistical Office (2012b)

**Table 15:** Average monthly fiscal balance of the permanent Swiss resident population aged 18 and older during the period 2003-2009 at different aggregation levels (in CHF)

Gender	Marital status	Fiscal balance per month		
		Min	Mean	Max
Male	Married	140	178	212
	Not married	951	1'023	1'079
	Total	500	542	576
Female	Married	-517	-419	-333
	Not married	-813	-753	-703
	Total	-650	-580	-520
Total		-95	-50	-15

Italics: Sign not statistically significant at the 95 per cent level